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NEWSLETTER

INTERNATIONAL LAKE ENVIRONMENT COMMITTEE FOUNDATION

— For Better Lake Management —

This Newsletter is also available in Japanese.

THIRD INTERNATIONAL CONFERENCE ON THE CONSERVATION AND MANAGEMENT OF LAKES—"BALATON'88"

At the beginning of the 1980's, Dr.M.K.Tolba, Executive Director of UNEP, proposed that regularly scheduled international conferences concerning lake enironments and lake management be held near lakes in which intensive and successful protection measures have been taken.

Following the first conference held at Lake Biwa, Otsu, Japan, and the second conference held at Mackinac Island, Lake Huron, USA, the third conference took place from September 11-17, 1988 at Keszthely, located on the shore of Lake Balaton, Hungary.

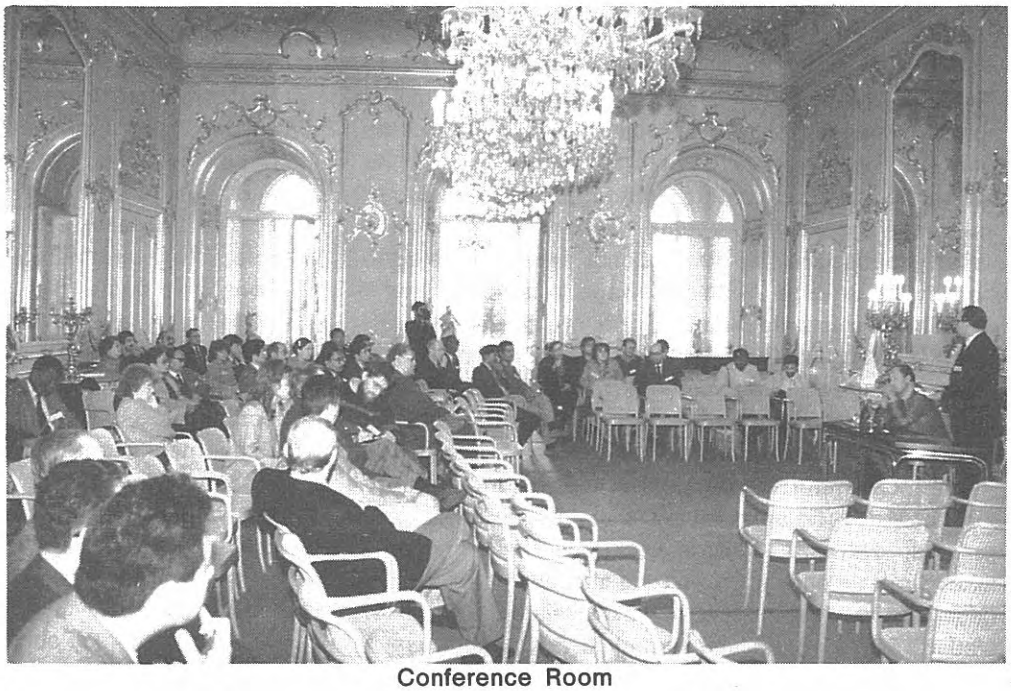
The Conference was organized by the Hungarian Academy of Sciences and the Ministry for Enviorment and Water Management. The scientific program was assembled and governed by the Balaton Limnological Research Institute of the Hungarian Academy of Sciences under the auspices of the International Lake Environment Committee.

Two-hundred and thirty participants from 31 countries of four continents attended the conference. Although most of the participants arrived from Europe and North America, developing countries were also well-represented thanks to the generous support of UNEP and other international organizations. In this way the conference was able to address the problems of protection of lake environments in developing countries. This was also the first time in the short history of these conferences that a comparatively large number of scientists from Eastern European countries participated.

The five working days of the conference included seven plenary addresses, 82 lectures, and 46 poster presentations. The main topics of the conference were : problems of lakes in Africa, Asia, Europe, and North and South America; eutrophication and its control; effects of toxic substances and the problems of acidification in lake ecosystems; and the role of modelling in lake protection. In addition, workshops were organized concerning economic problems of lake conservation and management as well as on water quality regulation in reservoirs.

Special attention was paid to the ecology of Lake Balaton and its protection. One plenary address, 8 lectures, and 8 poster presentations were devoted to this topic. In addition, a special exhibition on the management and development of Lake Balaton was presented at the Balaton Museum. This exhibition provided a detailed look at the lake's past, and offered insight into the near future of the lake's environment.

