



NEWSLETTER

– Save Water, Save Lakes –

International Lake Environment Committee Foundation

This newsletter is also available in Japanese.



The theme of the 18th World Lakes Conference is “Governance, Resilience and Sustainability of Lakes for a Better Society.” What is the implied message of this comprehensive theme?

The conference site, Guanajuato City, is the capital of Guanajuato State in central Mexico. The city, located at the elevation of 2000m in the valley of surrounding mountains with their peaks as high as 2500m, grew as a silver mining town through the period of Spanish rule, i.e., from the mid-16th to the early-20th Century. With a resident population of some 70,000 today, the city is famous for the colorfully painted houses and small shops along the crisscrossing streets and around the town plazas, majestically accentuated by colonial architectures such as churches, schools and museums. There used to be the old Guanajuato River, flowing underneath the city. A diversion dam constructed upstream in the 1960s has successfully eliminated the frequent flooding in the downtown area, leaving the dried-up underground channels that were transformed into the underground roads connecting various parts of this densely packed city. Together with the remains of abandoned but preserved old mining tunnels some 2km in the north, this intriguingly

picturesque land was designated in 1988 as a UNESCO World Heritage Site, drawing a large number of tourists from around the world. The groundwater aquifers underneath the surrounding mountain foothills provide for most of the city’s water needs. There is no lake to speak of in the immediate surrounding of Guanajuato City itself, but there is a series of natural and artificial lakes along the Lerma River crossing from east to west in the southern region of Guanajuato State.

The lakes in Mexico may be categorized into four geographical clusters respectively reflecting their associated national and anthropogenic features, as illustrated in the upper frame of Figure 1. In the north, there lies the Mexican Plateau land formed by two mountain ranges, the Sierra Madre Occidental in the west and the Sierra Madre Oriental in the east. The two mountain ranges and the plateau land in-between constitute part of the North American Tectonic Plate. This region accommodates the first cluster of lakes (a) in the form of endorheic dry land depressions in the plateau region, and many crater and maar formations in both the plateau land region and the volcanic mountain regions. Some are filled

IN
THIS
ISSUE

- The 18th World Lake Conference: Governance, Resilience and Sustainability of Lakes for a Better Society
- LAKES OF MEXICO: A MIRROR TO BE POLISHED
- Letter from Scientific Committee (Estonia)
- JICA-ILEC Follow-up Program (East Africa)
- JICA-ILEC Follow-up Program (India)
- International Workshop of “LAKES” Knowledge Base
- JICA Green Growth Promotion Project in Halong Bay Area, Vietnam
- The 13th Term Scientific Committee Comes on Board
- Our Activities Overview (FY2019)
- Board Members Reorganized
- “WLC18 Call for your Participation”

temporarily and intermittently as lakes only during the wet seasons, while others are invisibly connected to their respective underlying aquifer formations.

The second cluster of lakes (b) lies in the flatland formation south of the Mexican Volcanic Belt Region sloped gently from west to east, of which the southern part of Guanajuato State is also a part. An exemplary case is the flatland where a string of shallow lakes and reservoirs are located from the central mountain region westward along the Lerma River toward Lake Chapala, the largest lakes in Mexico. The outflowing water from Lake Chapala meet with Santiago River which runs toward the north and finally drains to the Pacific Ocean, as shown in the lower frame of Figure 1. The third cluster of lakes (c) lies in the Mexican Volcanic Belt Region where there are many high-altitude volcanic lakes and maar lakes, as well as some tectonic and impounded lakes. In the western end of the Volcanic Belt Region lie also some lakes connected with aquifer formations. The fourth cluster of lakes (d) lies in the southern bend region of the Gulf of Mexico, as well as in the Yucatan Peninsula region, where there are large coastal lagoons and associated wetland lake systems of various sizes and depths, together with natural springs and small groundwater-fed lakes formed as depression holes in the inland limestone structure (Cenotes).

