



NEWSLETTER

INTERNATIONAL LAKE ENVIRONMENT COMMITTEE FOUNDATION

No.13 JULY 1990

— For Better Lake Management —

This Newsletter is also available in Japanese.

3RD ILEC/UNCRD/UNEP JOINT EXPERT GROUP WORKSHOP

Third Expert Group Workshop on River/Lake Basin Approaches to Environmentally Sound Management of Water Resources: Improving Water Resources Management in a River/Lake Basin Context

12–17 February 1990, Otsu, Japan

and

Training Seminar on River/Lake Basin Management: Focus on Water Quality Enhancement

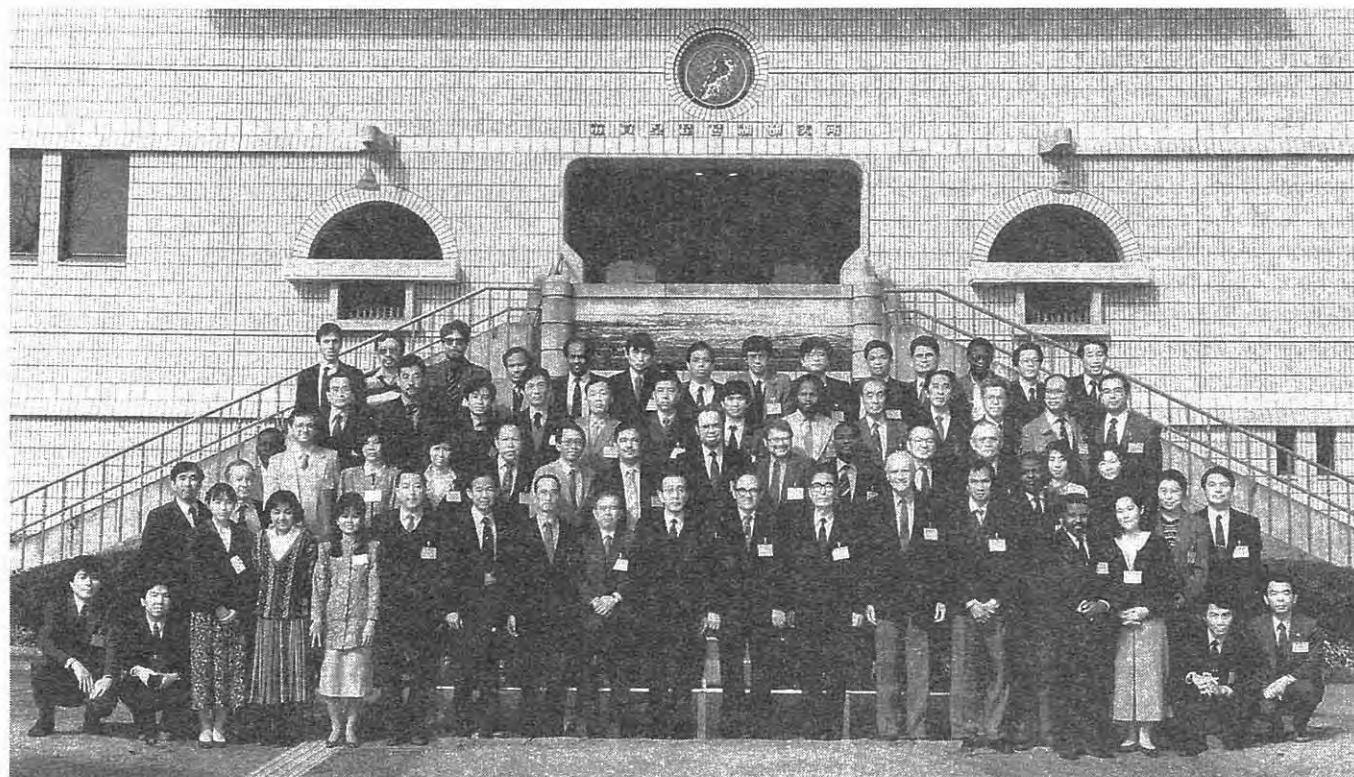
19–22 February 1990, Okazaki, Japan

The 3rd Expert Group Workshop/Training Seminar on River/Lake Basin Approaches to the Environmentally Sound Management of Water Resources was held in Otsu and Okazaki (Japan) from February 12 to 22, 1990. The workshop/seminar was jointly sponsored by the International Lake Environment Committee (ILEC), the United Nations Center for Regional Development

