



No.15 December 1990

# NEWSLETTER

INTERNATIONAL LAKE ENVIRONMENT COMMITTEE FOUNDATION

— For Better Lake Management —

This Newsletter is also available in Japanese.

## 4th International Conference on the Conservation and Management of Lakes "Hangzhou '90"

The 4th World Lake Conference "Hangzhou '90" took place from 5-10 September 1990 at Shangri-la Hotel in Hangzhou, China, located on the shore of Xi-Hu (West Lake). It brought together more than 422 participants, of which 120 were from outside China representing some 30 nations. Ninety-nine papers were presented orally, and more papers were also submitted to poster sessions.

### Organizers:

China National Environment Protection Agency (NEPA), The Chinese Research Academy of Environmental Sciences (CRAES), International Lake Environment Committee (ILEC).

### Co-hosts:

Zhejiang Provincial Environmental Protection Agency, Hangzhou Municipal Environmental Protection Agency, Zhejiang Provincial Institute of Environmental Sciences, The Nanjing Institute of Geography and Lake.

### Sponsors:

United Nations Environment Programme, United Nations Centre for Regional Development, International Water Resources Association, International Association of Water Pollution Reservation and Control, China National Nature Science Foundation, International Society of Limnology, Shiga Prefecture.

On 5th September, the conference commenced with keynote addresses by Prof. Qu Geping (Administrator of China NEPA), Dr. M.K. Tolba (Executive Director of UNEP), Prof. T. Kira (Chairperson of ILEC), Prof. H. Sazanami (Director of UNCRD), Mr. Chai Songyue (Deputy Governor of Zhejiang Province), Mr. Lu Wenke

(Mayor of Hangzhou City), Mr. S. Yamada (Vice-Governor of Shiga Prefecture). The following technical sessions were held during 5th-9th:

- Water resource management in lake basin context
- Siltation and toxic contamination and other health problems
- Integrated Lake Management
- Strategies for the control of pollutant sources
- Citizen participation and environmental education
- Choice of adequate technologies



Opening of "Hangzhou '90" at Shangri-la Hotel

- Lake ecology and compatibility between different lake uses
- Eutrophication and water resources economy
- Modeling and Planning
- Institutional and legal aspects and management
- Role and protection of aquatic bio-communities and wetlands.

In the closing session in the afternoon of 9th, convening of the 5th Conference in Italy in October 1992 was

announced. The outcomes of the conference was well summarized in the closing report of Prof. T. Kira.

## Summary Report of Hangzhou '90

Tatuo Kira

Enriched information on world lakes

One of the most remarkable achievements of this conference was no doubt a vast input of scientific knowledge to the present environmental state of Chinese lakes and reservoirs. The big volume, *Eutrophication of Lakes in China*, which was edited and published by Chinese colleagues prior to the conference, as well as a number of papers daily presented to relevant sessions, covered almost all the provinces of China, where only limited information on lakes had so far been available.

Preliminary syntheses were also reported on the data collected by the Joint ILEC/UNEP Project on the State of world Lakes. Particularly important was the report on its Canadian part, since about one-half of the total number of large freshwater lakes of the world over 500 km<sup>2</sup> in surface area is found in the country. Reports came also from Egypt and a few other African countries, Amazonian countries, India, Korea, Bulgaria, and so forth.

Eutrophication and use of ecotechnological measures against lake pollution

Eutrophication was the most important topic which the local organizers intended to deal with in this conference. We realized that most Chinese lakes in densely populated parts of the country tended to become hypertrophic. Xi-hu(West Lake) in Hangzhou was not an exception. We were impressed by the integrated countermeasures taken by the local environment agencies to prevent the progress of eutrophication and to protect the world-famous beautiful landscape of the lake.

One of the measures not adopted in Xi-hu was the use of wetland for removing nutrients from inflowing water. The effectiveness of this kind of ecotechnology was demonstrated by the report on Lake Balaton in Hungary, a detailed follow-up study on Kis-Balaton Reservoir which the participants of the last 3rd conference had a chance to observe. The same method was also effectively used in Yuqiao Reservoir in Tianjin, Hobei Province, and some other lakes in China. Wetlands were also found to remove heavy metals as reported from a few lakes in China and Kis-Balaton.