Of these categories, the lakes in cluster region (b) along the Lerma River are the important sources of agricultural, industrial and urban waters in the State of Guanajuato and its neighboring states of Michoacán and Jalisco. Lake Yuriria located within the State of Guanajuato, for example, plays an important role for regulating the use of Lerma River water, together with such lakes as Cuitzeo and Pátzcuaro, as well as the Solis Reservoir in the State of Michoacán. Because of the inflowing irrigation return flows and sediments from around the lakes, Lake Yuriria suffers from severe eutrophication and the resultant massive growth of water hyacinth occupying the entire shoreline all the way into the central part of the lake. Lake Chapala, on the other hand, satisfies some sixty percent of the water needs of Guadalajara City, the second largest city in Mexico. The wastewaters from this city, not adequately treated, are discharged to Santiago River which eventually flows into the Pacific Ocean after passing through several dams along the way. In addition, immediately east of the headwater region of Lerma River within the lake cluster (c) is an aquifer region from which almost entire amount of Mexico City water is supplied via huge pumping facilities and pipeline tunnels. In all, integrated management of groundwater aquifers, rivers and lakes in the Lerma-Chapala-Santiago basin and its surrounding regions has been and will continue to be a dictating issue facing the whole of Mexico.

Geo-historically and ecologically, Mexico's geographical and climatic diversity has supported the water system functions to provide for diverse biological habitats. Such diverse habitats have also supported the development of human civilization.



Figure-1 Geography of Lake Clusters in Mexico

The Aztec civilization, once flourished thanks to territorial expansions by reclamation of Lake Texcoco, was taken over by the succeeding periods of Spanish rule. The current Mexico City has been developed on this phantom lake.

Similarly, the Mayan civilization that flourished in the Yucatan Peninsula region disappeared because of the collapse of agriculture due to droughts and to the lack of water management skills. Further, the high-altitude volcanic lakes, dry-land endorheic lakes and Cenotes reminds us of the evolutionary time span far beyond the human civilization.

The upcoming Guanajuato World lake Conference is going to be the first to be held in Central America and will be the second, after the Lácar, Argentina, held in 1995. In these regions, there are lake clusters of similar nature as those four introduced above, together with other lake typologies such as the Pantanal Wetlands and the Glacier lakes in Patagonia. The conference theme, "Governance, Resilience and Sustainability of Lakes for a Better Society," will surely guide us to better understand the intricacy of lake basin management in these regions, and also provide us with a very useful framework for endeavoring toward mainstreaming lakes and other lentic waters in the global water agenda.

Masahisa Nakamura

Figure 1. was drawn by referring to:

1. Figure 1. Map of study area: Jonatan Godínez-Madrigal, Nora Van Cauwenbergh, Pieter van der Zaag (2019), Production of competing water knowledge in the face of water crises: Revisiting the IWRM success story of the Lerma-Chapala Basin, Mexico, *Geoforum*, Article Download PDF View Google Scholar 103 (7) (2019), pp. 3-15
2. Figure 1. Location of the Lerma-Chapala-Santiago watershed in Mexico: Luis Ricardo Manzano-Solis, Miguel A. Gómez-Albores, Carlos Díaz-Delgado, Carlos Alberto Mastachi-Loza, Raymundo Ordoñez-Sierra, Khalidou M. Bâ , and Roberto Franco-Plata. Identification of Variations in the Climatic Conditions of the Lerma-Chapala-Santiago Watershed by Comparative Analysis of Time Series, *Advances in Meteorology*, Volume 2018 |Article ID 1098942 | 16 pages | <https://doi.org/10.1155/2018/1098942>, Research Article | Open Access

LAKES OF MEXICO: A MIRROR TO BE POLISHED

Alejandro Juarez Aguilar

Director General, Corazón de la Tierra
(Heart of the Earth)



The lakes of Mexico have great diversity, ranging from some really young (from a geological point of view) to others clasified as “Ancient Lakes” as Lake Chapala (the largest one in the country, with an age of 6.8 million years). Also, their shapes, structures, basin features, residence times and major uses are quite diverse. With more than 100 well-known lakes and close of a thousand of lesser recognition (either from natural or artificial origin) they fulfill important roles on a daily basis, providing ecosystem services as evident as water provision for irrigation, industrial uses, ranching and human consumption; also fisheries, reeds, tourism and recreation activities. Besides, mostly unnoticed by most of people, they play significant roles on climate regulation, flood control, biodiversity reservoirs, carbon sequestration processes and other valuable roles.

