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SIL news

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In This Issue

Material for the April 2013 issue should be sent to the Editor by:

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Contributions on a PC formatted disk, in any standard word processor or DOS (ASCII) text, or as e-mail attachments, will assist the Editor.

Editorial

As Editor of the *Silnews letter* for nearly six years, I thought that as I gain experience and the routine, the task of editing the newsletter would become easier. Nevertheless, filling this issue was a bit of a challenge. Thanks to Internet/email and general advancement in science, there is remarkable upsurge in opportunities or avenues to interact with the fellow aquatic scientists. Remarkably, simultaneous with these developments, the number of our SIL colleagues who want to contribute to the newsletters has started to dwindle. It is striking that many of the SIL Working Group leaders, who earlier used to approach me with their reports/announcements, without my asking them, are no longer there. Thus, for the both present newsletter and previous one, I approached the WG leaders collectively, and when that did not help, I sent them all individual requests to contribute to the newsletter about their WG activities, including meeting reports or announcements of any upcoming symposia. Fortunately, a few- though really a few- responded and for the rest it appeared as though my emails had landed in the SPAM folders. I do not have any grudge or grievance but want to give a vent to my sensitivities and concerns, or my *angst* as one would say in Dutch. On the other hand, I am relieved that I received substantial material to fill-up this winter issue of the newsletter.

To start with, following this editorial note, our president Brian Moss would like to share with us all his personal experiences, the hardships and rewards of his teaching a course in tropical ecology in the East Usambara mountainous area of Tanzania. Second, Brian has also good news for us all about the SIL and its financial balance but also concerning our journal *Inland Waters.* There is also good news for young limnologists. I will not disclose all but keep the suspense as I want you get all the good news directly from Brian's message to us all.

We have some sad news from Lisbon, Portugal, about the demise of Maria José Boavida a well known limnologist from Portugal on 30 August 2012 (see her obituary on subsequent pages). Her friends, students, and we all as SIL colleagues, will miss Zé (as she liked to be called) -even more so because she at one point was recovering from a long illness. Subsequent pages in the newsletter are devoted to various reports on regional developments in limnology in south Siberia (Russia) and Aral Sea (Kazakhstan) on saline lakes**,** India (revival of SIL WG Wetlands, etc.), Sri Lanka (guanotrophy), S. Africa (Cyanobacteria blooms) and Israel (ecosystem services in Lake Kinneret). There is also an announcement of a training course in zooplankton taxonomy in Mexico in 2013, elsewhere in this issue. There is also good news from the SIL WG *Plankton Ecology* (PEG). The PEG, which organized its Workshop *Global Warming and Plankton* (12-18 February 2012; see SILnews 60, pages, 6-7) in Mexico University, Mexico, decided to publish the proceedings of the meeting in *Inland Waters.* Thanks to the Editor-in-Chief, John R. Jones, who agreed to publish the proceedings as a Special Issue of the *Inland Waters*. A five-man editorial committee has been registered with the journal as guest editors. The manuscript submissions are now under way and the review process is just starting. The appearance of this Special Issue of *Inland Waters* is planned to synchronize with the 32nd Triennial Congress of the International Society of Limnology (SIL), from August 4th to 9th, 2013, in Budapest, Hungary.

Lastly, our summer issue in June next year will appear two months before the 32nd SIL Congress, and I hope that we can come back with more good news about the Congress programme and the WG activities that will take place in the coming months or are planned during the Meeting in Budapest.

Ramesh D. Gulati
Editor, SILnews

From the President

I looked out of the plane window just after dawn as most other passengers slept or watched inconsequential films on their television screens. The air stewards did not like it, because raising the window shutter allowed sunlight into a darkened cabin, but I persisted and was well rewarded. For as we flew over the brown and gritty rockiness of southern Egypt, its fascinating landforms and dendritic drainages carved by copious water that the landscape had not seen for many thousands of years, a broad green ribbon emerged suddenly from the desert. There is no gradual transition to the Nile floodplain. It is marked by distinct boundaries. Either there is annual flood or there is not, and where there is, a tapestry of small fields marks out our absolute need for fresh water. Despite the current problems that the Aswan dam is causing, in reducing the flood, depriving the delta of fertiliser for its fields and organic matter for its offshore ecosystem and fisheries, robbing it even of material to maintain itself, and of enough water to keep the salt of the Mediterranean from penetrating, the Nile floodplain continues the many thousands of years of support of its human communities.

It was a lesson laid on another. I had spent the previous month helping to teach a course in tropical ecology, organised by the Tropical Biology Association in the East Usambara mountains of Tanzania (Fig. 1), and for many days we had been without any electricity. A transformer for the regional power supply had burnt out and was unlikely to be replaced for weeks and the back-up generator had failed. Spare parts were not available and the village blacksmith was attempting to fashion something that might work. We had water for part of the day because a small reserve generator could be run for just a couple of hours to pump some water, but water had to be carefully conserved. We bathed in buckets with deep brown water, full of disturbed sediment, heated on open wood fires that also cooked the food we ate, and after dark we held lectures and discussions by candlelight. There was no reliable availability of data projectors, computers or mobile phones beyond the couple of hours of their battery life, no PowerPoint projection, no internet, no microscope lights; indeed there were few of the amenities that most of us take completely for granted. Yet for a couple of weeks we managed perfectly happily with a lifestyle that would seem intolerable, yet is the norm for several billion people. By accepting the deficiencies, developing routines to cope and being inventive, we were able to teach and learn, continue with field projects and make the best of the situation. Whatever happens later this century when the 'perfect storm' of climate change, habitat loss, economic failure, population increase and possibly several other self-inflictions finally breaks, we will have to learn to cope and to manage.