(UNCRD) and the United Nations Environment Programme (UNEP). A total of 49 policy-makers and scientists from 15 countries attended.

The four main aims of the workshop/seminar were as follows:

- (1) Review the findings of the third-year case studies and related resource papers undertaken by the collaborating institutions and experts.
- (2) Examine the approaches to water resource development and management in the river/lake basin context with particular reference to strategies required to improve policy responses.
- (3) Discuss a framework for the finalization of the results of the 3-year joint project.
- (4) Suggest follow-up activities to be adopted by developing countries and related organizations for the promotion of environmentally sound management of



Workshop participants at Lake Biwa Research Institute.

water resources.

The programme was organised in two sections. The group workshop section (February 12 to 17, at the Lake Biwa Research Institute in Otsu) dealt directly with river/lake approaches to to environmentally sound management of water resources. Fourteen resource papers and case study reports were presented and discussed.

The Training Seminar (February 19 to 22, at UNCRD in Okazaki) was concerned with river/lake basin management with a particular focus on water quality enhancement. Ten papers were presented and discussed followed by a field visit to the Yahagi River Basin. Participants at the training seminar were divided into four groups to discuss the following topics:

- * Integrating Watershed Management and Water Resource Management.
- * Managing Social Conflicts over the Use of Water Among Competing Uses and Users.
- * Improving Policy Responses to Environmental and Social Effects of Water Resource Development Schemes.
- * Promoting Training in Water Resource Management in Specific River/Lake Basin Context.

BACKGROUND TO THE WORKSHOP/SEMINAR

The joint ILEC/UNCRD/UNEP project began in November 1986 with the Expert Group Workshop on Environmental Planning and Management for Local and Regional Development (Focus on Training Aspects Derived from Studies of Inland Water Management). The workshop drew up a three-year programme involving nine case studies, in seven countries to examine strategies in order to improve planning and implementation of water resource management in a river/lake basin context.

MAJOR ACHIEVEMENTS

The three year study programme has achieved four key objectives:

- (1) The programme brought together the experiences of scientists and policy-makers, dealing with a variety of water resource and related activities, to consider the common problem of sustainable water resource management. In so doing, the programme has developed a network of experts whose continued cooperation will enhance the water resource management capabilities in their respective countries and regions.
- (2) Nine multi-disciplinary case studies on selected river/lake basins in seven countries (Brazil, China, Indonesia, Kenya, Philippines, Thailand and Japan) were produced. They were complemented by a number of resource papers on selected policy issues in water resource management. The case studies and resource papers represent the base materials for the production of general guidelines on integrated water resource management in a river/lake basin context.
- (3) The programme identified a set of water resource management problems and issues common to most case studies and established a framework the development of strategies to bring about improvements in the

management of water resources in the river/lake basin context.

- (4) The project contributed to the production of a manual entitled "Guidelines on Lake Management", and provided materials for the production of the "Data Book on World Lake Environments."

RECOMMENDATIONS FROM THE GROUP WORKSHOP

At the conclusion of the 3rd Expert Group Workshop (12–17 February, at Otsu) the following recommendations were made:

- (1) Initiate follow-up activities to conclude certain aspects of the study programme:
 - * Preparation of a book on the case study and resource papers presented at the three workshops.
 - * Preparation of audio-visual materials for training.
 - * Preparation of training material on specific aspects of water resource management.