Besides the use of wetlands, other ecotechnological approaches to eutrophication control were also introduced. The recycling of harvested *Microcystis* and submerged macrophytes as animal fodders in China represented an interesting trial along this line.

Toxic contamination and chemical environment

A report from the Great Lakes of North America showed that the analysis of sediment core samples was a useful tool for elucidating the past history of contamination, and could be widely applied to other lakes.

This and an Austrian report on the behavior and transformation of heavy metals in the river sediments of the Danube are expected to help local researchers, since similar contamination seems to be widespread also in China. In addition, other changes in chemical environments of lakes such as acidification and salinization were reported.

Modelling

Several papers were presented dealing with different aspects of lake system modelling, demonstrating the steadily growing importance of modelling approach in the management planning and prediction of environmental change in lakes and reservoirs. Some new attempts were presented; e.g., an approach that could account for the shift of species composition and the change in properties of component organisms. A Chinese paper also proposed an interesting new model to be used for optimizing monitoring program—an area that deserves more attention, because it may be able to *squeeze* more information out of a data collection program which is always economically limited.

Planning and management

Several Chinese papers on planning, dealing with lakes under completely different climates, again emphasized the role of ecotechnological methods such as reforestation, improved management of agricultural lands, etc. to cope with the water shortage and water quality deterioration prevailing in China. Expensive environmental technology has to be avoided, though it seemed to be a necessary element in water quality management for the abatement of particular industrial pollution.

An attempt, quantitatively evaluating the environmental capacity of lakes, proposed by the Japanese National Institute of Environmental Studies was noteworthy in its implication to the sustainable development of lake basins and their resources.

Emerging *ethnolimnology*

Two papers respectively from Nigeria and India were of special interest for me in that they represented a new field of study on man/water systems. It was reported that different tribal tradition and ways of life resulted in different lake environments in Nigeria. There was also a presentation on the process of temporary eutrophication



Well-maintained lakeshore of Xihu-Lake

of a pond in India, caused by a local water festival. Such relationships between the lake and human life not only offer a unique area of lake study but may also provide important suggestions to reasonable lake management.

These reports reminded me of the ethnobotany, an already well-established branch of botany which has hitherto contributed much to the development of new plant resources such as new crops and medical drugs. May we similarly expect the advent of *ethnolimnology* in the future ?

UNCRD session on water resources management in a lake basin context

The UN Center for Regional Development(UNCRD), International Water Resources Association(IWRA), and ILEC organized such a special session in this conference. The UNCRD session was devoted to the presentation and discussion of the major findings in the expert workshops on River/Lake Basin Approaches to Water Resources Management, a joint three-year project by UNCRD/ILEC/UNEP. It consisted of the reports of five case studies in China, the Philippines, Thailand, Indonesia and Brazil as well as two resource papers and a paper contributed by UNEP.

The session identified and reaffirmed several needs of particular importance in the effort to further environmentally sound and socially acceptable management of water resources: viz. for a basin-wide perspective in dealing with environmental problems and water resources management issues; for a broader perspective over and greater sensitivity to the complex policy issues stemming from the interaction of social, economic, cultural and political factors concerned; for alternative institutional and organizational arrangements to ensure concerted efforts among scientists, administrators and local communities; and for developing effective and practical approaches to necessary manpower development.

ILEC session on environmental education and citizen's participation

In the first half of the session on environmental education, three speakers from Denmark, Brazil and Japan reported their experiences with experimental classes in elementary and/or junior high schools in which education programs on water and lake environments were conducted within the framework of ILEC's Education Project. Although the project is still going on, correspondence between school children, teachers and the advisers of three countries has already started with useful mutual stimuli. A report from Jianxi Province showed that similar efforts in environmental education were also actively in progress in China.

The later half of the session consisted of five papers dealing with citizens' participation in coping with environmental problems. One of the papers was a Japanese case report in which salt-barrier construction project in a brackish lake was discontinued at the last moment of its completion owing to the opposition movement by the local residents.

The audience heard with sympathy the report from Hangzhou that emphasized the role of citizens' affection for Xi-hu in their effort to protect the lake. The representatives of the ladies union of Shiga Prefecture, engaged in the voluntary movement to save Lake Biwa from pollution, were so impressed by the report that it led to the discussion and conversation between the citizens of the two countries, notwithstanding the difficulty with simultaneous interpretation.