SIL is coping with its difficulties of being a small scientific society at a time when the electronic revolution and changing ethos make its existence, temporarily at least, less easy than previously. I discussed these problems in the previous SILNews. Since then there are two good things to report. First, by making severe economies, we have managed to turn out a financial balance for 2011/2012 that allows us to be able to offer, at least for this year, some Tonolli Awards to young limnologists in developing countries. There is information on our web site, from which an application form can be downloaded (http://www.limnology.org/committees/tonolli.shtml). The deadline is December 31 and decisions will be made during January.

The second, and very important development, is indeed wonderful news. Our journal, *Inland Waters* is now listed in Science Citation Index Expanded and Current Contents. All papers from Issue 1 are indexed, so our first impact factor should be due in a couple of years' time. Launching a new journal and getting it established without the backing of a commercial publisher is not easy, and Jack Jones, David Hamilton, our editorial board and our publishers at the Freshwater Biological Association have made stupendous efforts to achieve this. We now need the membership to send in more papers, to encourage non-members to send in papers (indeed to convert non-members to members), and to quote papers from *Inland Waters*. Survival of a journal now depends on the size of its impact factor. Journal popularity brings in library subscriptions, and subscriptions bring financial stability and a continued future for SIL. Meanwhile we are looking at other ways to publicise the journal and increase its circulation and to make sure that societies in the freshwater field are able mutually to support one another and their journals. None of us can manage indefinitely, metaphorically or in reality, without water, electricity or money, but we can learn to use them to greatest effect.

Brian Moss
President of SIL

Fig. 1. Looking at the effects of gold mining in a stream in the East Usambara Mountains, Tanzania. Tropical Biology Association courses bring together students from many countries in Africa and Europe. They learn not only about tropical ecology, but about their different privileges and problems, attitudes and prejudices. After a month they understand a great deal.

Welcome to Budapest

The 32nd Congress of SIL will be held from 4th to 9th of August 2013 in Hungary, Budapest. The shrinking areas of natural freshwater habitats and their low biodiversity make the forthcoming congress of limnologists even more important. The difficulties of meeting the present global limnological challenges require putting together our skills and knowledge of many research disciplines. The scientific committee of the congress chose 33 themes grouped in 6 topics: biodiversity of freshwaters; ecology of main groups of animals and plants; physical and chemical properties of freshwater bodies; main aquatic ecosystems; monitoring, modelling, intervention; and other topics. The congress organizers are pleased to announce that Prof. Catherine Pringle will present the Kilham Memorial Lecture and Prof. Robert J. Naiman the Baldi Memorial Lecture. A plenary session has been reserved for the ASLO (Association for the Sciences of Limnology & Oceanography). The Global Lake Ecological Observatory Network (GLEON) representatives will probably demonstrate the work of their organisation.

Budapest is a very good site for a large limnological meeting. The bubbly waters emerging from the ground in Budapest make this city the Spa Capital of Europe: there are a large number of spas, baths and public pools, while the river Danube that runs through the heart of Budapest divides the city into the Buda and Pest sides. The Congress will take place in the Buda part of the capitol at the Budapest Congress Center, in the Hotel Novotel, offering the participants of the SIL Congress accommodation in several price categories and the best of Hungarian cuisine. The venue is situated in a very calm and quiet part of Budapest, within 30-min of relaxing walk to the historic Castle District of Buda, and even quicker using the public transport service. An extra five-minute walk will take the visitor to the embankments of the Danube that are a part of the UNESCO World Heritage sites and are favourite recreational area not only for foreign tourists, but also for the Hungarians. Eight bridges span the Danube, and two of them (the Chain Bridge and the Liberty Bridge) are so unique that they have become national symbols.

The Danube does not really divide the town into two parts, but rather connects the capital with the other places of Hungary. The mid-congress trips and the post-congress symposia will include visits to these sites. One of the possibilities of the mid-congress excursion is to take a boat trip a couple of hours journey to the north, away from the lighted, bustling city of Budapest to the Danube Bend, with its tranquil wooded hills and the meandering Danube. The organisers offer among others an excursion to the Lake Tisza and its newly developed Ecocentre, to the second largest side arm of the Hungarian Danube, the Ráckeve-Soroksár part or to the Lake Balaton and the Limnological Institute at Tihany.

In addition, the post-congress satellite symposia will be held at 8 other smaller cities in the country, dealing with wetlands, problems of modern fisheries, the invasive populations of the river valleys, ecology of saline lakes, the eutrophication of the rivers and the use of algae for monitoring purposes. Two of post-congress symposia, dealing with paleolimnoly and picoplankton, will be held in the Lake Balaton environs.

For details, please visit the congress homepage (www.sil2013.hu) and please don't forget to register and be part of the most distinguished limnological event of 2013.