Visiting an environmental educational boat "Uminoko" on Lake Biwa.

- (2) Promote the dissemination of materials produced in the three year programme through follow-up seminars and training workshops. Translation of material may be desirable to ensure wider dissemination.
- (3) Initiate action-oriented research geared to improve water resource management practices and enhance the necessary data bases. Suggested areas include:
 - * Environmental management at the local community level with particular focus on water resource management.
 - * Local community participation in water resource management.
 - * Policy responses to global climatic changes with respect to water resources.
 - * Public health and water resource development including secondary impacts such as endemic diseases, malaria control, sexually-transmitted diseases, etc.
 - * Development of early warning systems for water related disasters.
- (4) Strengthen the relations developed over the three year period between the participating institutions and experts so as to facilitate the increased exchange of information and researchers.

Suggestions included:

- * Preparation of an inventory of existing relevant training institutions and programmes.

* Preparation of a directory of experts/resource persons in River/Lake Basin Management.
Such activities will contribute to the enhancement of national and regional capabilities in resource management in a river/lake basin context.

List of Papers

| | | | |
|---|--|---|--|
| Hidehiko Sazanami | Keynote Address: River/Lake Basin Approaches to Water Resources Management: Issues and Prospectus | Otto Soemarwoto Edy Brotoisworo | Proposed Recommendations Towards Improving Water Resources Management in River/Lake Basin Context: The Saguling Case, Indonesia |
| Michio Hashimoto Saburo Matsui | Keynote Address: Manpower Development in the Field of Water Resource and Lake Environment Management | The Kasumigaura Study Team | Comprehensive Development of Lake Kasumigaura and its Environmental Management |
| Maynard M.Hufschmidt David S. McCauley | Strategies for Integrated Water Resources Management in a River/Lake Basin Context | | Part V: Lake comparative study and its application to the management of the drainage basin |
| Ken-ichi Nakagami | Sustainable Development and River/Lake Basin Management | | Part VI: Comprehensive management strategy for Lake Kasumigaura |
| Chris H. D. Magadza | Some Problems of Watershed Management in Usufructural Land Use Environments | Yahagi River Study Team | Consideration of Management System and Concensus Forming in River Basin Management |
| Yasuo Shimazu | Training System for Soft Approach to Watershed Management | Koichi Imai Masahisa Nakamura Tsukihiko Kondo Yoji Ito Taichiro Uda Takashi Otsuka Michio Akiyama Kiyoshi Nomura Motokazu Ando Itsukazu Suzuki Jaroslav Balek | Development and Conservation of Lake Biwa and the Changing Roles and Responsibilities of Prefectural Governments |
| Conrado E. Bauer | The Integration of Watershed Management and Water Resources Management | Anastacio A. Juras | Planning for Water Quality Management in International Rivers and Lakes: Emphasis on Developing Countries |
| Lake Dianchi Case Study Group | Practice of Water Resources Management in Lake Dianchi Basin | Edy Brotoisworo | Environmental Policies as Applied to Eletronorte: The Brasilian Northern Electrical Authority's Enterprises in the Amazon Region |
| David Mshila S. M. Machooka | Improving Water Resources Management in a River/Lake Basin Context: Case Study of the Kenya's Lake Victoria Basin | Tequam T. Gebremariam | Country Experiences in River/Lake Basin Management: Focus on Water Quality - Indonesian Case Study |
| James E. Nickum | Management of Water Use Conflicts in River/Lake Basin: Insights from Transaction Cost Economics | Rokman Bin Joned | Water Quality Status of the Lift Valley Lake Basin |
| Surin Setamanit Sunthorn Sotthibandhu Paktarawimol Phienlumplert | Proposed Policy Responses Towards Improving Water Resources Management in a River/Lake Basin Context: Songkhla Lake | Paktarawimol Phienlumplert | Water Quality Problems in Impounding Reservoirs with Particular Reference to Water Supply Development in Malaysia |
| Enrique P. Pacardo Floro R. Francisco D. M. Nepomuceno M.V.O. Espaldon L. G. Villacorta | Policy Responses Towards Improving Water Resources Management in Laguna de Bay | Surin Setamanit Rapeepun Suwannatachote | Water Quality Management in Thailand |
| Raul P. de Guzman | Role of Government in Water Resources Management | A. W. Kudhongania | Community Participation in Watershed Management |
| Michael M. Cernea | Population Displacement and Water Resources Development: Current Practice, Issues and Policy Responses | Floro R. Francisco | A Lake Basin Approach to Water Quality Management: The Laguna de Bay Experience |
| José G. Tundisi T. Matsumura Tundisi M.C. Calijuri E.M.L.M. Novo Joel M. Branski | River/Reservoir Approaches to Water Resources Management: The Lobo/Broa Reservoir Case Study and the Hydropower Development in the Amazon and Middle Tiete Basin, Brazil-The Conceptual Framework for Management of Reservoirs and Training of Qualified Human Resources in Brazil | Joel M. Branski | Water Quality Management Needs in Uganda |
| Joel M. Branski Elisabeth Monosowski Alan D. Poole José G. Tundisi Otto Soemarwoto | A Proposal for Integrating Regional Development Issues in the Brazilian Hydro-power planning | | MCI — A Model to Assess Cumulative Socioeconomic and Environmental impacts of large-scale water resources development Projects in Tropical Areas |
| | Making Dams Work for Rural Development: The Example of Saguling | | |