The Lerma-Chapala-Santiago basin, with more than 120 thousand square kilometers (a territory larger than Austria or Portugal) encompasses Lakes Yuriria, Cuitzeo, Patzcuaro, Zirahuén and Chapala, among others. This watershed and the water bodies it engulfs are a perfect example of the situation of basin management in Mexico: all aforementioned lakes have beautiful landscapes, complex biodiversities (strong on endemisms) and provide livelihood for millions of people, generating a large number of goods and benefits. Yet, all of them are under medium-severe stress levels, coming from wastewater, non-point pollution, nitrogen and phosphorus run-off, siltation, water diversion, encroachment, introduction of non-native fishes and other stress sources. As a result, several manifestations arise, which risk functions or the whole ecosystem: eutrophication, floating plants infestation, native fish species vanishing, water quality reduction, risks to human health, etc.



At the same time, an increasing number of institutions and stakeholders are working to improve such circumstances, amending regulations, reducing pollution sources, improving productive systems and promoting governance strenghtening. Bit by bit, lake by lake, and basin by basin, they have been creating a wave of successful cases, learned lessons and better practices that have allowed in the recent years to accelerate the exchange of experiences and methods. The national policies which have been regarding rivers as channels and lakes as water deposits, instead of complex and rich ecoystems, completely entwined with their basins, have gradually been changed in the right direction. The Integrated Lake Basin Management (ILBM) Platform has been reaching adepts from its first use in Lake Chapala, back to 2007, to be more widely accepted in other Mexican lakes.

In this interesting context, Mexico will hold the 18th World Lake Conference (in November 2020), an opportunity to share with experts from around the globe for the better management of the world lakes. Welcome all!



Lake Chapala

Centre for Limnology at Lake Võrtsjärv, the Cradle of Estonian Lake Research

Tiina Nöges

Professor of Hydrobiology,
Estonian University of Life Science



Estonia has nearly 2,000 lakes that form 4.9% of its land cover, making it the 4th richest country in regard to lakes in Europe. The Centre for Limnology (CL; founded in 1961) at the Chair of Hydrobiology and Fishery, Estonian University of Life Sciences (EMU), is the leading institution studying the ecological processes in Estonian lakes.

CL is situated on the shore of Lake Võrtsjärv (EUR-47 in ILEC World Lake Database), one of the most intensively long-term studied lakes in Europe. Võrtsjärv is a large, shallow lake (270km²; mean depth 2.8m) with a remarkable climate-induced variability in hydrology and water chemistry. Together with the interconnected Lake Peipsi (Peipus, EUR-207), the two lakes provide a perfect model environment to study the impacts of climate change on shallow lake ecosystems.

Over its more than 60-year existence, CL has become the leading center of competence in Estonia for water protection, research and management. CL operates Bachelor and Master level curricula in Applied Biology of Aquatic and Terrestrial Ecosystems and PhD curricula in Environmental Science and Applied Biology. It has been and is active in the international networks (GLEON, NETLAKE) and projects of EU Framework Programs (ECOFRAME, MANTRA-East, CLIME, WISER, REFRESH, MARS, MANTEL), INTERREG and European Fisheries Fund. Covering a wide range of lake research issues, it has primarily studied food web functioning in shallow lake ecosystems, with a special focus on the origin and importance of different carbon sources in supporting aquatic food webs. It also has strong competence in studies on fish larval feeding, carbon pathways and food web interactions using stable isotopes, and plankton communities based on advanced DNA methodologies.