Furthermore, a scientific excursion of the Kis-Balaton reservoir system and the Balaton Limnological Research Institute at Tihany was conducted. The Kis-Balaton reservoir system was created in order to protect Lake



Conference Room

(This newsletter is published with support from the Japan Shipbuilding Industry Foundation)

Balaton from eutrophication, siltation, and toxic materials. The Balaton Research Institute has been the focal point of biological research of the lake since 1927.

To commemorate the conference, a 110-page case study on Lake Balaton was published with the financial support of UNEP.

As at the previous conferences, the scientific content was very advanced. Participating lecturers included: Dr.C.Forsberg (Sweden) ; Dr.R.C.Goldman (USA); Dr.H.Golterman (Netherlands); Dr.S.E.Jørgensen (Denmark); Dr.K.M.Mavuti (Kenya); Dr.M.Strascraba (Czechoslovakia); Dr.J.F.Vasilev (USSR); Dr.R.A.Vollenweider (Canada), to name a few.

Scientific administrators and decision-makers included: Mr.M.Inaba, Governor of Shiga Prefecture, Japan; Dr.G.N.Golubev Assistant Executive Director, UNEP; Dr.T.Kira, Chairman, Scientific Committee of ILEC Foundation; Mr.C.Finch, President, Great Lakes National Program Office, USA; Mr.R.S.Shimizu President, Great Lakes Environment Office, Canada; Mr. K.Abraham, Under-Secretary, Ministry of Environment and Water Management, Hungary; Dr. A.Csurgay, Vice-Secretary General, Hungarian Academy of Sciences.

The proceedings of the conference will be published in the near future.

Prof. J. Salánki
Conference Chairman

The session of "Lake Balaton and the Kis-Balaton Reservoir" is summarized as follows:

Although Lake Balaton has a surface area of 593 km², its mean depth is only 3 m. The lake, ideal for swimming and other water sports attracts 2 million tourists each summer. In recent decades the western part of the lake became hypertrophic, the central portion eutrophic and today only the eastern basin remains mesotrophic. But even here primary production has doubled.

nutrient uptake of the phytoplankton and experiments with lake enclosures indicate phosphorus as the limiting nutrient of algal growth. The total external P load of the lake was estimated to be 314 tons/year. Half of the biologically available external load originates from communal sewage waters. Recently two thirds of the sewage water produced in the recreational area was diverted from the watershed. At other sewage treatment plants P removal was introduced. Disposal of liquid manure is strictly controlled. The 30-40 per cent load reduction in the last five years seems to be arresting the entrophication of the lake. Further efforts, including non-point source control are necessary to reverse the process.

The most important segment of the restoration program of Lake Balaton is the construction of a pre-reservoir called Kis-Balaton on the main tributary of the lake. Kis-Balaton was originally a shallow, partly marshy basin at the western end of Lake Balaton. This lake/wetland was drained and turned to agricultural use in 1937. However, in the meantime, due to increasing environmental pollution, and changes in value judgement of functions of the area, the question of reconstructing the Kis-Balaton was raised, and in 1983 a resolution was passed in its favor. When planning the scheme, apart from the usual civil engineering design, an assessment of the major environmental and social impacts was also worked out.

The first segment of the Kis-Balaton reservoir system, with a surface area of 20 km² went into operation in 1985, and has proved to be effective in retaining a significant part of the nutrient load. A comprehensive monitoring and research program was launched at the same time with the objective of devising an appropriate strategy for the operation of the reservoir. The system in its present form is capable primarily for high flow conditions in order to regulate fluctuations in the water level and residence time of Lake Balaton.

Among presentations at other sessions were:

Forsberg, C. (SWEDEN)
GLOBAL STATE OF LAKE ACIDIFICATION AND ITS CONTROL

After twenty years of rapidly increasing emissions of sulfur oxides, the amounts of these pollutions generally stabilized around 1970. In the eastern US the increase continued into the early 1980's, while in most parts of western Europe the emissions declined. As a result of this decline, sulfate in precipitation has decreased in parts of Sweden by 30 %. However, emissions of nitrogen compounds are reported to have increased or remain at unchanged levels. It can be expected that increases in lake acidification due to deposition of nitrogen compounds will occur. The present state of measures to control transboundary air pollution is briefly discussed.

The extent of the acidification is larger than believed a decade ago. Improved knowledge demonstrates the existence of large acid sensitive areas in the US, Europe, Asia, Africa and South America.