Participants

Conrado E. Bauer (Argentina); Heinz Löffler (Austria); José G. Tundisi, Anastacio Afonso Juras (Brazil); Liu Hongliang, Zhang Jiqiang, Zhang Chaohui, Xiong Yue, Lin Zhendong (P. R. China); Tequam T. Gebremariam

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Upper: Opening of the of training seminar part at Okazaki.
Lower:

INTERNATIONAL SYMPOSIUM ON RESOURCE USE AND CONSERVATION OF THE AFRICAN GREAT LAKES

Bujumbura, 29 November - 2 December 1989

by

SIL African Great Lakes Group
Université du Burundi, Faculté des Sciences

RECOMMENDATIONS

In view of the exceptional value of the African Great Lakes to the welfare of the riparian population and to mankind as a whole:

- (a) As a major source of protein, particularly in the form of fish;
- (b) As a major supply of freshwater close to semi-arid areas, and as avenues of transportation;
- (c) On account of the great geological age of some of these lakes;
- (d) On account of their unique faunas containing many (often hundreds) of species not found in any other lake and showing great genetic diversity;
- (e) On account of their special value for scientific work including evolutionary studies;
- (f) For their landscape value which has a high tourism potential.

In view of the present lack of knowledge on many aspects of the functioning of these lakes.

In view of the vulnerability of these lakes to changes brought about by man's activities, both within and outside the lakes:

- (a) On account of the extremely long water retention time (e.g Lake Tanganyika is virtually a closed basin);
- (b) On account of the low chemical buffering of the lake waters;
- (c) On account of the limited distribution of many of the fish and invertebrate species within the one lake (often limited to about 500 metres of shoreline).

In view, often, of the lack of coordination at national and international level of activities both of exploitation and research within the lakes.

In view of the fact that many introductions of non-endemic species of fish have been made to lakes without due regard to the possible deleterious effects on indigenous species and the likely consequences of invasion of other parts of the drainage system.

In view of the great dangers from potential developments, such as oil exploitation, to the lake ecosystems.

In view of the impacts from the use of agrochemicals which are already showing on the natural resources of the Great Lakes;

In view of the financial and technical constraints in the region of the African Great Lakes.