The coexistence of potentially toxic bloom-forming cyanobacteria

and generally smaller-sized

grazer communities has raised the question of the ability of zooplankton to control harmful blooms. Our recent studies showed that cyanobacteria formed a significant component of algae ingested by Cladocerans, and that potentially toxic strains also were ingested (Agasild et al. 2019).

Estonian lakes experienced heavy nutrient loadings in the 1970s-80s, and a rapid decline in the early 1990s, after the collapse of the former Soviet style of extensive agriculture. As the catchment N loading decreased faster than the P loading, the N/P ratio decreased, favoring the growth of blue green algae (cyanobacteria), resulting in the re-emergence of water blooms in some lakes, causing summer fish kills. Our studies suggest the decadal rise of blue-green algae in shallow lakes lies in the interaction between cultural eutrophication and global warming, collectively resulting in the physical and chemical conditions in the lakes being more optimal for cyanobacterial growths (Cremona et al. 2018). Moreover, as a result of decreasing wind speed (wind stilling) near the lake surface over the Northern Hemisphere, wind-induced water movement at the bottom of the large, shallow Võrtsjärv has decreased by 47% since 1996, reducing lake bottom sediment nutrient releases and increasing the phytoplankton biomass despite reduced nutrient levels. Our recent study (Janatian et al. 2019) showed how the declining amount of suspended sediments resulted in an enhanced light penetration (opening of a light niche) into the water column, which was capitalized and filled by the light-limited phytoplankton community, suggesting wind stilling is another global factor, complementary to climate warming, that counteracts eutrophication mitigation in lakes.



Centre for Limnology at Lake Võrtsjärv



Lake Võrtsjärv

JICA-ILEC Follow-up Program (East Africa)

From Nov.30 to Dec.8 three ILEC members undertook a post-course assessment of selected African participants in the previous JICA-ILEC training course programs, with regard to their professional development to date, giving advice for their present issues, and sharing new knowledge, among others. Eight participants from Kenya, Uganda and Zimbabwe together with several local resource persons participated in the three-day program that included a field trip. The participants presented the status of implementation of their ILBM action plans in their respective countries. They were also introduced to the ILBM promotion activities in Kenya and also to the ESSVA (Ecosystem Service Shared Value Assessment) methodology.

The one-day field trip to the Nyanza Gulf regions provided an opportunity to exchange ideas with the fishing village residents. The program led participants to establish new networks for enhancement of their professional development. The success in implementation of this program hopefully will lead to the renewed commitment by the participants in advancing ILBM for sustainable use and conservation of lake basin resources in Africa.



JICA-ILEC Follow-up Program (India)

With support from the Wetland International, South India, ILEC undertook a Follow-up Program of JICA-ILEC ILBM training for selected past Indian participants during the period, 9-11 December in New Delhi, India. It was also participated by other invited and willing participants from Japan, India and Nepal, taking advantage of the opportunity to share their respective past and ongoing ILBM activities. The program featured the post-training experiences reported by the Superintending Engineer of the Gujarat State and those reported by the officials of Lake Chilika Authority (CDA), the former reporting the importance of infusing the ILBM approach in a wide range of water resources management projects and programs and the latter reported the ILBM success at Lake Chilika as well as other similar projects implemented by the State of Odisha. In addition, the

organizers arranged for a technical seminar on the involvement of private sector in lake basin management as well as other water management challenges faced in South Asia. The presentations by three Japanese firms specializing in environmental instrumentation and engineering were attended by the participants in the above Follow-up Program as well as representatives from the local experts. In all, this rare opportunity culminated out of the Follow-up Program arrangement coordinated by JICA, ILEC, WISA, CDA and other Indian and South Asian institutions and experts turned out to be a rare opportunity for the transfusion of experiences by the respective organizations, collectively contributing to the respectively pursued programs, not to mention to the future of JICA-ILEC ILBM training in the region.