The papers and discussions in this session seemed to have aroused fresh interests among the participants and attending citizens by suggesting a new horizon in environmental studies. Therefore, we expect to extend this ILEC session into the following world lake conferences.

## — Book Review —



Eutrophication of Lakes in China.

Edited by Jin Xiangcan, Liu Hongliang, Tu Qingving, Zhang Zongshe and Zhu Xuan; Published by the Fourth International Conference on the Conservation and Management of Lakes "HANGZHOU'90"; Beijing; 652pp, (1990).

(All inquiries to: Jin Xiangcan, Water Environmental Institute of the Chinese Research Academy of Environmental Sciences, Beiyuan, Beijing, 100012, China. Price 30US\$)

«Eutrophication of Lakes in China» was published in 1990 by the 4th International Conference on the Conservation and Management of Lakes, "Hangzhou 90", under the support of International Lake Environment Committee(ILEC) and Chinese Research Academy of Environment Sciences(CRAES).

This book is a special one on the eutrophication of lakes and reservoirs in China. It is the latest achievements of years' studies and researchs of dozens of limnologists, environmentalists, and scientific workers. It contains the main contents of the research programs on eutrophication of main lakes and reservoirs in China between 1986 and 1990 and those summing-up's, Chinese limnological and environmental scientists have presented this book as a special gift to the 4th International Conference on the Conservation and Management of Lakes to be held in September, 1990 in Hangzhou, China, and to their colleagues of the world. It is hoped that the publication of this book would enhance international academic exchange, help scientists of the



world to have a better understanding of China's lakes and their eutrophication, and provide some technical basis for international co-operation and exchange in the field of lake environment protection.

This book covers large areas and abounds in first-hand information. It is the first comprehensive introduction to the environmental characteristics, status of eutrophication of lakes in China and the trend and regularity of changes of lakes in China as a whole. At the same time it introduces many famous lakes and reservoirs in China and for the first time shows to the world the result of a series of researches on the eutrophication of lakes and reservoirs in China.

The book consists of two parts.

Part One tells about the characteristics of the eutrophication of Chinese lakes, with the emphasis on the nation-wide regularity, such as the natural environment of China's lakes and its changing trend, their status of eutrophication, their source of nutrient, the community structure of their aquatic life, the distribution characteristics of nitrogen and phosphorus in their sediments, and the harm, characteristics of eutrophication of lakes and reservoirs in China and the methods of its assessment.

Part Two contains case studies of lake eutrophication in China. It introduces 33 lakes and reservoirs located in the five lake regions: the East China Plain, the Mongol-Xinjiang Plateau, the Northeast China Plain, the Yunnan-Guizhou Plateau. Urban lakes and reservoirs are treated as two major types. Among the well-known lakes introduced are the Boyang Lake, the Dongting Lake, the Tiahu Lake, and the Chaohu Lake. The lakes introduced also include some world famous scenic lakes like the West Lake in Hangzhou, the Xuanwu Lake in Nanjing, the Dianshan Lake in Shanghai, the Erhai Lake in Dali, the Dianchi Lake in Kunming, the Fuxian Lake in Yunnan, and the Tianchi Lake in the Changbai Mountains.

The book was completed under the guidance of the Organizing Committee of 4th International Conference on the Conservation and Management of Lakes. Professor Tatuo Kira of Japan, Chairman of ILEC, also showed great concern to the writing and publication of the book and wrote the foreword of the book. Environment Protection departments of various provinces, leaders and scientific workers of many institutions gave generous support for the writing and publication of the book.

(Xu Nanni)

### ILEC Participation in GEMS/WATER

The first session of GEMS / WATER (UNEP / WHO / UNESCO / WMO project on global freshwater quality monitoring and assessment) Steering Committee took place in Leningrad during 13-18 August 1990. The meeting was attended by representatives from UNESCO, WHO, GEMS/MARC, UNEP/GEMS, GRDC, WMO, NWRI, USEPA, Japanese Institute of Public Health and ILEC.

The GEMS/WATER programme was the first of its kind to address global issues of water quality through a

network of about 350 monitoring stations in rivers, lakes, reservoirs and groundwaters on all continents. A first assessment of global freshwater quality was published in 1989.

A Meeting of UNEP/WHO Government-designated Experts in Geneva, September 1988, requested a thorough review of the programme concerning validity of its objectives, achievements to date and future direction.