THE SYMPOSIUM RECOMMENDS THAT

1. The lacustrine states take all the measures for the conservation of the African Great Lakes which are compatible with their long-term exploitation, and

- recommends that the international community provides technical and financial support.
2. Comprehensive programmes of scientific research should be undertaken on the African Great Lakes, which should be coordinated on a regional and interregional scale, and be supported by international organizations and agencies of cooperation.
 3. In order to conserve the great natural heritage of the African Great Lakes, the lacustrine states should
 - (a) carefully manage the lake resources, and their catchments;
 - (b) safeguard and monitor the water quality;
 - (c) establish lacustrine National Parks or Reserves, including their landward catchments, in areas particularly rich in characteristic diverse faunas and habitats;
 - (d) introduce by legislation measures for the protection of endangered species and biotopes.
 4. National and regional fisheries institutions are strengthened and regional meetings facilitated.
 5. Resource surveys and stock assessment methods should be standardized, as well as fishery data collecting systems.
 6. Strong efforts should be made to inform the human populations on the economic and scientific values of the lake resources;
 - (a) By sensitizing government decision-makers to the economic values and social benefits of fisheries and of fishery management institutions;
 - (b) Through extension courses for fishermen;
 - (c) Through courses at schools to inform the younger generation.
 7. If any further introductions of any organism into the Great Lakes systems are contemplated, they should be preceded by intensive scientific research into the ecology of the species and the ecology of the system into which it is proposed to introduce it.
 8. Clear guidelines, specific for African inland waters, should be prepared on how a proposed new introduction can be thoroughly appraised. The Symposium welcomes the fact that such guidelines are to be discussed at the eighth session of CIFA in October 1990 and urges that every effort should be made to implement this initiative.
 9. Every effort should be made to prevent any introduction of fish or other organisms into the deep Rift Valley lakes Tanganyika and Malawi and their drainage systems, to protect their endemic faunas.
 10. At the international level, aquariums at Zoological Gardens should be used to mobilise public opinion to support measures to ameliorate specific problems (such as the fish populations of Lake Victoria) and to raise funds to be used to study the situations and investigate methods of restoration.
 11. Now pollution threats have been recognised and it is realized that information on pollution is far from sufficient, a 'state of the lake' Environmental Audit should be carried out for each of the Great Lakes. This would collate and interpret existing information and identify gaps in our knowledge as a guide to future

research and action.

12. Bearing in mind recommendation (11) and recognizing a trend of increasing population pressure and industrial development, information about the circulation and fate of pollutants in lakes and the toxicity of pollutants to key species should be obtained.
 13. New developments around the Great Lakes and their catchment areas should be preceded by an Environmental Impact Assessment. The onus is on the proposer of the development to finance the Environmental Impact Assessment.
- Examples of such developments are:
- (a) Oil exploration.
 - (b) Sewage plants.
 - (c) Road construction.
 - (d) Construction of dams for irrigation, water supply or hydroelectricity.
 - (e) Industrial development.
14. The Lakes should be protected from potential damage from agrochemicals. This should involve the establishment of an effective control system for identifying which agrochemicals should be allowed for particular uses.
 15. Account should be taken of the fact that some current land use practices e.g. forest burning, intensive agriculture on steep slope, and destruction of wetlands, which act as a buffer to reduce pollutants entering the Lakes, are contributing to the degradation of water quality in the Great Lakes.
 16. Where riparian countries are asked in the interests of the international community not to carry out particular measures, means should be investigated whereby the international community could compensate them.
 17. A permanent system for mutual consultations and coordination of action between the states is set up. The best method of doing this needs investigating but it might take the form of a Commission which would ensure regular meetings of scientists and administrators and ensure a flow of information on Great Lakes activities. The Commission should incorporate all interests in the natural resources of the lakes and help set priorities.

The Proceedings of Lake Chad Seminar

The Proceedings of the International Seminar on Water Resources of the Lake Chad Basin: Management and Conservation, 3rd-5th June, 1987, N'Djamena, Chad has gone to press and will be available in April 1990 for US\$20 per copy.