International Workshop of “LAKES” Knowledge Base

“LAKES” (Learning Acceleration and Knowledge Enhancement System) is a general-purpose multilingual knowledge-mining and knowledgebase system which was developed as part of the ILEC-Shiga University collaboration research on ILBM. The prototype system developed in early 2010s has been continuously refined over the past years through a series of consultative workshops held mainly in Southeast Asia. In February 2019, a regional workshop was held in Kusatsu, Japan, for a network of tropical limnology research institutions named the Southeast Asian Limnological Network (SEALNet). The workshop outputs were subsequently refined and synthesized for presentation at a satellite session in the International Conference on Tropical Limnology (TROPLIMNO 2019) held in Bogor, Indonesia in

August. To the satellite session participants, a brief introduction to the LAKES system was presented by ILEC and some application examples and future application plans were presented by the SEALNet member institutions from Indonesia, Malaysia and the Philippines. The LAKES system has been introduced and is planned to be introduced through consultative workshops in other regions of the world including West Africa and Latin America. It is also being used as a data-mining system for ILEC’s World Lake Database which is currently undergoing redesigning for that purpose.



JICA Green Growth Promotion Project in Halong Bay Area, Vietnam

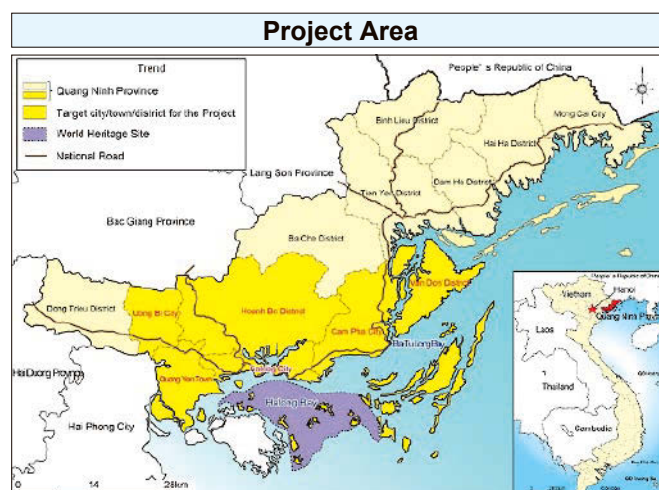
Halong Bay in Quang Ninh Province, northeastern Vietnam, is a scenic spot registered as a World Natural Heritage Site, but in recent years the water environment has deteriorated due



to industrial activities and development. To solve this problem, Quang Ninh Province worked on a project to promote green growth through environmentally sustainable policies in key industrial sectors in the Halong Bay region and development policies in the tourism sector, using Lake Biwa as a model. ILEC was jointly commissioned from the detailed planning stage to the implementation stage of this project (2015-2019), and the project was successfully completed with the full cooperation of Shiga Prefecture, including advisory mission and training in Japan.

At the implementation stage of the project, pilot activities for (1) construction of financial mechanism, (2) energy conservation and management measures, (3) sustainable tourism measures, (4)

measures to reduce direct load on Halong Bay, and (5) issuing a Green Growth White Book were implemented, and related institutional measures were taken. In 2017, Shiga Prefecture and Quang Ninh Province concluded a Memorandum of Understanding on Mutual Cooperation in the Environmental and Economic Sectors, and the exchange will continue in the future.



The 13th Term Scientific Committee Comes on Board

The members of ILEC Scientific Committee are renowned scientists and managerial experts with depth of experience in the field of lake basin management, providing their expertise and playing the regional focal point role for all of ILEC activities. The Committee has entered its 13th term in April 2019, with newly elected members as Mr. Alejandro Juarez from Mexico specialize in participatory lake basin management, Prof. Tiina Nõges from Estonia specializing in ecological science for lake basin management, and Dr.