Acidification models estimating acidity in relation to sulfate have been developed based on conditions prevailing during the acidification stages. Some results indicate however that during recovery from acidification sulfate is at least temporarily losing its central steering, role, lakes were more acidic although sulfate concentrations have decreased to previous levels. The questions of recovery are specifically addressed in this paper.

The water quality and the biological response in acidified lakes are to a large extent often a result of complicated soil-water processed in the watershed. Experimental whole lake acidifications or acidifying manipulations in enclosures will therefore fail to account for watershed modifications such as changed inflow of metals, humic material and phosphorous. Examples are presented and discussed.

Until the acidifying emissions have been reduced to a degree permitting acidified lakes to recover, a national lake liming programme is operating in Sweden. Experi-

ences gained by this programme are summarized and discussed.

Richard A. Vollenweider (CANADA)
GLOBAL PROBLEMS OF EUTROPHICATION AND ITS CONTROL

During the 20th Century eutrophication of inland waters and marine coastal areas and estuaries became a major water quality problem world-wide. Excess nutrient discharge, primarily phosphorous and nitrogen, to bodies of water due to rapid urbanization, crop intense agriculture and animal husbandry and increased use of industrial household products, particulaly detergents, have been identified as the main causes of this process. Research carried out over the last 30 years has highlighted the fundamental role of phosphorous in stimulating algal and macrophyte growth, and it is this factor which has been singled out as the primary target of control. While considerable success with phosphorous load reduction has been achieved in many cases, questions still remain open as to the concomitant role of other factors such as nitrogen, trace compounds, and, not least, the particular limnological and oceanological properties of bodies of waters. In this context, the predictive capability of systems modelling has become an important research and management tool. This is of particular importance in cases where external nutrient load control is not, or is only partially practicable, and alternative control techniques have to be applied.

Moiseenko, T.I. (USSR)
ANTHROPOGENIC REMAKING OF THE KOLA NORTH LARGE LAKES

Industrial development of the Kola North natural resources resulted in anthropogenic loading in the large lakes Imanfra, Umbozero, and Lovozero. The sewage from metallurgical and mining-chemical plants causes lake toxicophication which is accompanied by growing mineralization, decreasing transparency and change of water ionic composition. Domestic sewage causes eutrophication of basins; nuclear power station heated waters causes thermophication of the local water area. These affects are responsible for disappearance of the typical inhabitants of the north basins and intensive increase in eurybiontic species, which in turn affects the functioning of the whole biocenosis negatively. The processes of evolution, growing and breeding are broken among the salmon and sig population, and pathology can be seen in organisms. Protection and rational exploitation of basins of complex importance in the north involves measures such as the introduction of a non-waste technology at plants, maximum removal and cleaning of domestic sewage, exploitation of nuclear power station heated waters for market fish growing, and rationalization of fishery and recreation.

Allan, R.J. (CANADA)
TOXIC ORGANIC CHEMICAL POLLUTION OF LAKES WITH EMPHASIS ON THE LAURENTIAN GREAT LAKES

During the last few decades, many lakes around the world have been polluted by toxic organic chemicals. These chemicals enter lakes in industrial discharges, urban effluents, or following their use in agriculture, forestry, and other human activities. They can be transported long distances to lakes by tributaries, the Laurentian Great Lakes are used as an example to discuss the evolution of knowledge in this area, with emphasis on the sources and destination of toxic organic chemicals. Detection of chlorinated organic chemicals began in the early seventies and accelerated into the early eighties with sequential discoveries of different compounds. The phase of maximum toxic organic chemical pollution of the Great Lakes occurred in the early seventies. However, improvement has been seen in the Great Lakes since the early eighties and major recovery is underway as evidenced by decreases in toxic organic chemical concentrations in lake bottom sediments, fish and fish-eating birds. Nevertheless, global scale atmospheric sources of toxic organic chemicals along with recycling of chemicals from contaminated bottom sediments prolong this recovery. Long-term recovery may be slow and is related to limnological factors and processes such as trophic state and sedimentation rates. Globally, there is a lack of information of the state of toxic organic chemical pollution of the world's lakes. In the developed countries of the northern hemisphere, as for the Great Lakes, the major pulse of toxic organic chemical inputs to lakes may already be past. In developing countries, present day input of chlorinated organics to lakes may still be high. Worldwide, coordinated studies of two sets of lakes should be considered. One set of lakes should reflect direct industrial, urban, and agricultural toxic organic chemical inputs. The other series should be restricted to lakes where there is only atmospheric input of toxic organic chemicals.