It is to be available in English and French versions separately and can be booked for in advance from:

Executive Secretary
Lake Chad Basin Commission
B. P. 727
N'Djamena, Chad.

This publication contains 29 papers from various authors on diverse aspects of the water resources of the Lake Chad basin and will be invaluable to scientists, engineers, etc.

LAKES OF THE WORLD

THE HIGH DAM LAKE

Development of the river basins for conservation and better utilization of waters for the benefit of man-kind has gained importance all over the world. The High Dam lake is one of the largest man-made lake in the world. Since the beginning of its filling in 1964, it attracted the attention of several investigators, due to its great importance in its utilization for agriculture, power generation, main tap water source, fisheries and navigation. However, its utilization for recreation is not yet well established.

The High Dam Lake is unique in its performance, as it is situated in the subtropical region where it is surrounded by rocky terrain. To the west, is the great Sahara Desert and to the east is the Eastern Desert extending to the Red Sea. The rate of evaporation is very high (about 10% of the lake volume) and precipitation is negligible. The only water source is the river Nile with its inflow in the south. The outflow at Aswan is the continuation of the Nile towards the north.

The lake has a long narrow shape with a number of side areas called khores (Fig. 2). The number of important khores, reaching one hundred, is expected to decrease with rise of water level, where the neighbouring khores will diffuse to form single ones. These khores differ from each other in several characteristics and the most important khores are those of El-Allagi and Tushka.

The High Dam reservoir extends over an area of 480 km², with the northern - two third in Egypt (Lake Nasser) and the southern third in Sudan (Lake Nubia). This latter part tends to have retained more of the original riverine characteristics. The deepest region of the High Dam Lake is found near the High Dam (about 85 m) and the water depth decreases towards the south. At full capacity of the lake, i. e. at 180 meter above sea level (m.a.s.l.) the surface area and total volume of Lake Nasser will be 5237 km² and 131 km³.



View of the Lake

The storage of the Nile water in the High Dam reservoir started in May 1964, with a water depth of 106 m.a.s.l. and the filling process has continued up to 1971. Since that time, this process was interrupted and the water level showed fluctuations; the drop was due to the extremely dry weather along the blue Nile. Fig. 3 A presents the annual average values of water levels during last eleven years. These averages showed highest levels in 1978 (175.4 m.a.s.l.), then decreased gradually reaching a lowest of 158.1 m.a.s.l. in 1987, followed by a slight increase in 1988. The curves of the monthly variations of the daily averages of water levels during 1978 and 1987 show a similar pattern (Fig. 3B). The water level was lowest in summer months followed by a gradual increase during autumn (flood period), remained high in winter and then decreased gradually during spring. The level of 180 m.a.s.l. (full capacity of the lake) has not yet been reached until now.

The general trend of the vertical distribution of water temperature in the lake was the decrease with depth. This is mainly attributed to the heating effect of the sun on the surface waters and the transference of heat throughout the water column by mixing processes. The vertical temperatures in May and August show a distinct thermal stratification. The maximum average water temperature in August is accompanied by a high evaporation value.

Transparency of the lake water varies according to locality and season from 16 - 350 cm. The lowest values occur during the flood period and hence result from the influx of suspended silt and clay particles in the flood waters and also from the increased plankton activities during the flood season. The highest transparency, however, is recorded in the lacustrine part of the lake towards its northern side.

The turbid water of the flood and the development of the phytoplankton are the most important factors affecting the water colour in the lake. During the flood period, the turbid water has a brownish-greyish colour. In winter and spring, however, the colour changes from greenish blue to bluish green, due to the abundance of blue green algae.

The High Dam Lake is a eutrophic lake containing natural Nile water enriched with nutrients. This is one of the causes for intensive photosynthesis resulting in high pH levels (7.8-8.8) and sometimes as high as 9.4. Light penetration and water temperature are also most important factors affecting primary production. The photosynthetic activity at the surface is inhibited by the high light intensity of solar radiation. Consequently, the maximum production occurs

at about one meter below the surface and then decreases gradually with depth. The lake is not subjected to anthropogenic inputs.