Masatsugu Takamatsu from Japan, specializing in international financial instruments. The outgoing members after 12 years of distinguished service include Prof. Tsugihiko Watanabe from Japan, a renowned irrigation water management specialist, and Mr. Juan Skinner from Guatemala, an avid promotor of indigenous peoples' involvement in ILBM. The members of ILEC Secretariat would like to express heartfelt appreciation by joining those having benefitted greatly from their dedication and wisdom.

The ILEC Scientific Committee 13th Term Members (April 2019 ~ March 2022)

Name	Nationality	Affiliation
Walter Rast (Chair)	USA	Professor Emeritus and Director, International Watershed Studies, The Meadows Center for Water and the Environment, Texas State University
Adelina Santos-Borja (Vice Chair)	Philippines	Department Manager III, Resource Management and Development Department, Laguna Lake Development Authority
Salif Diop (Vice Chair)	Senegal	Professor, Member, Academy of Sciences and Techniques of Senegal
Sandra Azevedo (Bureau Member)	Brazil	Professor, Carlos Chagas Filho Biophysics Institute, Brazil Federal University of Rio de Janeiro
Daniel Olago (Bureau Member)	Kenya	Professor, Institute for Climate Change and Adaptation & Department of Geology, University of Nairobi
Ajit Kumar Pattnaik	India	Vice President, Wetlands International South Asia
Zhengyu Hu	China	Deputy Director, The Institute of Hydrobiology, Chinese Academy of Sciences
Yoshihisa Shimizu	Japan	Professor, Research Center for Environmental Quality Management, Graduate School of Engineering, Kyoto University
Colin Maxwell Finlayson	Australia	Professor, Director, The Institute for Land, Water and Society, Charles Sturt University
Pieter van der Zaag	Netherlands	Professor, Water Resources Management IHE Delft Institute for Water Education
Alejandro Juarez Aguilar	Mexico	Director General, Corazón de la Tierra (Heart of the Earth)
Tiina Nõges	Estonia	Professor of Hydrobiology, Chair of Hydrobiology and Fishery, Institute of Agricultural and Environmental Science, Estonian University of Life Sciences
Masatsugu Takamatsu	Japan	Disaster Risk Management Specialist, World Bank

Our Activities Overview (FY2019)

- **May**
 - 19- Participation in the Ha Long Bay Project for Green Growth (Quang Ninh Province, -June 1)
 - 21 Attendance at UNEP Forum 2019 as observer (Shibuya)
 - 30 Receipt of a donation from Kansai Mirai Bank, Limited (Otsu) **[PIC①]**
- **June**
 - 18 Receipt of a donation from Kinki Rokin Bank (Osaka)
- **July**
 - 21-30 WLC18 Preparatory Meeting (Guanajuato, Lake Chapala, Guadalajara) **[PIC②]**
- **August**
 - 20- JICA commissioned training program, “Integrated Lake, River and Coastal Basin Management (ILLBM) for Sustainable Use and Preservation of Water Resources” kicks off (Kusatsu, -Oct.17) **[PIC③]**
 - 25-31 Booth presentation and Holding joint Event with Shiga Pref. at World Water Week (Stockholm)
 - 28-29 Attendance at TICAD-7 (Yokohama)
 - 28-30 Participation in International Conference on Tropical Limnology (TROPLIMNO) 2019 (Bogor)
- **September**
 - 13 Exchange Session with JICA ILLBM training participants and high school students (Moriyama) **[PIC④]**
- **October**
 - 1 Technical Seminar with Japanese companies and JICA training participants (Kusatsu)
 - 16-18 Exhibition at Biwako Environmental Business Exhibition (Nagahama) **[PIC⑤]**
 - 29-31 Participation in the 1st Latin American/ 5th Mexican National Watershed Management Congress (Mexico City)
 - 29- Participation in the Ha Long Bay Project for Green Growth (Quang Ninh Province, -Nov.9)
- **November**
 - 16 Regional Understanding Program “Lessons from the Lake Biwa Developments” (Kusatsu)
 - 17 Holding Metagawa River Nature School co-hosted by Kinki Rokin Bank (Moriyama)
 - 30- JICA Follow-up Session for ILBM Training Course in KENYA (Kisumu, -Dec.7)
- **December**
 - 8-12 JICA Follow-up Session for ILBM Training Course in INDIA (New Delhi)
 - 11 Technical Seminar in India with Japanese Companies (Measuring Technology, Chemical Materials, Water treatment Equipments) (New Delhi)