Photo 1. View at the Tihany peninsula and the Benedictine Abbey.

Photo 2. Hungarian Parliament on the Pest left side and the Castle District on the Buda right side (A must-see on the people's list).

Photo 3. The first stone bridge of Budapest, the so-called Chain Bridge.

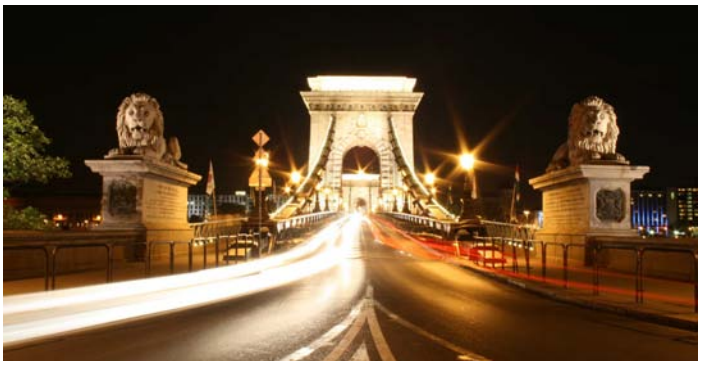


Photo 4. The view on Pest from the hills of Buda

In Memoriam:

Maria José L. Boavida who died on the 30th of August, 2012, aged 64.

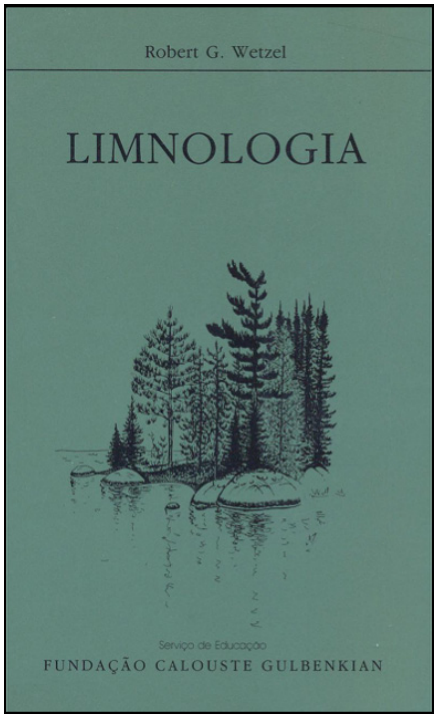
Maria José, or Zé as she preferred to be called, was the national representative of Portugal for the SIL: we profited from her great efforts in keeping us up to date with the latest developments in limnology, and for organising the bureaucratic aspects of SIL membership.

Zé Boavida in Portugal, August 2011.

After graduating in Biology at the University of Lisbon (Portugal), she continued her studies at Kent State University (Ohio, USA). It was at the end of her first year at Kent that she became fascinated by a paper published by Ramon Margalef in 1951, concerning the production of phosphatases by *Daphnia* (Boavida, 2010). This interest led to her choosing this subject for Master thesis topic (Boavida, 1981) and later to her Ph.D. studies. She demonstrated that zooplankters were really producing their own phosphatases and not only releasing those ingested with their algal food (Boavida and Heath, 1984). The role played by phosphorus, phosphorus regeneration and zooplankton interactions in lakes was a fundamental part of her scientific research, which contributed to the development of limnology studies in Portugal.

As a teacher, Maria José was well known for her carefulness in preparing her class lectures and guiding students, to whom she imparted her interests in the various phenomena shaping the dynamics of lakes. Many students and colleagues became interested in aquatic ecology through her inspiration and guidance. In order to encourage the learning of limnology by students, she translated into Portuguese the well known book *Limnology* by the famous limnologist Prof. R.G. Wetzel, who was Ze's personal friend. The book was famously used by Zé as a syllabus in her course of "Limnologia" at the University of Lisbon. Her curiosity and scientific knowledge, further developed in cooperation with researchers both at the University of Lisbon and at several research centres throughout the world, granted her the esteem from co-workers and students alike.

As Prof. R.T. Heath recalls, Zé also had an impish sense of humour that made her an excellent companion in the laboratory. When she was studying in the US, she once made a Secchi disk from a button on a thread so the American students could compare the difference in strength between American coffee and European strength coffee. Everyone got a good laugh and she made her point.



Cover of R.G. Wetzel's "Limnology" translated into Portuguese (Limnologia) by M.J. Boavida (Wetzel, 1993).

Her enthusiasm for science required great dedication and discipline from her part, and often others felt she demanded a similar level of attention and dedication from them. Although the demand for scientific honesty and human decency was a requirement in her dealings with students and co-workers, she was generous with those in need of help, and often brought out the best in them. Allying her drive to help and her characteristic fight against scientific inaccuracy, she recently wrote a book "Scientific Glossary of Limnology" in a small format so that "students may use it in the field or poster sessions in conferences, where often doubts arise and there is nobody to ask" (Boavida, 2011). Considering her prolific career, it is fitting that her last book can be carried in the pocket as a protection against embarrassment and error.

She was a member of several professional associations, and was appointed to several important positions at her home institution - the Faculty of Sciences, University of Lisbon - which included Vice-President of the Scientific Council, general coordinator of the European Programmes Socrates/Erasmus and Leonardo da Vinci, and coordinator of various teaching programmes. Such duties she performed with a very strong commitment until her retirement in August 2011.