Diamant, Rolf (USA)
NATIONAL TECHNICAL ASSISTANCE FOR COMMUNITY RIVER AND LAKE CONSERVATION PROJECTS

Section 11 of the National Wild and Scenic Rivers Act authorizes the U.S. National Park Service to assist local, state and federal government agencies, private groups and landowners interested in developing cooperative conservation plans for rivers and lakes. This paper will examine how this national program has provided river and lake technical assistance to states and local communities across the United States. Inherent in the approach to the program is the assumption that the states, local governments and private landowners are the cornerstone of any successful strategy for river and lake conservation. This assistance helps communities conserve their most valued river and lake resources at a low cost, while encouraging home rule, the maintenance of local tax bases and continued private ownership of adjacent lands. Assistance includes developing strategies for community shore-front revitalization, recreation management and agricultural land preservation, as well as the use of sitespecific conservation demonstration projects.

THE 2ND GENERAL MEETING OF THE ILEC SCIENTIFIC COMMITTEE

The 2nd General Meeting of the ILEC Scientific Committee was held subsequent to the Balaton Conference, from September 18 through 20,1988 at Budapest Convention Center in Budapest, Hungary. The general meeting was held on September 18 and 20, and the working group meetings on September 19, 1988.

The General Meeting of the Scientific Committee

The 2nd General Meeting, the first held since the new Committee was formed in April 1988, commenced with the introduction of the newly elected members, Followed by the election of the Board in accordance with the provisions of ILEC Foundation Charter. The Board members elected are as follows:

Chairperson:

Prof.Tatuo Kira	Director, Lake Biwa Research Institute.

Vice-Chairperson:

Prof.R.A.Vollenweider	Senior Scientist, Canada Centre for Inland Water.
Ing.Corrado E.Bauer	Honorary President, Committee on Engineering and Environment, World Federation on Engineering Organization.

Secretary:

Prof.Saburo Matsui	Professor, Department of Environmental and Sanitary Engineering, Kyoto University.

Member:

Prof.T.N.Khoshoo	Distinguished Scientist-Council of Scientific and Industrial Research.
Prof.S.E.Jørgensen	Secretary, International Society of Ecological Modelling.

Next, the proceedings commenced. The proceedings consisted mainly of:

Discussion of the rules to be applied when ILEC assists in carrying out projects for developing nations in the future.

Exchange of opinions as to the achievement of the Balaton Conference and discussion on the theme, proceedings and the announcement method for the 4th Hangzhou '90.

Discussion as to the cooperation ILEC will extend to IWRA in holding the Morocco Conference in 1991 and the possibility that ILEC take charge of sessions at the conference.

Working groups

In addition to the existing three working groups, a group for environmental education has been newly established. The working groups are organized as follows:

Guidelines :
: Prof.S.E.Jørgensen
: Prof.José G.Tundisi
Prof.R.A.Vollenweider
Prof.Saburo Matsui

Data Collection :
: Prof.Tatuo Kira
: Dr.N.B.Ayibotele, Prof.János Salánki
Prof.R.A.Vollenweider, Prof.C.H.P.Magadza
Prof.Saburo Matsui, Prof.Liu Hongliang

Training :
: Prof.S.E.Jørgensen
: Prof.Robert G.Wetzel, Prof.Sanga Sabhasri
Ing.Conrado E.Bauer, Prof.Sabro Matsui
Prof.Liu Hongliang, Prof.Heinz Löffler

INTERNATIONAL SEMINAR ON LAKE AND RESERVOIR ENVIRONMENT MANAGEMENT

From October 31 through November 10, 1988, the International Seminar on Lake and Reservoir Environment Management was held in the Argentine Republic under the sponsorship of the country's national institute of aquatic science. The objectives of this seminar were to provide those involved in lake and water quality management in South America with opportunities to acquire advanced knowledge through discussions with first-rate lecturers of the relevant fields, and to collect information on the environments of lakes and reservoirs in South America.

The International Lake Environment Committee

(ILEC), at the request of the sponsor, supported the seminar as part of its activity to enhance the lake management ability of developing countries, and dispatched professor Tetsuo Sunaga of the Faculty of Education at Kagawa University as a lecturer. Prof. Sunaga is an ichthyologist, and through his study of ichthyology he is well-versed in the subject of water environment. Following is an excerpt from Prof. Sunaga's report on the seminar submitted to ILEC.

