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NEWSLETTER

INTERNATIONAL LAKE ENVIRONMENT COMMITTEE FOUNDATION

— For Better Lake Management —

This Newsletter is also available in Japanese.

The launch into Cyberspace

ILEC's Home Page goes on-line

Welcome to the ILEC Home Page!



International Lake Environment Committee Foundation
for Sustainable Management of World Lakes & Reservoirs

<http://www.biwa.or.jp/ilec>

Few people would disagree with the notion that technology often brings as many problems as it is supposed to solve. For all the technological advances made over the current century its legacy to the new millennium would still appear to be a dying mother earth. Forests are being cut down faster than they can be replanted; whole lakes are drying up; and atmospheric pollution is raging at a level that can only compound matters with side effects such as acid rain and serious depletion of the ozone layer.

However, technology, and especially advances in it, is here to stay and to suggest anything to the contrary would be rather like King Canute trying to repel the waves. No, rather we should accept that it has its

role to play in our lives and as environmentally concerned citizens of the world we should use it to further our cause.

Computers are, without doubt, at the forefront of technology. By utilising computers properly, information gathering, retrieval and dissemination can be made a great deal easier than it has been up to now and can reach a larger number of people than ever imagined before. It is with this in mind that ILEC is proud to announce its launch into Cyberspace. For those of you unfamiliar with the latest computer-babble this is another way of saying that ILEC now has its own home page on the Internet. The information held in those pages covers a wide variety of ILEC's activities starting with the complete Survey

of the State of the World Lakes, and a brief introduction to the Directory of Water Related International Cooperation. Those familiar with the Internet and the profusion of home pages on it, will also be familiar with the term "under construction". Our home page is very much "under construction", but in the short time it has been online we have received over 12,000 "hits" - that is to say over 12,000 people have accessed our home page from their own computer. A lot of these people had never even heard of ILEC before they made a search on the Internet for general information on lakes and reservoirs.

We hope all of you with access to the Internet will take a look at our home page and contact us with your opinion.

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Environmental Education Project Concludes

It was in 1989 that ILEC initiated a pilot project for developing a new approach to environmental education in primary and secondary schools of Brazil, Denmark and Japan. Its basic idea was that lakes and other inland water bodies near schools would provide, if combined with the study of their catchment areas, an excellent subject for younger generations to understand the entity of the environment, complex interactions between natural and socio-economic factors, importance of water resources, and means for coping with environmental degradation.

Promising results of the pilot project led the Japanese Environment Agency to support ILEC's five-year venture (1991-1995), *Promotion of Environmental Education in Developing Countries*, with the participation of Argentina, Ghana and Thailand added to the three countries mentioned above. In addition to the basic approach employed by the pilot project, emphasis

was placed on starting the education program with the recognition of the state of the local environmental and making full use of field observation and experimental practice.



Argentinian schoolchildren

Members of the ILEC Scientific Committee served as national coordinators in their respective countries, organising steering committees, and nominating several elementary and junior higher schools as

pilot schools. In each country, the training of responsible teachers as well as the development of Environmental Education (EE) curricula and various teaching materials, including simple experimental instruments, were successfully carried out with the supply of partial funding, information and certain instruments from ILEC.

Both students and teachers concerned enjoyed participating in the project and agreed that it was very successful. The EE activities in pilot schools also affected students' families and local communities, even giving rise to local movements toward cleaning the environment.

A synthesis of the project has been published recently and is available from the ILEC Secretariat. A volume of ILEC's Guideline Book series on environmental education is now being edited based on the project's experiences.

Lake Biwa Museum opened by Royalty

The Lake Biwa Museum was opened amidst considerable fanfare by their Royal Highnesses Prince Akishino and Princess Kiko on Friday 18 October, 1996.

Situated directly opposite ILEC's offices on the shores of Lake Biwa, the museum was visited by the two members of the Japanese royal family twice. After the official ceremony on the Friday, they then returned on Saturday for a Symposium at which the Prince himself gave a paper.

The Symposium, entitled "Lake Biwa, Fish and People - An East Asian Perspective", was attended by some 250 people with papers given by speakers from Japan and abroad. The Prince, who has a doctorate in biology, gave his paper on the life of a catfish in the Mekong River in northern Thailand and participated a discussion as one of panelists.