She was always very fond of the time spent in collaborating with friends in the scientific community, and considered that the responsibility for the wellbeing of the others and friendship were all important aspects of the human character. Her passing is a great loss for limnology, yet, for those who had the privilege to know her personally, it is the loss of a loyal and generous friend.

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With thanks to Prof. R.T. Heath for his kindness in sharing his thoughts about Zé.

Addendum to Obituary of Boavida

Zé, or Maria José Lemos Boavida, was known and loved in many places from Beira (Mozambique) where she was born, through Kent (Ohio) where she made her most meaningful discovery on *Daphnia* role in phosphatase production, to Lisbon (Portugal) where she had lived most of her academic life. She shared her life with many people in other places, though. I am only one of many whom Zé had made her friends for life. I met her first as Bob Heath's Ph.D. student at Kent State University (Ohio) in 1981. She became my guide in the world of Portuguese culture and Mozambican geography that led us thorough research projects on Zambezi, Cahora Bassa and Lake Niassa during1982-83. A few years later, she joined us for a field course on aquatic ecology on the shores of Lake Mikolajskie (Poland). In 1993, I joined her in Lisbon as a Gulbenkian fellow, and we made an intense study on zooplankton and fish of lakes of Estrela Mountains: our

Zé Boavida (second from right) with me and two other Polish friends flanking us at one of experimental lakes, Mazurian Lake District, Poland, July 1995

joint paper on the contrasting effects of cyclopoid and fish predation on *Daphnia* clutch size fetching 28 citations to date . We also submitted a joint proposal for research work to the European Commission, which was funded. Zé joined our group in 1995-97 for exacting field studies on the possibility of mediating the effect of planktivorous fish on water quality in lakes by large doses of alarm substance to scare fish away from their zooplankton prey. She mastered some Polish words, but we all preferred her flexibility of often switching between Portuguese, English and French. We shall miss Zé greatly. I am sure others will miss her as much in other places in Africa, North America and Europe, perhaps on other continents as well.

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Reports

Twentieth anniversary (1992-2012) of the construction of the first earthen dike in the Berg's strait of the Aral Sea (Kazakhstan)

Due to morphology of Aral Sea depression there have always been two water basins - the Small Aral Sea in the north and the Large Aral Sea in the south. The Small Aral Sea was separated from the large one by Kokaral Island lying east-west. On the west side both the water basins were connected by shallow strait Auzykokaral and on the east they were connected by relatively deeper Berg's strait (maximum depth 13 m). The first one dried up already in 1968, and the second one in 1989-1990 when the water level dropped by about 13 m, reaching ca. +40 m a.s.l., and separating the Small Aral from the Large Aral Sea.

After separation, the water level continued to decrease only in the Large Aral. In the Small Sea, contrary to the Large Sea, the relatively higher water level was caused by evaporation of water that was lower than water income. This level increase resulted in water overflow to the Large Aral via the channel along the dried area of Berg's strait. As difference in levels of Small and Large Aral Sea increased, the stream velocity gradually increased, causing the channel bottom erosion and increasing in depth and length. Discharge of water from Small Aral

Dike and water spillway under construction, August 24, 2005 (Photo by E. Putnam)

occurs primarily in spring and early summer high flow period on Syr Dar'ya (Aladin et al., 1995).

Because the bottom sediment in the former Berg's strait is loose, there was a danger that the channel would deepen and result in the water level in the Small Aral to decrease again. Moreover, after

*Table 1. Hydrological and Salinity Characteristics of the Aral Sea, 1960–2009 (*Source: *Micklin, Philip (2010). "The past, present, and future of? Aral Sea." Lakes & Reservoirs: Research and Management, 15,*

Year and portion of sea	Level (m asl)	Area (km2)	% 1960 area	Volume (km3)	% 1960 volume	Avg. salinity (g/l)	% 1960 salinity
1960 (Whole)[a]	53.4	67,499	100	1,089	100	10	100
Large	53.4	61,381	100	1,007	100	10	100
Small	53.4	6,118	100	82	100	10	100
1971 (Whole)	51.1	60,200	89	925	85	12	120
1976 (Whole)	48.3	55,700	83	763	70	14	140
1989 (Whole)		39,734	59	364	33		
Large	39.1	36,930	60	341	34	30	300
Small	40.2	2,804	46	23	28	30	300
Sept. 2009 (Whole)		8,409,	12.5	84	7.7		
W. Basin Large	26.5	3,702	27	56		>100	>1000
E. Basin Large	26.5	857	1.8	0.64		>200?	>2000
Small	42	3,487	57	27		14-Oct	100-140
Tshchebas Gulf	28	363		0.51		>100	>1000

Completed dike and water spillway view from tailrace, September 23, 2007 (Photo by I. Plotnikov)

Completed dike and water spillway view from the Small Aral, September 23, 2007(Photo by I. Plotnikov)

some time this self-deepening channel could approach the Syr Dar'ya mouth and so divert most or all of its flow into the Large Aral. Thus, there could be a danger of not only rapid fall in water level of the Small Aral but of its disappearance (Aladin et al., 1995).