(Seminar Outline)

1. Part 1: El Chocon (Neuquén)

Under the Sponsorship of HIDRONOR (hydroelectric complex built on Neuquén and Limay Rivers), Salto Grande (dam management company), and INCYTH (National Institute of Hydrics Science and Technique), and with the cooperation of ILEC, SIL, UNESCO, and OPS the seminar commenced on October 31,1988 in the HIDRONOR auditorium. The theme of part one of the Seminar was "Water Quality Control and Modeling." Dr.Jørgensen (Denmark) and Dr.Branski (Brazil) gave lectures and drills. I gave lectures entitled "the Effect of Water Pollution in Rivers and Lakes on the Fishing Industry" and "the Effect of Ichthyic Movement in Japan" on November 3 and 4, respectively.

Participants in the seminar numbered about 40, and consisted of researchers and technical staff of the three organizations mentioned above, and researchers at nearby universities. For some, this was the first natural science seminar they had attended.

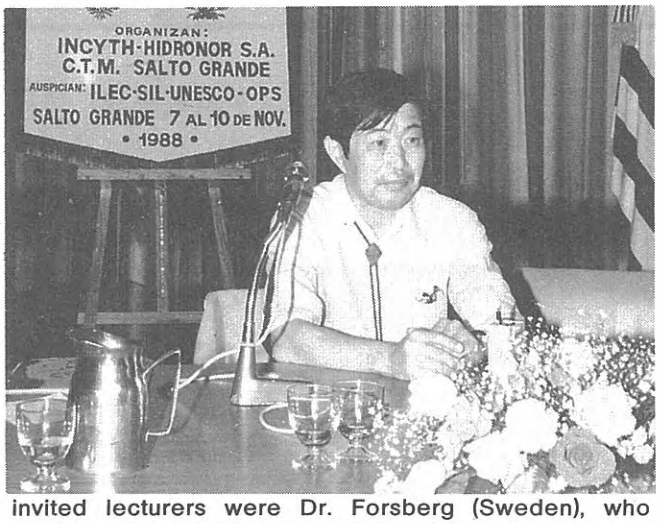
The video which I brought from Japan was quite well-received. As for my lectures, questions received were generally basic in nature since there were only a few participants involved in ichthyology. Lectures and drills were given from 9:00 a.m. to 6:30 p.m. throughout the seminar period until the final day, November 5. Since there were only three lecturers as compared to the originally planned five, each lecturer had to serve two to three times, and this turned out to be a rather heavy burden. It is believed that the subjects covered were not as diverse as the participants had expected.

El Chocon is an artificial lake built for hydroelectric power generation at the lower reaches of Limay River.

Limay River originates in Lake Nahuel Huapi and joins Neuquen River in Neuquen to become Negro River (Rio Negro). There are nine hydroelectric power genaration stations on Limay River and six on Neuquen River (presently in operation, under construction or planning all included: some are used for irrigation) under the management and ownership of HIDRONOR. I visited some of them, all of whose water was clear. The problems facing HIDRONOR are, first, the relocation of residents in communities which would become submerged due to dam construction: native people see their communities as their living years of many years and ancestral home; therefore, their attachment to the land is extremely strong. HIDRONOR's negotiations with them have become very difficult for this reason. Secondly, since the dams have no fish path, the migration of fish is prevented, and thus certain measures for resource preservation are being called for.

2. Part 2 Salto Grande (Entre Rios)

Part 2 of the Seminar consisted of presentations about research by researchers and specialists from various parts of Argentina, as well as invited lecturers. The



invited lecturers were Dr. Forsberg (Sweden), who spoke on two subjects, Dr. Tundisi (Brazil) who spoke on three subjects, Dr. Arbella (UNESCO) and me. I gave two presentations, "A Video Introduction of Lake Biwa" and "the Effect of Water Pollution on the Ichthyic Phase." Although part 1 of the seminar was dedicated to intensive lectures and drills, part 2 had an atmosphere of a gala academic meeting, and a more lively question and answer period took place.