The museum was opened to the public on Sunday 20 October. Museum staff were overwhelmed with some 10,000 visitors reported to have come on the opening day. Since then the crowds have not abated,

with the numbers exceeding 5,000 most days. The museum is accessible by both road and water by means of a boat service. Many people come for the whole day and visit the ILEC and UNEP/IETC facilities at the same time.



Their Royal Highnesses arriving to open the museum

Indian Lakes Report

A report entitled *Conservation and Management of Lakes/Reservoirs in India* was published as part of ILEC's continuing series of survey of the state of lakes and reservoirs in developing countries.

In the wake of ever-increasing human population and rapid industrialisation, lakes, rivers, wetlands and other aquatic habitats in India have naturally been the victims, directly or indirectly, of all anthropogenic activities either in the water bodies or in their watersheds.

This report does not attempt to describe all aspects of water-related environmental issues in India, but rather places greater emphasis on the introduction of people's (including government, citizens, researchers and other sectors) efforts for the conservation and management of existing or vanishing water bodies in India.

The report is intended to serve as background material for promoting international cooperation by introducing the cases of conservation and management of lakes and reservoirs in India.

Profile on Professor Robert G. Wetzel ILEC Scientific Committee Member

A founding member of the ILEC Scientific Committee, Robert G. Wetzel is Bishop Professor of Biological Sciences, University of Alabama, Tuscaloosa, USA. His on-going research programs address two major areas of contemporary limnology. The first area in his programs includes experimental studies that evaluate and quantify the abiotic and biotic processes that regulate the retention, transformation, and/or export of dissolved organic matter from specific habitats in lake and stream ecosystems, along the following directions:

- Quantitative loadings of natural dissolved organic compounds from allochthonous and wetland-littoral sources to lakes and streams. Particular emphasis is directed to the very high productivity of aquatic macrophytes and the epiphytic microflora in shallow lakes and wetlands.



Professor Wetzel

- Determination of physical, chemical, and biotic environmental factors that regulate microbial and degradation of the organic matter and associated rates of nutrient regeneration, particularly of phosphorus and inorganic carbon. Examples of such processes include
 - Bacterial metabolism by spatial and temporal dynamics of temperature and organic substrate availability in lakes,
 - Complexation of extracellular enzymes with organic compounds, and
 - Alteration of organic substrate and nutrient utilization in association with carbonates, iron, and particulate organic matter.
- A primary research effort currently addresses experimentally the effects of photochemical alteration of dissolved organic substances particularly humic and fulvic acids from decomposing terrestrial and

macrophyte vegetation, by ultraviolet radiation of natural sunlight. The studies demonstrate the generation of numerous volatile fatty acids that are readily utilized by bacteria and greatly accelerate nutrient regeneration and rates of nutrient recycling.

Because the dissolved organic compounds of relatively recalcitrant chemical composition emanating from higher plant structural tissues dominate in aquatic ecosystems, metabolism of these compounds dominate completely in fresh waters. Professor Wetzel's research demonstrated that the slow but massive decomposition of these detrital compounds provides a buffered metabolism essential to the thermodynamic stability of aquatic ecosystems.

The second area of his research is directed toward the couplings and interdependencies of wetland and littoral organisms and their metabolism to the whole of lake and river ecosystems. His studies focus particularly on the physiology and ecology of higher aquatic plants and associated attached microorganisms. He demonstrated the overwhelming productivities of the macrophytes and particularly the attached microflora in most lake and stream ecosystems. Much experimental study is now directed to quantifying controls of intensive recycling of carbon, phosphorus, nitrogen, and other nutrients among the epiphytic communities of algae, particulate and dissolved detritus, and bacteria, fungi, and other heterotrophic protists within the attached communities embedded in dense mucopolysaccharide matrices. For example, the direct physiological interdependency between attached algal photosynthesis and attached bacterial metabolism is critical to the high efficiency of internal recycling of nutrients and the high productivity of the epiphytic communities.

Professor Wetzel has held the highest offices in many major limnological organizations, such as President of the American Society of Limnology and Oceanography and General Secretary-Treasurer of the International Association of Theoretical and Applied Limnology for the past 30 years. He is also the author or co-author of 14 books and over 340 articles in scientific journals and books.

A New Face at ILEC



Mr. Kiyoshi Imai

Mr. Kiyoshi Imai is the new Secretary General of ILEC. Before joining ILEC he was involved closely with the enactment of a number of Shiga Prefectural Environmental Ordinances. It is not surprising then that in his work he says he wishes to emphasise the 3 Rs: "Re-use", "Re-cycle", and "Reduce". We will only be able to hand over a decent environment to our children if we re-use goods, re-cycle where appropriate, and perhaps the most important of all, reduce consumption. Without an emphasis on these 3 Rs our environmental activities are handicapped.