During winter circulation, the lake water is saturated or nearly saturated with oxygen. The oxygen values are from 5 - 7 mg/l. At the beginning of spring, the start of phytoplankton blooms is associated with a strong increase in oxygen content in the surface waters reaching up to 14 mg/l. However, the hypolimnion becomes poorer in oxygen, due to the increased thermal stability. The oxygen consumed in decomposition of the descending organisms possibly represents the main loss of this gas from the lake.

Based on the annual average concentrations, bicarbonate occupies the first order in abundance for anions followed by sulphate, chloride and carbonate. For cations, sodium ranks first, followed by calcium, potassium and magnesium. The distribution of major ions in the High Dam Lake is affected by physico-chemical and biological factors.

The High Dam Lake is rich in phytoplankton belonging to Cyanophyta, Bacillariophyta and to a much less extent Chlorophyta. *Oscillatoria*, *Anabaenopsis*, *Phormidium* and *Microcystis* are common among the blue green algae, whereas *Melosira* and *Nitzschia* dominate the diatoms. Distribution of zooplankton in the lake illustrates that Copepoda represents the most dominant group, succeeded by Cladocera and Rotifera. These zooplankton groups represent typical limnoplankton community. The zooplankton populations are represented by few species, but they are rich in number of individuals and most of the organisms are small in size. Several fish species have been recorded in the lake and the predominant ones are *Tilapia nilotica*, *T. Galilaea*, *Lates niloticus*, as well as *Labeo*, *Synodontis* and *Baqrvs* spp.

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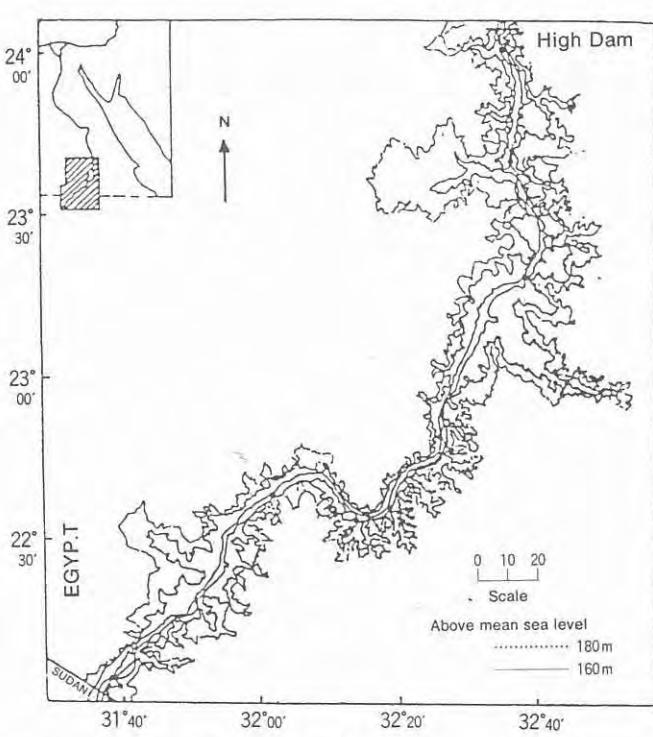
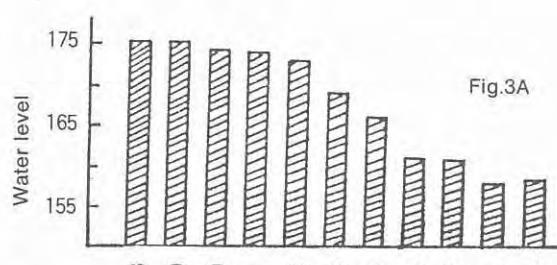
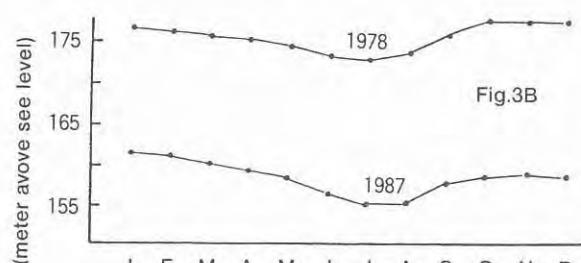


Fig. 2. Map of the Lake.