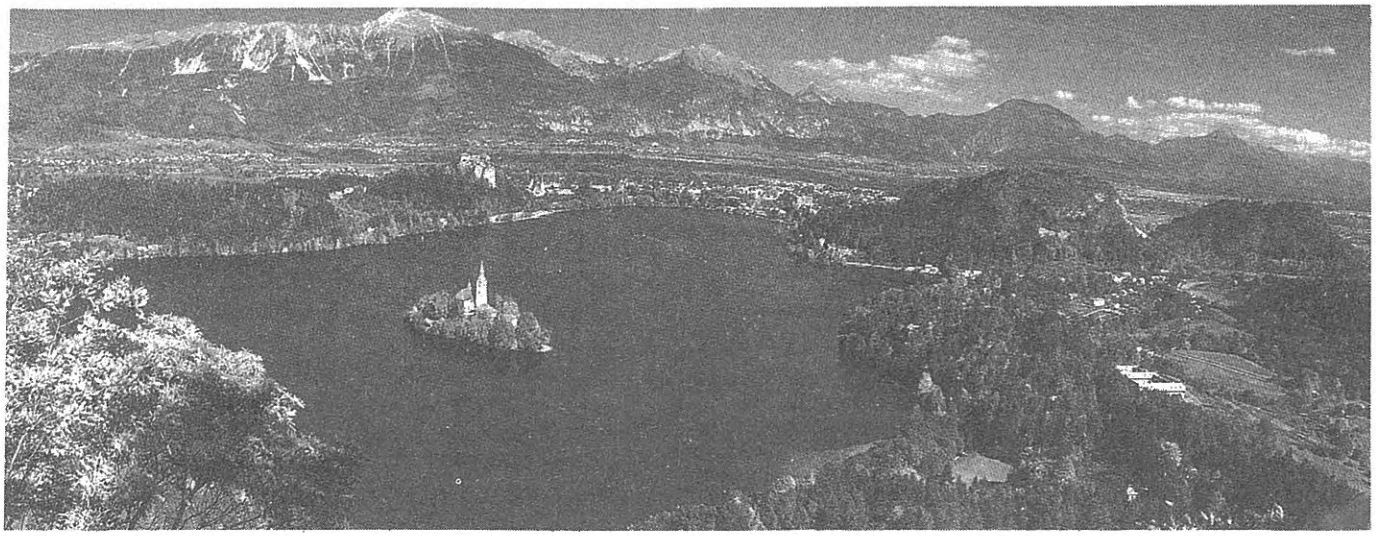
Presentations by researchers of Argentina and Uruguay were as follows:

1) The Relocation of Indian residents ... Cr. Ramon Aguirre (HIDRONOR)
2) A Summary of Salto Grande ... Cr. Alfredo Oliveros (C.T.M)
3) Hydrologic Characteristics of Salto Grande ... Ing. Manuel Irigoyen (C.T.M)
4) Ecological Characteristics of Salto Grande ... Arq. Winston Manosa (C.T.M)
5) Ichthyic Phase of Salto Grande ... Lic. Claudio Baigun, Lic. Ricardo Delfino, Lic. Alberto Espinach (INIDEP), Dr. Hebert Nion, Dr. Graciela Fabiano, Dr. Gustavo Chediak (INAPE)
6) Water Quality of Salto Grande
   - — General water quality ... W.Manosa, C.Lopez, J.Gerard (C.T.M.)
   - — Physical, chemical, and microbiological observations ... Laura Beron (DECISION SRL)
   - — Mathematical model ... Ricardo Carrizo (INCYTH)
   - — Movements of granulated and soluble carbon compounds ... (CONICET)
   - — About insecticides ... J.Gerard, C.Lopez (C.T.M.), R.Carrizo (INCYTH)
   - — About water quality goals ... Osvaldo Postiglioni (Sec. Rec. Hidricos)

Salto Grande Lake was built as a joint project of Argentina and Uruguay with a budget of $3 billion, for multi-purpose use including water supply, fishing, transportation, and hydroelectric power generation. A dam is located on Uruguay River,which constitutes the Argentina-Uruguay national border. The lake's circumference is about 100 km, maximum width is about 9 km, area is 783 km^2, maximum capacity is 5×10^6 ton, and maximum power generation is 1890 MW. Currently the joint venture established between the two countries at the time of the construction, known as Comision Tecnica Mixta de Salto Grande (C.T.M.), takes charge of the dam management.

LAKES OF THE WORLD

LAKE BLED



Located in the triangle between Austria, Italy and Yugoslavia, Lake Bled does not owe its fame only to the fact that it is one of the oldest and most renowned tourist resorts in our country but also to its unique beauty and charm which, for decades, have attracted both domestic and foreign visitors and explorers.