.... and at UNEP- IETC

Vicente Santiago, a biologist from Mexico with a PhD in Environmental Chemical Engineering (UK) has been working in UNEP since 1986. His first position was at the Regional Office for Latin America and the Caribbean, and then moved to the Caribbean Environment Programme in Kingston, Jamaica, where he coordinated a regional programme on Integrated Planning and Institutional Development (IPID) for five years. Dr. Santiago has recently joined the Shiga Office of IETC to strengthen the institution's capabilities on matters related to the management of fresh water resources.



Mr. Vicente Santiago

Stockholm Conference on Water Issues



ILEC's Professor Matsui (left) attending the Symposium

One of the greatest threats to our very existence today is environmental pollution, not least of our water. Water is such a prerequisite for all life on this earth that it cannot be a matter of only national concern: it is an international concern. It is just such far-sighted thinking that led to the establishment of the Stockholm Water Foundation (the organisers of the Stockholm Water Prize), and the Stockholm Water Symposium.

The 1996 Symposium was the sixth held since its inception in 1991, and was entitled "Safeguarding Water Resources for Tomorrow - New Solutions to Old

Problems". Held over a period of six days, from 4-9 August, the conference was once again a part of the annual Stockholm Water Festival. A number of Plenary Sessions, which featured keynote addresses from speakers who will also be attending the International Shiga Forum, Poster Sessions and Workshops were held, culminating in the Stockholm Water Prize Award Ceremony at the City Hall.

This year's Water Prize was awarded to Dr. Jörg Imberger of the University of Western Australia for creating a computerised predictive analysis model correlating water motion research with biochemical data.

Hiro Yamagata is Japan's most famous living modern artist. Currently resident in Los Angeles he painted the picture shown here as a result of his concern for the deterioration of the earth's environment. Yamagata was born in Shiga Prefecture and in his own words "I thought hard to see if there was anything I could do for the place I was born near and painted the picture 'Lake Biwa' as a result".

Posters have been made of the picture, which hangs in the building where ILEC is located, and some of the funds raised from the sale of these posters go to ILEC to support activities in aid of lake and reservoir preservation. Any readers wishing to purchase a poster or requiring any information should contact the ILEC Secretariat - contact details can be found on the back page of this newsletter.

What is the Stockholm Water Symposium?

Arranged by the Stockholm Water Company, the Symposium is an annual international conference on water issues attended by scientists, politicians and decision makers from all over the world. The purpose of the Symposium is to raise questions surrounding water and water environments, with a view to the future. The Symposium is organized under the directives of a scientific committee consisting of Swedish and international members, and is supported by scientific bodies around the world.

What is the Stockholm Water Prize?

Awarded annually to bring attention to a person or persons who have made an outstanding contribution to the safeguarding of the world's water resources, the Stockholm Water Prize is a coveted global environment Prize. Leading scientific organizations, universities, colleges and academies from around the world are invited to nominate candidates for the Prize, with a winner eventually being selected by the Stockholm Water Foundation Board of Directors.



Hiro Yamagata's Lake Biwa

International Shiga Forum on Technology for Water Management - Soft Options or Hard Choices

Absence of Water in the International Political Agenda - Asit Biswas

Water management during the earlier part of the 21st century is going to be an increasing difficult task. There is no question that the total global demand on water resources, both in terms of quantity and quality, will continue to increase due to increasing population, changing lifestyles which would translate into higher per capita requirements, and escalating human activities needed to provide more food, energy and industrial goods. Accordingly, unless water management processes become increasingly more efficient at a much faster rate than has ever been witnessed in human history, the world -

especially the developing world - is likely to face untold human misery more frequently and extensively than has been recorded in the past. The above simple message has still not percolated into the collective consciousness of the world. In spite of the general rhetoric the Dublin Conference on Water and the Environment was primarily a failure, and contrary to expectations, it did virtually nothing to put water on the international political agenda. Professor Biswas's paper analyses why a critical resources issue like water has so far been basically ignored in the international political agenda, and why it must be accorded a higher profile.

A Global Freshwater Convention - The Best Means Towards Sustainable Freshwater Management? - Anthony Milburn

This paper identifies three major challenges facing the global freshwater sector:

- The mass of the public around the world is unaware of the challenges facing the freshwater sector. As a result of the public opinion on the issue is lacking and the political systems of the world generally do not recognise water issues as a high priority.