2020

- **January**
 - 19-29 Training Course of Lake Conservation for officers of Indonesian Ministry of Environment and Forestry (Otsu) **[PIC⑥]**
- **February**
 - 12-14 ILEC Scientific Committee Bureau Meeting (Kusatsu)
 - 20 The first Japanese Committee Meeting for the 18th World Lake Conference (Otsu)

Board Members Reorganized

● Replacement of Trustees

As of April 1, 2019, Mr. Yasuhisa Ishikawa (Director General, Department of Lake Biwa and the Environment, Shiga Prefectural Government) was appointed as a new Trustee to succeed Mr. Masaki Hirowaki.

● Board of Directors: The 4th Phase (Since June 11, 2019)

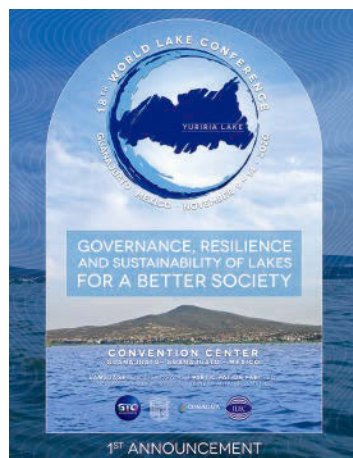
President	Kazuhiko Takemoto	President, Overseas Environment Cooperation Center, Japan; Former Vice-Minister for Global Environment, Ministry of the Environment
Vice-President	Masahisa Nakamura	Professor, Research Center for Sustainability and Environment, Shiga University
Director	Kaori Kubo	Professor, Faculty of Education, Shiga University
	Yoshihisa Shimizu	Professor, Research Center for Environmental Quality Management, Graduate School of Engineering, Kyoto University
	Keiichi Takahashi	Director General, Lake Biwa Museum
	Kenzo Hiroki	Professor, National Graduate Institute for Policy Studies; Former Vice-principal for College of Land, Infrastructure, Transport and Tourism
	Nobuhiko Miwa	Senior Technical Director, Department of Lake Biwa and the Environment, Shiga Prefectural Government

WLC18 Call for your Participation

Abstract Submission and Registration for the 18th World Lake Conference is announced.

For more information, please visit the official website of WLC18 at

<http://www.worldlakeconference.ugto.mx/en/>



- **Date:** November 9-14, 2020
- **Venue:** Centro de Convenciones
- **Host Organizations:** University of Guanajuato·ILEC
- **Theme:** "Governance, Resilience and Sustainability of Lakes for a Better Society"
- **Important Dates:**
 - ★ Abstract Submission Opens: February 3 2020.
 - ★ General Registration Opens: June 29 2020.
 - ★ Abstract Submission Deadline: June 29 2020 (24 hrs. GMT-6).
 - ★ Abstract Acceptance Notifications: all acceptance notifications will be sent by August 1 2020.

We are looking forward to your participation!

Thank You for Your Support!

- In the Fiscal Year 2019, ILEC received donations from the following Organization



Kansai Mirai Bank



まっすぐ未来
滋賀中央信用金庫

SHIGA CHUOU SHINKIN BANK



THE KOTO SHINKIN BANK

- In the Fiscal Year 2019, ILEC received sponsorship from the following Supporting Member Organization (90,000 JPY or more)



Your donation could provide funding to our activities on the world lake environmental conservation. Online donation system is also available. If you are interested, please visit our webpage at

<https://www.ilec.or.jp/en/support/>



INTERNATIONAL LAKE ENVIRONMENT COMMITTEE FOUNDATION (ILEC)

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*The latest issue and back issues of this newsletter are also available on our website above.