From a scientific point of view, the lake is interesting due to possibilities which enable us a controlled influence of its throughflow. The artificial throughflow works as a great pilot in a continuous experiment within nature. A still better understanding of long-term changes related to the lake of Bled and other lakes can be obtained from "in situ" experiments.

Geology and geography

The Bled depression with its lake occupies the western part of the Radovljica basin filled in by fluvioglacial deposits. The characteristic feature of the Bled landform is the frontal moraine at the north-east edge of the lake, where the Alpine resort of Bled is now situated. Even more conspicuous are some monadnocks rising above the general level of the glacial deposits. On the lake shore and its hinterlands there prevail Anisian and Ladinian dolomites and limestones containing nodular chert. At several places Pleistocene lacustrine chalk occurs, associated with sandy and conglomeratic glacial deposits. Lake Bled lies at an altitude of 457 m above sea level at 46°22′ N latitude and 14°5′30″ E longitude. The lake is typically alpine with a maximum depth of 30.2 m, average depth of 17.9 m, surface area of 1.43 km², volume of 25.69×10^6 m³ and watershed area of 9.2 km². The lake has a large number of small natural inflows, the largest of which is the stream Misca. Their annual discharge into the lake is approximately 13×10^6 m³. The lake's natural outflow is the river Jezernica at Mlino. Natural retention time of the lake water is 3.6 years.

The eutrophication problem

The problems of Lake Bled are similar to those of all meromictic alpine lakes influenced by man's activity. Due to its hydrological characteristics and inflow of sewage from the city Bled, eutrophication has taken place. Based on data obtained from the literature and with the help of saprobic indices of algae, the presently eutrophic Lake Bled was still oligotrophic as recently as 80 years ago. Since then, many species of algae have completely disappeared. Some of these had been present for a long time. The biological processes in the lake started to change. Accumulation of nutrients, especially phosphates and nitrates were observed; the anaerobic hypolimnetic layer with the H_2S in summer period became enlarged. New species of phytoplankton, characteristics of heavy eutrophication, appeared and surface "water blooms" due to massive growth of Oscillatoria rubescens were temporarily present. The physico-chemical characteristics of the lake water and surface "Water blooms" are the main reasons why restoration measures have been applied in Lake Bled.

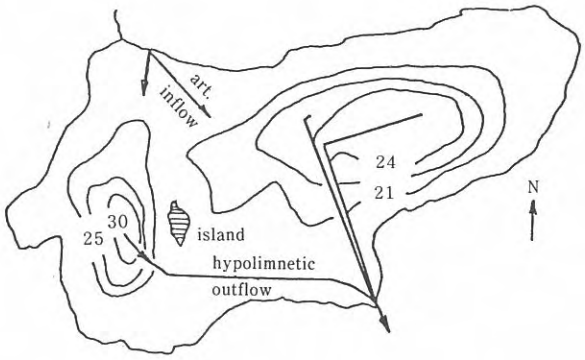


Fig. Lake Bled

Restoration of Lake Bled

First, it was decided to introduce surplus flows of the river Radovna, a mountain stream with clean, cold and oxygen rich water. Two branched tubes were installed at a depth of about 19 m and the expected maximum of 2 m³/s was achieved in 1972. It was predicted but not confirmed that the above mentioned inflow would improve the lake's condition by diluting the hypolimnetic water and that an increase in dissolved oxygen content would follow. A few years later neither a surface nor a metalimnetic massive appearance of O. rubescens was observed. However, from 1976 to 1978 surface and metalimnetic blooms were again present temporarily.

After applying the modified Imboden's model, it was shown that bottom flushing in Lake Bled would be more efficient than the Radovna's inflow in reducing phosphates and nitrates. In September 1980, first the Olsewski tube, and in the same month of the following year two consequent tubes were installed for hypolimnetic water outflow (Fig). On site inspection of the city Bled storm drainage system revealed that the system was completely clogged, and that therefore nearly all domestic sewage had been running into the lake. In February 1982 the main drainage line was cleared and at least 80 % of wastes were diverted away from the lake.

Although the artificial inflow of Radovna River has reduced the water retention time, it has not influenced the balance of nutrients in the lake. Contrary to a report which stated that the inflow would supply additional oxygen, the average annual concentration did not increase until the year after the hypolimnetic diversion project was initiated. After one year of diversion, a decrease in nitrogen and silicon concentration of about 50 % was observed. The phosphates level was also reduced in the two years following hypolimnetic diversion. As in other lakes where hypolimnetic water outflow has been applied, rapid recovery signs of lake Bled were observed during the initial three year period, at which time the situation had become stabilized and significant changes occurred due only to ecological and other factors (e.g. pollution of natural inflows). The average values of phosphorus, nitrogen and silicon correspond to concentrations which are typical of medium eutrophic lakes. From 1980 to 1983, the periodic blooms of phytoplankton were disrupted. Since 1983 their presence is similar to those of before the renovation measures, however the algal concentration is lower.