In 1991, one of us (N. Aladin) reported to local authorities about this imminent danger. In May 1992 N. Aladin suggested to the head of Aral district administration Bigali Kayupov to build a dam in the former Berg's straits in order to maintain water in the Small Sea. The District Administration together with N. Aladin reported this to the head of administration of Kyzylorda region: the Seilbek Shauhamanov. After discussions, the idea was accepted and the government of Kazakhstan decided to construct a dike in Berg's strait. The channel was dammed in August 1992 (Aladin et al., 1995).

The dike was built from sand and reed fascines. However, the dike was very fragile and sensitive to wave action and had no mechanism to discharge excess water. In April 1993 when the level of the Small Aral rose >1 m the dike was partly damaged (Aladin et al., 1995). New head of Aral district administration Alashpay Baimyrzaev continued to reinforce the dike. Finally a dike across the whole width of Berg's strait of about 13 km long and 4 m high was built. Every year until 1999, this earthen dike was broken during spring floods, but immediately after that it was repaired again.

Anyway the water level could be maintained at about +42 m a.s.l. Salinity could be maintained at <20g/l. Conservation of the Small Sea allowed fishing activities and a partial restoration of the Syr Dar'ya delta ecosystem. The danger that the artificial channel connecting the Small and Large Aral seas would cut down and drain the Small Sea completely and divert the flow of Syr Dar'ya into the Large Sea was temporarily eliminated (Aladin et al., 1995). However, because of a storm on April 20, 1999 waves destroyed the dike (Micklin, Aladin, 2008). After this catastrophe the dike was not repaired. A. Baimyrzaev was removed from his duties and the next head of Aral district administration Aitbay Kusherbaev got an order to build a proper concrete dike with a gated spillway.

The *water resources committee* of the Ministry of Agriculture of Kazakhstan headed the project. In addition to the US$ 62 [64?] million provided by World Bank, US$21.3 was made available by the Kazakh Government. World Bank granted 9 con-

tracts, the most important of these going to the China-Geoengineering (US$16.6 M) and Russian Zarubezhvodstroy (US$27.8), which won the tender. In October 2003 preparation works were in process, and construction itself was to begin in spring 2004. Water retention began in the autumn of 2005 and by March of the next year the water level had increased to +42 m a.s.l. (Micklin, Aladin, 2008; Aladin et al., 2008, 2009). All the time till now, the water of Small Aral Sea is relatively stable with a maximum fluctuation of one half meter (41.5 m to 42.5 m) around the design height of 42 m. Average salinity was decreasing and reached less than 10 g/l. Freshening of the water allowed the aboriginal commercial freshwater fishes returning to the Small Aral Sea from the lacustrine system of lower Syr Dar'ya (Micklin, Aladin, 2008).

The hydro system of Northern Aral Sea Dam includes the dam itself with spillway, supply and tailrace canals and an access road. The dam is constructed of sandy soil mixed with limestone rocks; its length in the ridge is 13 km, average height is 4 m and width in the ridge is 10 m. The spillway is designed as a broad-crested overflow with a 5m deep pool. Total crest width is 49.5 m. This new dike in Berg's strait allows increase of level in Small Aral Sea to +42 m a.s.l. and steady decrease of average salinity. This has allowed improving brackish water environment of this residual water body of the Aral Sea.

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Siberian scientists launched an interdisciplinary research cooperation project to study the stability of meromictic lakes

Most deep lakes in temperate and subtemperate regions stratify during summer, i.e., the water column separates into distinct layers of different density. As the air temperature falls during autumn, winds mix the lake and the temperature differences and density gradient disappear. In spring, winds can also mix the lake completely so that there is a complete homogeneity of temperature from lake surface to bottom. In salt lakes, however, mixing can be impeded by the non-uniform distribution of the salinity, with usually relatively higher density of the deeper waters. There are many lakes in which the density of the bottom, more saline layer of water, is higher than that of the upper, less saline layers and, thus, these layers with varying salinities do not mix. These lakes are referred to as meromictic (Boehrer and Schultze 2008).

What is so interesting about the meromictic saline lakes? The bottom layer of the lake, which is not involved in the autumnal or spring turnover, becomes anoxic and may persist in this state for decades. The metabolic activities of bacteria in these deeper, anoxic layers result in accumulation of hydrogen sulfide (H_2S). Unusual bacterial communities develop at the lower boundary of the upper layer, containing dissolved oxygen, and the lower layer, which is anoxic. The amount of organic matter produced by oxic and anoxic bacteria in this transitional zone can be comparable with the amount of organic matter photosynthetically produced in the oxygen-containing layer. The non-mixing bottom layer of water – the monimolimnion – serves as