- There is a vacuum of lead-

ership in the freshwater sector, at national, regional and international levels. This contributes also to the lack of concerted action by governments on freshwater matters.

- In order to meet the growing demands being made on the world's freshwaters, which are of finite quantity, a huge increase in productivity is needed.

Overall a *blue revolution* is needed in the way mankind manages its freshwaters, to secure the huge increase in productivity of freshwater usage needed for the next century and to establish sustainable exploitation of water resources. The catalyst for the needed changes would be a new global Freshwater Convention.

River Basin as Ecological Units - International Cooperation and Efforts for Water Management Around the Baltic Sea - Sven Bjork

Its long retention time and salinity stratification make the Baltic Sea sensitive to pollution. Eutrophication, oxygen deficiency and accumulation in the food web of poisonous substances have, therefore, caused severe environmental problems. Even if the basin had become negatively influenced throughout the industrial period, political awareness of the problems has only recently been recorded.

Efforts to stop further degra-

The Shiga International Forum will be focusing on environmentally sound technologies for water management over a period of three days from 25-27 November, 1996. Here we highlight four abstracts from papers to be given at the Forum.

dation of the Baltic Sea were hampered by the Iron Curtain which effectively divided the Baltic Region into a Western and an Eastern section. Environmental threats like discharge of DDT, PCB, organic matter and nutrients have been possible to reduce from the western sector and are currently under reduction in the eastern one. However, new threats such as unlimited increase of car traffic and the intensive fragmentation, including drainage of the catchment landscape with its river basins are appearing. A redevelopment program has, of course, to start on land, focusing on restoration of matter recycling within individual river basins.

Mekong Basin Development and International Coordination - Yasunobu Matoba

The development of the Mekong River Basin is moving fast. Economic growth rates are expected to be in the order of 6-9% per year for the foreseeable future, and simultaneously, investments in industrial and power generating plants can be expected to nearly double over the next decade. It is time now to take the opportunity to prevent irreversible impacts on the environment, and prepare the basis for a sustainable and environmentally sound devel-

opment in the Mekong River Basin into the next century.

The Mekong River Commission (MRC) intends to start preparation of a Basin Development Plan (BDP) in early 1997. The BDP will provide a framework agreeable by all countries for sustainable use of water and related resources in the river basin. The Environment Programme will support the BDP preparation, and environmental aspects will be considered for all national sector development plans and projects, and integrated in the process of developing the BDP focusing on transboundary impacts. The BDP is intended to be a permanent tool for future planning in the Mekong Basin.

LAKES OF THE WORLD

Turkish Lakes and Reservoirs: Management and Conservation

R. Sinan Erer & Gonul Mihtadiz

It is not only water, but all kinds of natural resources that has made the wealth of Turkey. However, only recently has it become abundantly clear that "wealth can bring disaster if you don't manage it". Turkey is indeed rich with its rivers and lakes, but impacts of short-term concerns along with the fast industrial development process are now increasing and further exacerbating environmental problems.

studies are continuing to find the reasons and solutions. The next greatest lake is the Salt Lake used extensively for salt production. The remaining lakes are almost all fresh water resources used for supply of drinking water, domestic and industrial uses. Certainly they are recreational elements, within the very susceptible ecological balance, in harmony with the surrounding settlements and their cultures.

Reservoirs are mainly used for the purpos-

tant impact on the reservoirs particularly. Another significant problem with the reservoirs is rather social: displacement of the local people.

Most of the settlement zones developed at the lake peripheries were once small communities that lacked sewerage systems but now have grown into larger towns still lacking sufficient sewerage systems and no treatment facilities at all. It is easy to guess that lakes will deteriorate in the very



Lake Sapanca

In Turkey, natural lakes spread over a surface area of 8903 km² (48 of them with a surface area greater than 5 km²) whereas the 164 reservoirs cover approximately 2410 km². The largest is Lake Van in the east, with its 3713 km² surface area. The lake has a very high content of sodium hydroxide and therefore cannot be used for drinking water supply. Very recently Lake Van has become very popular in the mass media with the reported sightings of a monster by the local people, which is still not explained scientifically. Though, a more important problem is with the continuously rising water level resulting in severe floods. Investigations and research

es of irrigation, energy production and drinking and domestic water supply. The largest reservoir is of the Ataturk Dam constructed within the context of the South-Eastern Anatolia Development Project.