Monthly variations of the daily water levels.



Annual average values of water levels.

LZRG - Littoral Zone Research Group

A littoral zone research group is forming for facilitating exchange of information via workshops and newsletters; promoting comparative research on structural and functional properties of the littoral zone in lakes of different sizes and trophic status; and for promoting improvement and development of methodologies. The first goal is to prepare a comprehensive list of current "who's who" in

littoral zone research which will be distributed among LZRG members. For further information contact:

Dr. Avital Gasith, George S. Wise Faculty of Life Sciences, Institute for Nature Conservation Research, Tel-Aviv University, Ramat-Aviv 69978 Israel. (Fax. 972-3-445518)

ILEC ACTIVITIES IN 1989

- January 16-25 2nd Expert Group Workshop on River/Lake Basin Approaches to Environmentally Sound Management of Water Resources, under the sponsorship of ILEC, UNCRD, UNEP, ONEB and PSU. (Bangkok and Hat Yai, Thailand)
- January 29-30 Planning and Cooperation Meeting for the 4th World Lake Conference "Hangzhou '90" (Hangzhou, China)
- May Distribution of Guideline Book Vol. 1 "Principles of Lake Management"
- May 13-25 Participation of ILEC representative in UNEP 15th Session of Governing Council (Nairobi, Kenya)
- June 12-16 Cooperation to a training course "Protection against environmental damage caused by industrial pollution" sponsored by Asian Productivity Organization (Otsu, Japan)
- July 18-25 Visit of USSR representatives at ILEC office to discuss ILEC/USSR cooperation (Otsu)
- August 3 Cooperation of ILEC to 7th Water Festival for Lake Biwa
- August 8-9 Joint training seminar of school teachers and pupils on board for environmental education project in Japan (Otsu)
- August 29- September 10 Cooperation of ILEC to the training course on lake management for Specialist from Lake Chad basin (Irkutuk and Leningrad, USSR)
- August Participation of ILEC representative in SIL Congress (Munich, W.Germany)
- October 21-22 River water-quality monitoring by school teachers and pupils for environmental education project in Japan (Otsu)

November 2-3 Cooperation to International Symposium - "Ecology for Tomorrow" sponsored by the Ecological Society of Japan (Otsu)

November 29- December 2 Participation of ILEC Representative in SIL Symposium "Resource Use and Conservation of the African Great Lakes" (Bujumbura, Burundi)

December 14 Visit of delegates at ILEC office from Sichuan Province (China)

In-house meetings

- January 10 1st planning committee meeting for technical assistance project (Otsu)
- March 25 2nd planning committee meeting for technical assistance project (Otsu)
- March 29 6th meeting of board of directors (Otsu)
- May 17 5th meeting of board of councilors (Otsu)
- May 17 3rd Scientific Committee bureau meeting of ILEC (Nairobi)
- July 1 1st executive committee meeting for environmental education project in Japan (Otsu)
- July 26 3rd planning committee meeting for technical assistance project (Otsu)
- September 26 7th meeting of board of directors (Otsu)
- September 30 6th meeting of board of councilors (Otsu)
- September 30 2nd executive committee meeting for environmental education project in Japan (Otsu)
- November 27 4th planning committee meeting for technical assistance project (Otsu)
- December 26 8th meeting of board of directors
- December 26 7th meeting of board of councilors

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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