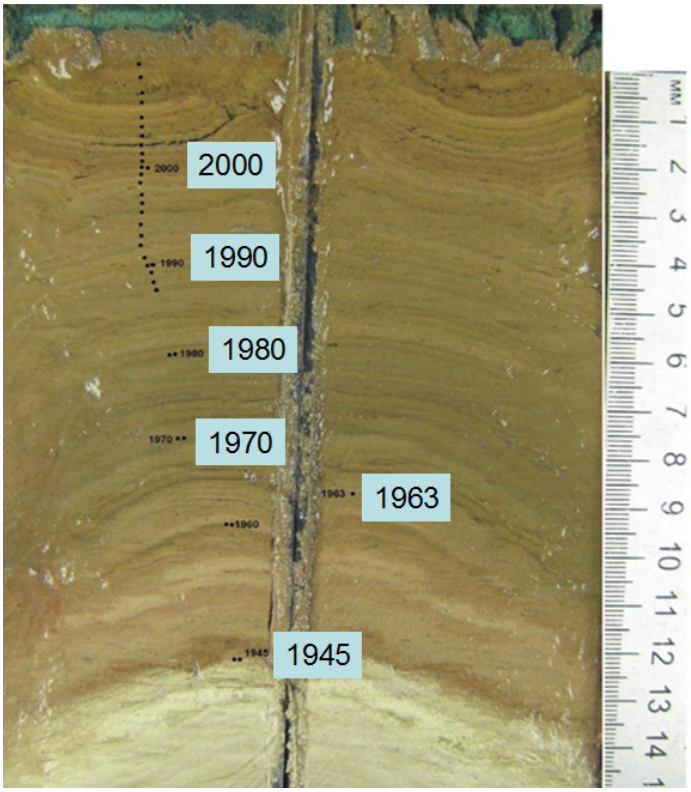

Fig. 1. The upper part of the sediment core from the bottom of Lake Shira. Date of 65 years was placed by 137Cs dating and varve counting. Data on age-depth model for Lake Shira sediments for 2500 years including radiocarbon analyses are presented in (Kalugin et al. 2012). Photo is kindly provided by Dr. Ivan Kalugin from the Institute of Geology and Mineralogy SB RAS (Novosibirsk)

a natural "scavenging system" of the lake. The organic matter that has been generated during summer settles down in the monimolimnoin. In most lakes, the organic matter that has settled down on the bottom gets involved in the cycling again during seasonal mixing events. Should, however, a meromictic lake be accidentally mixed, a limnological catastrophe would inevitably occur. On mixing, the toxic gases accumulated in the bottom layer would exterminate all life in the lake. The release of the great amounts of biogenic elements (carbon, nitrogen and phosphorus) would lead to a dramatic increase in phytoplankton densities causing and algal blooms.

Such lakes can be found on all continents. The Black Sea is considered as the largest meromictic waterbody on earth. It is very stable, and its complete mixing is unthinkable. In lakes, however, such mixing events occur quite regularly. A great limnological catastrophe occurred in 1986 in Lake Nyos, a volcanic lake in NW Cameroon (Africa), when about 1,700 people within 25 kilometers of the lake suffocated as a result of a limnic eruption which triggered the sudden release of about 1.6 million tons of CO_2 (Schmid, Halbwachs, Wuest 2006). Scientists are still unable to accurately predict when one type of mixing will be replaced by another.

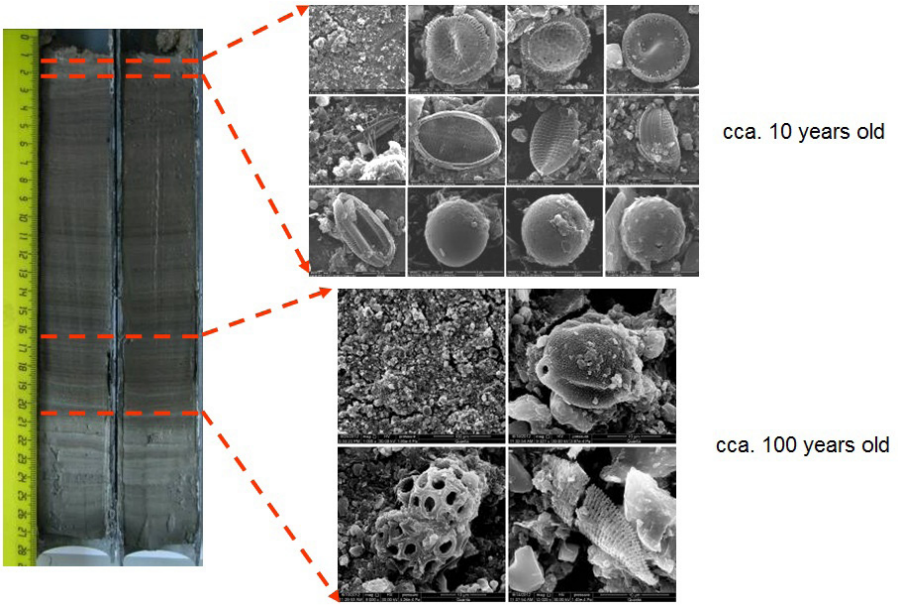

Fig. 2. The electron microscopy photographs of diatoms from the upper part of Lake Shira sediments. The analysis was performed and the picture was kindly provided by the doctor Alena Firsova from the Limnological Institute of SB RAS (Irkutsk)

This year, a joint project was launched in Siberia: this project is aimed at investigating saline inland lakes. The three-year project is financially supported by the Siberian Branch of Russian Academy of Sciences and is focused on promoting collaboration and interdisciplinary research. Participants of the project are limnologists, geologists, modellers, and biophysicists of five cities and six institutes of the Siberian Branch of RAS. The participating institutions are:

- Institute of Biophysics SB RAS (Krasnoyarsk, http://www.ibp.ru)
- Institute of Geology and Mineralogy SB RAS (Novosibirsk, http://www.igm.nsc.ru/Menu/MainPage.aspx)
- Institute of Computational Modeling SB RAS (Krasnoyarsk, http://icm.krasn.ru/index.php?lang=eng)
- Institute of General and Experimental Biology SB RAS (Ulan-Ude, http://www.igaeb.bol.ru/en/)
- Limnological Institute SB RAS (Irkutsk, http://www.lin.irk.ru/new/index.php/en.html)
- Institute of Natural Resources, Ecology and Cryology SB RAS (Chita, http://www.inrec.chita.ru/en_ver/index.php)

The project is coordinated by Prof. Dr. Andrey Degermendzhy, the biophysicist, academician of Russian Academy of Science.. There are three salines lakes in Siberia of the type described above: Lake Shira (54°30'33.43"N 90°12'37.59"E) and Lake Shunet (54°25'3.65"N 90°13'46.67"E) in Khakassia and Lake Doroninskoye (51°14'8.00"N 112°13'59.00"E) in Transbaikalia.

The first task of the project is to understand and to predict under what conditions a usual, well mixed lake can become meromictic and vice versa. The second task is to study adaptations of different organisms to these unique conditions and theoretically access transformations that occur in the food web when mixing modes are switched on.

The inaugural workshop on the project was held in the field laboratory of the Institute of Biophysics SB RAS at Lake Shira in July 2012. Dr. Ramesh D. Gulati from the Netherlands Institute of Ecology was invited to participate and attend the workshop as an external expert.

(This year, Dr. Ramesh D. Gulati was awarded the title Honorary Doctor of the Siberian Branch of the Russian Academy of Science (RAS). Participation of the well-known scientists like Dr. Gulati in the project offers a good opportunity to get a critical evaluation of the study in its earlier stage and discuss possible publication of the results in international journals. Previously (in 2002 and 2010), Dr. Gulati took active part in the publication of two special issues of the Journal of Aquatic Ecology, which were devoted to Lake Shira studies).

Lake Doroninskoyeis relatively the least studied of the three lakes. Scientists of Chita and Ulan-Ude participating in the project conducted joint studies of the lake ecosystem last winter, and their data raises a number of questions. Lake Doroninskoye is an alkaline lake. The profiles of distribution of physicochemical factors and biological processes recorded in the lake (Zamana and Borzenko 2007) seemed unusual to many of the specialists.

The next workshop is likely to be held in Chita. Lake Doroninskoye is difficult to access, but needs to be carefully monitored. The participants will conduct field studies on Lake Doroninskoye, in order to resolve controversial issues arising from their data collected so far. Other workshop participants reported studies of lakes Shira and Shunet. These lakes have been investigated for many years (e.g. Degermendzhy and Gulati 2002; Zadereev and Tolomeyev 2007; Degermendzhy, Zadereev, Rogozin, Prokopkin, Barkhatov, Tolomeev, Khromechek, Janse, Mooij and Gulati 2010), and new objectives have come to the fore.

Dr. Ivan Kalugin, a geologist from the Institute of Geology and Mineralogy SB RAS (Novosibirsk), reported results of using bottom sediments from Lake Shira and used his data to reconstruct the climate and the state of the lake for the past 2 500 years. Metabolism of bacterial communities typical for the meromictic waters leave behind specific pigments in lake sediments. A study of the composition of bottom sediments, their state, pigment concentrations, and

some other biological markers can offer a means to characterize of the lake as it was several hundred and even several thousand years ago. Previous studies showed that bottom sediments of Lake Shira were distinctly layered. By now, the sediments have been dated and sedimentation rates in the lake estimated (Kalugin et al. 2012). At the present time, Lake Shira is probably the only lake in Russia whose layered sediments have been dated.

Denis Rogozin, a biophysicist at the Institute of Biophysics (Krasnoyarsk), reported his recent studies of using the pigment of purple sulfur bacteria, okenone, as a marker of the lake's meromictic state. The logic of using the pigment of sulpher bacteria seems quite clear. If the lake is not mixed, at the boundary of the hydrogen-sulpher layer there are purple bacteria, and their remnants are buried in bottom sediments. If the lake is mixed, there are no purple bacteria at all or their concentrations are very low, and the amount of their pigment in the corresponding layers must be significantly lower (Rogozin et al. 2011). By examining sediment layers of the past several thousand years, one can predict the future state of the lake.

Alena Firsova, a biologist of the Limnological Institute (Irkutsk, Siberia) conducted her first project-related field work at Lake Shira in May 2012. She presented preliminary results of on the remnants of diatomic algae in sediments of Lake Shira. Diatomic algae are among the most commonly used biological markers preserved in sediments. High professional skills and state-of-the-art equipment are, however, required to study them. In addition to bacteria and algae, remnants (or even imprints) of different animals – from small crustaceans to fish scales – can be detected on the lake bottom.