As for the environmental conditions of Turkish lakes, signs of deterioration are observed almost everywhere. Urbanization and industrial development within the lakes environment are the major sources of pollution. Parallel to these, deforestation and desertification have caused severe impacts by altering the lake ecosystems; siltation being an impor-

near future unless preventive measures are taken. Lake Sapanca in northwestern Turkey, which was a drinking water resource for a population of over 50,000 until very recently, is now a striking example of such conditions. The town, very close to Istanbul, is one of the biggest industrial centers of the country. Direct discharge of domestic wastewater as well as waste discharge from industries and agricultural areas surrounding the lake are giving way to a fast pollution process towards eutrophication. Swamps and marshes have increased, the water quality is measured to be high in nitrogen and very low dissolved oxygen levels, and the

lake is getting smaller every year. Daily pollutant loads have been recorded as 3000 kg BOD, 800 kg nitrogen, 160 kg phosphorous and 100 kg toxic substances from domestic, industrial and agricultural sources. Some 80% of this BOD loading is calculated to be resulting from the residential zone.

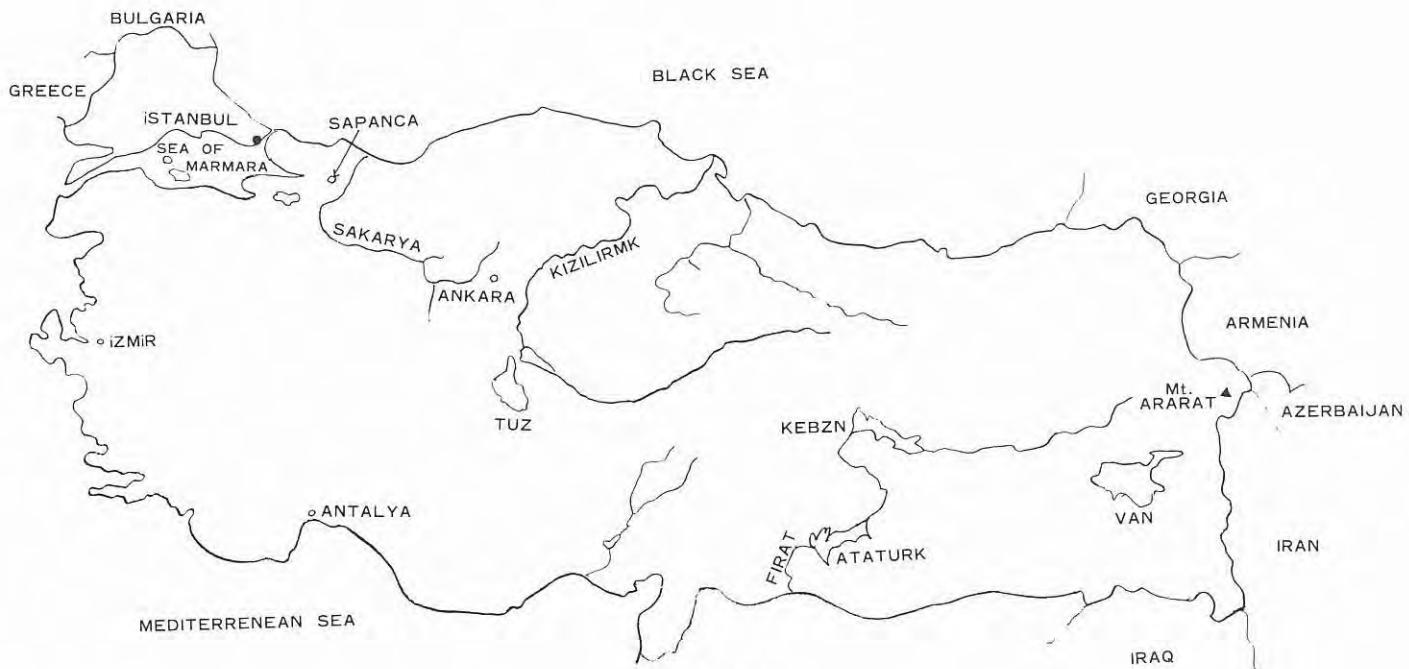
The basic cause behind all environmental problems should be sought at the level of governance. In other words, it is the legal and institutional mechanisms that give way to lack of integrated water resource management and waste management plans, and plans that

components, calls for prevention of pollution in the lake environment but the environmental liabilities are weak and punishments are too low to prevent waste discharges. Moreover, despite the land-use plan prepared and principles outlined for conservation and use of Lake Sapanca, measures are still not effectively practiced.