In response, it has been proposed in phase two to shift its emphasis from monitoring to interpretation of data and assessment of water quality issues and trends. A restructured global network of 20-30 baseline stations, 150-200 trend stations and 50-60 global flux monitoring stations is proposed. A new Standing Committee of Experts on Freshwater Quality will oversee the project and prepare global assessments.

This was the first session of the Committee to outline implementation plans for phase two with operational procedures, meetings and publications.

ILEC representatives pointed out that ILEC will extend the support to GEMS through assessment activities such as proposals of monitoring of lakes, water quality variables and socio-economic aspects. To this end, descriptive information should be collected for understanding both the basic structures of lake/reservoirs environment and annual changes of limnological and socio-economic factors on this environment. Descriptive information on the basic structures of lakes/reservoirs environments should be collected during country missions.

### The 1st Meeting of Working Group for the UNEP/UNEP/COM project "Assistance in the Development of an Action Plan for the Re- habilitation of the Aral Sea"

Aiming at assisting the USSR government in the preparation of an action plan for the rehabilitation of the Aral Sea and setting up of a mechanism for its implementation, UNEP and USSR Commission for UNEP (UNEP/COM) started a project entitled "Assistance in the Development of an Action Plan for the Rehabilitation of the Aral Sea". ILEC, the Institute of Geography and the Centre for Aral Sea (Moscow, USSR) are to be associated with to implement the project.

The first expert group meeting of the project was held in Moscow (16-18 September 1990) and Nukus (18-23 September 1990), which is situated in the Amudarya basin, about 200km south of Aral Sea. Participants were:

- Dr. J. Balek, senior Programme Officer, UNEP
- Dr. Nikita F. Glazovsky, First Deputy Director, Institute of Geography, Moscow (USSR).
- Dr. Richard Abbou: President of International Association of Environmental Medicine and Biology, Paris (France)
- Prof. Philip P. Micklin: Geography Dept., Western Michigan University, Kalamazoo (USA)
- Madame Monique Mainguet: Professor, University of Reims, Physical Geography Laboratory, Reims

(France)

- Prof. Janusz Kindler: Institute of Environmental Engineering, Warsaw Technical University, Warsaw (Poland)
- Prof. Gilbert M. White: Institute of Behavioral Science, University of Colorado (USA)
- Prof. Takeshi Goda: Deputy Director, International Lake Environment Committee Foundation (Japan)

In addition, about 25 USSR scientists have participated in the discussion and outdoor inspection. The presentation, discussion and outdoor inspection were continued until 28 September, mainly in the Amudarya basin, with the following programme:

19 September (Wed.)

- am — Opening ceremony, scientific reports and discussion;
- pm — Field excursion to the suburb

20 September (Thurs.)

- am — pm, Field excursion to Muinak and Aral Sea; hearing from Karakalpak people

21—22 September (Fri.—Sat.)

- am — pm, Scientific reports and discussion

23 September (Sun.)

Nukus to Urgench (Khorezm District, Uzbek SSR); familiarization with irrigated farming in the Uzbek part of lower Amudarya

24 September (Mon.)

- am — pm, Scientific reports and discussion; field excursion to the reservoirs, water intake facilities

25 September (Tues.)

- am — Urgench to Tashauz, Turkmen SSR; hearing from Tashauz people;
- pm — Scientific reports and proposal both from USSR and foreign expert sides

26 September (Wed.)

- am — pm, Field excursion to various districts

27 September (Thur.)

- am — Field excursion,
- pm — Discussion on the constitution of the report of First USSR/UNEP Work Group

28 September (Fri.)

- am — Scientific reports and proposal both from USSR and foreign expert sides;
- pm — Discussion on the manuscript of report of the First USSR/UNEP Work Group

There were valuable presentation, discussion and information concerning the problems of Aral Sea and its basin. As the result of diagnostic survey, the official report of this First Meeting will be issued until February, 1991. This Meeting was focussed on the diagnostic study and survey for the state of Aral Sea and its basin. However, the interrelations between those factors such as political, economical, social, limnological, geographical, geological, hydrological, hydraulical, agricultural; epidemiological and public health seem to be quite complicated, and the damage on human livings, industries, agriculture and regional economy are so severe, that we shall need well-balanced comprehensive surveys and analysis hereafter.