The limnological station at the lake has been established in order to regulate the throughflow according to actual conditions in the lake. A new sewage treatment plant has been planned in order to improve the waste water and hypolimnetic water treatment which originate in the storm drainage system and the lake itself. In the vicinity of Bled there are several other still oligotrophic high mountain lakes which are part of the operational programme of the limnological station. This programme has been promoted in scope to that of a national programme for prevention and restoration of other Slovene lakes.

Vrhovsek Dani, Kosi Gorazd
Limnological station
Bled, Yugoslavia

World Lake Survey

— Cooperation of Canada's National Water Research Institute —

ILEC and the United Nations Environment Program (UNEP) have been jointly enganged in the World Lake Survey. Recently, the cooperation of Canada's National Water Research Institute in compiling data on lakes in Canada, which constitutes a part of this survey, has been assured. This Canadian institute conducts research and surveys on water pollution caused by development in Canada, focusing particularly on fresh water, setting its objective as providing information and knowledge about the hydraulic system.

As described in a previous issues of the Newsletter the results of this survey will be made into a "World Lake Data Book" compiling data about sedimentation, acidification, eutrophication, etc. as well as a "World Lake Catalog" which will provide basic data.

At least 20 Canadian lakes are planned to be included by the time the data book is completed.

INFORMATION

MANUAL ON RESERVOIR WATER QUALITY MANAGEMENT

At the international Conference on Reservoir Limnology and Water Quality in June 1987 at Ceske Budejovice, Czechoslovakia, the participants agreed that there is a need to summarize the practical approaches of ASSESMENT, PREDICTION AND MANAGEMENT OF RESERVOIR WATER QUALITY. Anthony Milburn, Director of the International Association on Water Pollution Research and Control, suggested that a task force be formed with the goal of preparing, within about two years an international. MANUAL ON RESERVOIR WATER QUALITY MANAGEMENT.

At present about 60 contributors have agreed to participate. However, the problem is rather broad and anyone willing to include his/her experiences is invited to contact one of the following editors.

Walter Rast : The U. S. Geological Survey, Water Resources Division/Austin, Texas

Sven-Olof : Ryding of the Swedish Environmental Research Institute / Stockholm, Sweden

Milan Straskraba : Biomathematical Laboratory, Biological Research Centre, Czechoslovak Academy of Sciences Branisovska 31 370 05 C. Budejovice Czechoslovakia

FORTHCOMING MEETINGS

1. FOURTH INTERNATIONAL CONFERENCE ON THE CONSERVATION AND MANAGEMENT OF LAKES "HANGZHOU '90"
(Provisional)

Date : September 5-8, 1990

Place : Hangzhou, The People's Repubulic of China

Organization : Chinese Research Academy of Environmental Sciences (CRAES)
International Lake Environmental Committee Foundation (ILEC)
Environment Protection Agency of Zhejiang Province, Environment Protection Agency of Hangzhou Prefecture

Co-sponsors : Environment Protection Agency of China
United Nations Environment Programme (UNEP)
International Water Resources Association

Main Topics : 1. Problems - Identification and Case Studies
2. Sustainable Management of Lakes and Lake Basins
3. Special sessions on the interaction of local, national and international agencies, scientists and citizens in lake management

For details write to : Mr. Zhang Yutian
Secretariat of "Hangzhou '90" Preparation Committee for "Hangzhou '90"
Foreign Affairs Office
Chinese Research Academy of Environmental Sciences Beiyuan, Anwai
Beijing, The People's Republic of China

2. INTERNATIONAL SOCIETY FOR ECOLOGICAL MODELLING
(ISEM) NORTH AMERICA ANNUAL MEETING

Date : August 6-10,1989

Place : University of Toronto (Toronto, Ontario, Canada)

Sponsored by : Ecological Society of America(ESA)
American Institute of Biological Science(AIBS)

Secretary : Dr. Efraim Halfon
National Water Research Institute
Canada Centre for Inland Waters
Burlington, Ontario, Canada L7R 4A6

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

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