The role of local authorities in conservation and management of lakes is rather unclear, though, most of the sensitivity is shown by the municipalities as the basic unit of local governance. However, municipalities are responsible for safe disposal of wastes within the framework of waste-

tor and so can not use its powers and tools of pollution prevention.

With rising concern on sustainable resource use, it is clear that there is a need for a well-established data base system that enables continuous monitoring of lakes, and preparation of recovery projects, sound conservation and management plans. The State Hydraulic Works has responsibilities only within the framework of "development of water resources", mainly the dams and reservoirs, and does not consider conservation measures for those with recreational functions solely. Therefore, as a start-up



Turkey

lack holistic views and neglect the ecological unity of lake and river basins. In the case of Sapanca Lake, the complexity of the legal framework and over-riding powers among several public institutions have left the problem unsolved. Today, there are directorates of the Ministry of Environment, Ministry of Public Works and Settlement, Ministry of Health, Ministry of Culture, Ministry of Interior, Ministry of Agriculture and Rural Affairs, and State Hydraulic Works, all responsible for the rational use, protection and conservation of the lake basin. The Water Pollution Control Regulation of the Turkish Environmental Law, besides other

water management. Municipalities are also responsible for preparation of the land-use plans within their jurisdictional boundaries. Thus, for the lake-side jurisdictions, municipalities have an important role in lake pollution regarding their land-use plans that have come about to be neglecting ecological soundness. In fact, the mayor's sympathy towards lake conservation is their tool for financing their basic infrastructural needs. At this point comes the lack of auditing and monitoring of the water quality and illegal waste discharges into the water bodies by the Ministry of Environment. The Ministry, lacking a reliable data collection system, cannot moni-

towards achieving sustainable management of Turkish lakes and reservoirs, the institutional set-up that will undertake coordination between pertinent organisations and initiate collection of physical, chemical and biological data in a systematic way needs to be structured.

Do you have something to say about your lake? The Lakes of the World series is a regular feature of the ILEC Newsletter and we welcome contributions from our readers. Please send your article with photographs to the ILEC Secretariat at the address given on the next page.

New Publications

Final Report: Promotion of Environmental Education in Developing Countries (1991-1995).

This publication gives an overview of ILEC's Environmental Education Project with national reports from the participating countries of Argentina, Brazil, Denmark, Ghana, Japan and Thailand. (See related article on Page 2)

Conservation and Management of Lakes/Reservoirs in India.

An overview of conservation and management of lakes and reservoirs in India - the largest sovereign nation in both area and population in South Asia - with a plethora of case studies. (See related article on Page 2)

(Both of the above publications can be obtained by contacting the ILEC Secretariat at the address given next to the postmark at the bottom of this page.)

Predictive Limnology: Methods for Predictive Modelling, Hakanson, L., and Peters, R.H. 1995. SPB Academic Publishing bv., Amsterdam.
ISBN: 90-5103-104-1.

Designed as a methodological textbook for graduate students concerned with "predictive limnology", this book deals with both statistical and simulation modelling, with greater emphasis on the former.

Enclosed Seas and Large Lakes of Eastern Europe and Middle Asia, edited by Anatoly F. Mamdych, SPB Press Academic Publishing bv, Amsterdam, The Netherlands.
ISBN: 90-5103-110-6.

This book deals with eight large inland water bodies - four in Europe and four in the arid zone of Central Asia in the Commonwealth of Independent States.

Forthcoming Events

BIOGEOMON

3rd International Symposium on Ecosystem Behaviour

June 21-25, 1997

at Villanova University, PA, USA

Organised with Czech Geological Survey, Prague.

Some of the main themes:

- Catchment Monitoring/manipulations/models
- Element cycling in the global change perspective
- Isotopes in biogeochemistry
- Acidification of soil and water
- Integrating biogeochemistry with GIS

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INDIAN ENVIRONMENTAL SOCIETY

- Global Conference on Environmental Education

August 17-21, 1997

New Delhi, India

The Conference will focus on the current status of:

- Environmental Education and Sustainable Development
- Environmental Education and Population
- Environmental Education and Social Development
- Environmental Education and Women Development
- Environmental Education and Habitat Development
- Environmental Education and Actions
- Environmental Education and 21st Century

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