For the time being, ILEC has to contribute to the followings urgently;

- 1) Public relation concerning the activities and results of USSR/UNEP Working Group on "Assistance in the Development of an Action Plan for the Rehabilitation of the Aral Sea",
- 2) Setting new monitoring spots with in the Aral Sea and its basin in connection with GEMS/Water Programme.



## IAWPRC 15th Conference

IAWPRC 15th Biennial Conference was held in Kyoto from 29 July to 2 August, 1990. Some 1,800 participants gathered at the conference, and 60 exhibition booths and 250 poster sessions attended at the event hall. ILEC activities and publications were introduced at a booth of the exhibition corner, and 300 peoples visited during the period.



ILEC booth at IAWPRC Conference

# LAKES OF THE WORLD

## West Lake (Xi-hu)

The West Lake is a little shallow fresh water lake, situated close to the west side of Hongzhou City in the southeast coastal area of China, and the other three sides of the lake are surrounded by hills. The scenery of the Lake is beautiful with the interfusion of picturesque hills and lake and has been famous since Tang Dynasty(618-907 AD).

### Main Character of the West Lake

| Item                                       | Controlled Level                      |
|--|---------------------------------------|
| Surface Elevation(m)                       | 7.15m                                 |
| Surface Area(km <sup>2</sup> )             | 5.593km <sup>2</sup>                  |
| Average Depth(m)                           | 1.97m                                 |
| Max. Depth(m)                              | 3.10m                                 |
| Volume                                     | 10.999×10 <sup>6</sup> m <sup>3</sup> |
| Catchment Area<br>(Including Lake Surface) | 26.63km <sup>2</sup>                  |

The West Lake was evolved from shallow estuary to fresh water lake, after which there had happened many times of swamping or drying-up. Dredging had also been conducted more than 23 times according to the record of its history; thus human activities played an important role in the protection of the West Lake.

The West Lake is divided by man-made dams into five sections. Outer lake is the main body, occupying 82.42% of total lake volume. The catchment area of the West Lake is very small, with an annual natural runoff inflow only 1.5 times of the lake volume; so its water supply is not enough and retention time of the lake water is long. The relative height difference is 405 m in the basin, which is mainly composed of eroded and karst hills. The latitude of Hongzhou city is 30° N, belonging to subtropical monsoon climate region, warm, and humid affluent in rainfall.

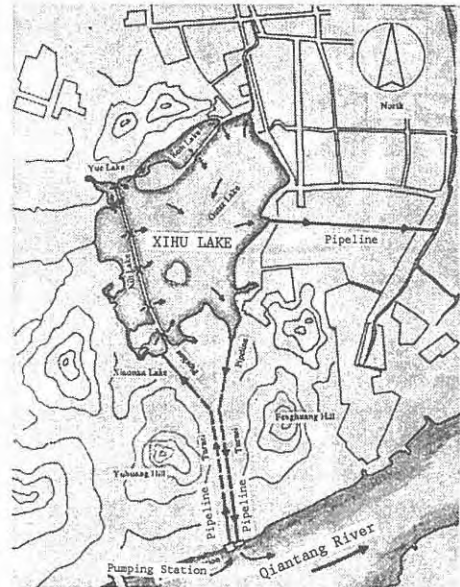
In the basin, evergreen broadleaf trees of subtropical zone and coniferous and deciduous trees of temperate zone are the main natural vegetation; and the rate of forest coverage is up to 70% with good conservation of water and soil.

Tourism is the main economy in the basin and the traditional tea plantation takes the most part in agriculture.

The rain water and waste water of the urban area to the



View of Xihu Lake



Location of Lake Xihu Diversion Works

east of the West Lake discharged to downstream are not in the scope of the basin. The population density in the basin is 1,536 person /km<sup>2</sup>. In recent years, the number of tourist in the West Lake has reached 17.4×10<sup>6</sup> person /time./a.

In 1983, an overall plan of the city was adopted, which defined tourism as the function.

### DEVELOPMENT OF THE EUTROPHICATION OF THE WEST LAKE

Natural swamping-type of eutrophication had taken place in ancient West Lake with large amount of nutrients accumulated in the sediment.

According to the report of 1940's a number of phytoplankton species indicating water eutrophication had appeared at that time; but the fact that many benthic alga species existed illustrates that the transparency of lake water at that time is better than that at present. Although in 1950's large scale dredge engineering had been carried out, the eutrophication process was accelerated because of the increasement of population and tourists, as well as the development of public facilities and industries. In 1979-1980, the Institute of Environmental Sciences of Hongzhou City made a systematic investigation on the environmental quality of the West Lake, and concluded that the West Lake was seriously eutrophicated by organic pollution, with the main features as follows:

(1) Heavy artificial load On account of the imperfectness of urban drainage system, large amount of waste water was discharged into the West Lake, up to 3.5×10<sup>6</sup>m<sup>3</sup>/a.

(2) Organic pollution Caused by of the pollution of domestic sewage, the annual average value of COD<sub>Mn</sub> was 9.41 mg/ℓ and BOD<sub>5</sub> was 6.55 mg/ℓ in the West



Lake, corresponding to the polluted water of Class V in the "National Standard of Surface Water Quality".

(3) Concentration of nutrient in lake water The concentrations of main nutrients like N and P are much higher than the standards of eutrophic water body.

(4) Primary productivity The amount of phytoplankton was very great, with average value of algae in most Lake sections over  $600 \times 10^5$  ind./L, such a high primary productivity, results in the annual average pH value of 8.99, DO of 9.99 mg/L, and frequency of saturation and over-saturation of 44%.

During the period from 1978 to 1981, the alga biomass had been increasing every year, and "black water" phenomenon had been reported for many times when algae(water bloom) grew rapidly in spring. In the last ten days of March, 1991 alga biomass had increased up to  $7233 \times 10^5$  ind./L.

(5) Super-eutrophicated ecosystem Higher hydrophyte in most lake sections has disappeared and there forms almost a single community of phytoplankton. In 1980, it was determined that there were 117 species of phytoplankton, with green algae dominant in the composition of the community; but most of these species were seasonal or sectional chance species in the lake. In the numbers of individual, the blue alga phylum was year-periodically dominant species, occupying 83% of the annual total, and over 70% even in winter, thus controlling the whole lake ecosystem.

#### COMPREHENSIVE RENOVATION AND CONTROL OF THE WEST LAKE

To counter the tendency of the West Lake eutrophication, a series of comprehensive measures of renovation and control have been taken.

(1) Interception of waste water Units with greater discharge of waste water in the basin drained all their waste water through main pipeline into the urban waste water works, which was put into operation in 1982.

(2) Diversion of river water Clean water was diverted from Qiantang River into the West Lake, through a diversion line of 3.137km in length, including a tunnel of 1.605km. The total power of pumping system was 720 kW with maximum diversion capability of  $300,000 \text{ m}^3/\text{d}$ ; and the project was put into use in September, 1986.

(3) Control of pollution source Industrial enterprises blindly developed during 1960's and 1970's in the basin were gradually removed out or closed up.

(4) Dredging of bottom soil The amount of bottom soil dredged was  $7.2 \times 10^6 \text{ m}^3$  in the period from 1954 to 1958; and the dredging was continued in small scope from 1978 to 1988 with the soil dredged of  $0.268 \times 10^6 \text{ m}^3$ .

(5) Building of protection bank 30km of the lake bank was built or rebuilt with blocks of stone to prevent the inflow of soil, sand and nutrients by storm runoff.

(6) Renovation of pleasure boats In the 70's, most pleasure boats used diesel engine for drive; but this pollution source of power facilities was replaced by storage batteries since 1978.

(7) Reasonable fishery An annual fishery product of 272.5t, can remove N and P from the lake water about 3 and 0.5 ton respectively; so it is an important way for the output of N and P. On the other hand, it was inhibited to put bait into the lake.

(8) Strengthening of management to prevent the lake from pollution by a large number of tourist.

Remove of factories and limit of construction projects have effectively controlled the growth of nutrient load.

Most of waste water in the basin was caught into the sewage plant in the city (annually  $2.0-2.5 \times 10^6 \text{ m}^3/\text{d}$ ).

The artificial loads of N and P input are reduced by 71.3% and 73.9% respectively, and the reduction of COD Mn load is more.

The interception of waste water and the diversion of clean water have fundamentally changed the balance of both N and P in the West Lake.

(excerpted from "Eutrophication of Lakes in China")

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## Forthcoming Meetings

### SYMPOSIUM ON AQUATIC BIRDS IN THE TROPHIC WEB OF LAKES

The aim of the symposium is to bring together aquatic scientists interested in the role of aquatic birds in inland water bodies. Define the role of aquatic birds play in the flow of energy in lakes. Relate aquatic bird production and the utilization of lakes by birds to limnological features.

The proceedings of the Symposium will be published in a Special Volume of the Journal Hydrobiologia.

Date: August 20-22, 1991

Place: Mount Allison University  
Sackville, New Brunswick  
Canada

Contact: Dr. J. Kerekes  
Canadian Wildlife Service  
P. O. Box 1006  
Dartmouth, Nova Scotia  
Canada B2Y 4A2

Telephone: 1(902)426-6356 1(902)426-7827

Telex 019-31552

### SECOND ARGENTINA LIMNOLOGICAL MEETING (RAL'91)

The Argentine Association of Limnology (ASSOCIATION ARGENTINA DE LIMNOLOGIA, A. A. L.) is organizing the Second Argentina Limnological Meeting (RAL '91) aiming at emphasizing regional limnology in warm-temperated waters. The organizing committee (Honorary President, Dr. Argentino A. Bonetto; President, Dr. Hugo L. Lopez) is planning activities such as Symposia, Conference, oral presentations and poster displays.

Date: November 4-8, 1991.

Place: La Plata city, Buenos Aires Province, Argentina

Contact: Organizing Committee President of RAL'91,  
Instituto de Limnologia "Dr. Raul A. Ringuelet",  
Univ. Nac. de La Plata.

51-484-1900 La Plata -Argentina - C. C. 712  
Telephone: (021)3-9125/21-9066/21-8217. Interno 30

## 7th World Congress on Water Resources

### THEME

Water for sustainable development in the 21st century: 1. Water Resources policy, 2. Water Resources Management, 3. Institutional and Financial consideration for water development

### Special Session

Sustainable lake management (organized by ILEC)

### Date

May 13-18, 1991

### Venue

Rabat, Morocco

### Organizers

International Water Resources Association

### Sponsors

UNDP, UNEP, UNESCO, UNICEF, FAO, WMO, WHO, World Bank

### Contact

Administration de l'Hydraulique Direction de la Recherche et de la Planification de l'Eau,  
Rue Hassan Bencheikroun, Agdal-Rabat-Morocco

## 1st IAWPRC International Symposium on Hazard Assessment and Control of Environmental Contaminants in Water

### Theme

1. Contamination of water by chemical substance: 2. New methods of analyzing and monitoring micropollutants, and their application to various waters: 3. Hazardous assessment of xenobiotics on ecosystems: 4. Risk assessment of toxic substances on man: 5. Control and decontamination of hazardous substances in the water environment by new engineering methods: 6. Policies and strategies for control of hazardous substances.

### Date

November 25(Mon.)-28(Thu.), 1991

### Venue

Lake Biwa Research Institute, Otsu City, Japan

### Organizers

Kyoto University

Laboratory for Control of Environmental Micropollutants(LCEM)

Lake Biwa Research Institute(LBRI)

International Association on Water Pollution Research and Control(IAWPRC)

### Sponsors

Japan Society on Water Pollution Research(JSWPR)  
Japan Society of Civil Engineers

### Supporters

International Lake Environment Committee(ILEC)  
Chemicals Inspection and Testing Institute, Japan  
Environment Agency, Japan

### Contact

Prof. Saburo Matsui, Kyoto University, Laboratory for Control of Environmental Micropollutants(LCEM),  
1-2 Yumihama, Otsu, Shiga, Japan 520

## International Conference on Land-Water Interactions

### Theme

- \* All kinds of activities and processes on land which impinge on the aquatic ecosystems
- \* Eco-system processes in the land-water interface(ecotone)

### Date

December 7-14, 1991

### Venue

New Delhi, India

### Organizers

National Institute of Ecology, India  
International Society for Tropical Ecology

### Sponsor

Societas International Limnologiae (SIL)

### Contact

Dr. Brij Gopal, School of Environmental Sciences,  
Jawaharlal Nehru University, New Delhi 110067  
India

### CALL FOR ARTICLES

Those who wish to contribute to ILEC Newsletter are invited to send manuscripts to the secretariat.



## INTERNATIONAL LAKE ENVIRONMENT COMMITTEE FOUNDATION

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