While sediment-related studies are aimed to gain an insight into the past, the joint efforts of hydrophysicists, mathematicians, and biophysicists are directed to the predictions of the future. Integrated mathematical models describing the behavior of the lake and its ecosystems under different climate conditions can be used to evaluate the stability of the meromictic state (Prokopkin et al. 2010). This is not a simple task: too many interrelated processes occur even in a small lake to be perfectly ensured that the forecast is accurate. Two years ago, hydrophysicists of the Institute of Computational Modeling SB RAS began to use Doppler current profilers to study 3D structure of currents in these lakes. This year, the Institute of Biophysics SB RAS has installed a weather station at the Institute's field laboratory. Temperature sensors that continuously monitor water temperature have been installed at Lake Shira. The analysis of the temperature, weather, and hydrophysical data lines will enable insight into mechanisms of stratification and development of currents in the lake, providing the basis for the prediction of the stability or instability of the meromictic state.

Siberian scientists are open to suggestions of joint studies on the stability of stratification and functioning of meromictic lakes. The field laboratory at Lake Shira invites all those who would like to work there. It may be mentioned here that quite recently, a partial mixing occurred in the Salton Sea (US), which resulted in the high mortality of fish and the spreading of the toxic gas cloud as far as Los Angeles. These events suggest that accurate prediction of the stability of the water column in lakes is a very important task.

Participating scientists at the meeting in Shira (Siberia).

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Epibionts on Zooplankton In two Brackish, meromictic Lakes in Khakasia, southern Siberia, Russia

Many researchers (Corliss, 1979; Song, 1991; Laura Roberta Pinto Utz, 2003) have noted the importance of ciliated protozoa (such as sessile peritrichs) as ectocommensals that live on the surface of zooplankton in marine and freshwater habitats. Identification of the epibionts, studying their structural characteristics and succession in aquatic ecosystems are the important research tasks that are needed to understand the the ecology of epibiont organisms. Henebry and Ridgeway (1979) have assumed that commensalism between ciliates and their invertebrate hosts is indicator of water pollution and that the epibiosis might be used as a bioindicator for water quality.

Protozoan epibionts have been observed in different ecosystems as noted from published literature, but the relationships between the epibiont organisms and their hosts are not clearly understood (Carman & Dobbs, 1997; Ferna´Ndez-Leborans et al., 1997).

We observed (2004-2012) protozoan and algal epibionts dominating the zooplankton assemblages, e.g. on calanoid copepods *Arctodiaptomus salinus* in brackish water lakes Shira and Shunet (Republic of Khakasia, Southern Siberia, Russia). Although the calanoid copepods had high level of infestation by infusorians, these features have so far been neglected as essential components on fauna of these two lakes.

Both these saline lakes are meromictic, and are characterized by a pronounced hydrogen sulphide (H_2S) layer: this anaerobic zone is located at 13m in L. Shira and at 6m in L. Shunet. The lakes have a simplified food chain being without fish in a pelagic zone. The maximal depth of Lake Shira is 24m, the salinity in the water column increases from the 14 to 15g/l in the mixolimnion to up to 19 g/l in the monimolimnion. The Lake Shunet is much smaller and shallower (depth maximum 6m). The salinity increases with depth from 19-20 g/l to up to 60 g/l near the bottom (Degermendzhy et al., 2010).

The calanoid copepod *A. salinus* was the most abundant zooplankter in the zooplankton assemblages of both these two lakes. Its average summer densities in the water column were 141±26 x 10^3 ind/m^3 in L.Shira and 90±11 x 10^3 ind/m^3 in L.Shunet in 2003-2009. This copepod reached up to 98% (L.Shira) and 100% (L.Shunet) of the total density of pelagic zooplankton organisms (Anufrieva, 2006; 2007; 2011).

All protozoan epibionts found adhering onto *A. salinus* were identified as *Epistylis* sp.: Family Epistylididae Kahl, 1933; Genus *Epistylis* Ehrenberg, 1838 (Protozoa, Ciliophora, Peritrichida) (Fig. 1).

We studied the structural parameters of zooplankton-epibiont community (epibiosis *Epistylis* sp./*A. salinus*): infection prevalence by the epibionts on *A. salinus* (percentage of substrate organisms with epibionts), epibiont density (epibiont colonies/host), burden (number of epibionts on a substrate organism), load (zooids/colony), mean number of zooids per colony on host (adults, copepodites and nauplii of *A. salinus*) and we observed the presence of peritrichs on different body parts.

Lake Shira. The length and width of the zooids *in vivo* were 37.8±1.3 µm and 24.8±1.0 µm, respectively. The colonies usually had up to 15 bell-shaped zooids, the size of colonies was up to 150 µm, and the epibiont load was 2-15 zooids per colony.

Lake Shunet. The average cell size of peritrich epibionts *in vivo* was 39.1±1.6 x 26.7±1.5 µm. The colonies were up to 120 µm in size and their epibiont load ranged from 2 to 24 zooids/colony. The colonial sessile ciliate *Epistylis* sp. had bell-shaped inverted form, which became oval on contraction. These ciliates had a C-shaped macronucleus located in the upper half of the body, the size of basal and lateral stalks of coenobia was medium, they were transparent and non-contractile (Fig. 2).

We observed epibionts on all the developmental stages of *A. salinus*: the nauplii, copepodites and adult. The infestation prevailed from 67% of the population of *A. salinus* in lake Shira to 87% in lake Shunet. *Epistylis* sp. was observed in summer and during ice period

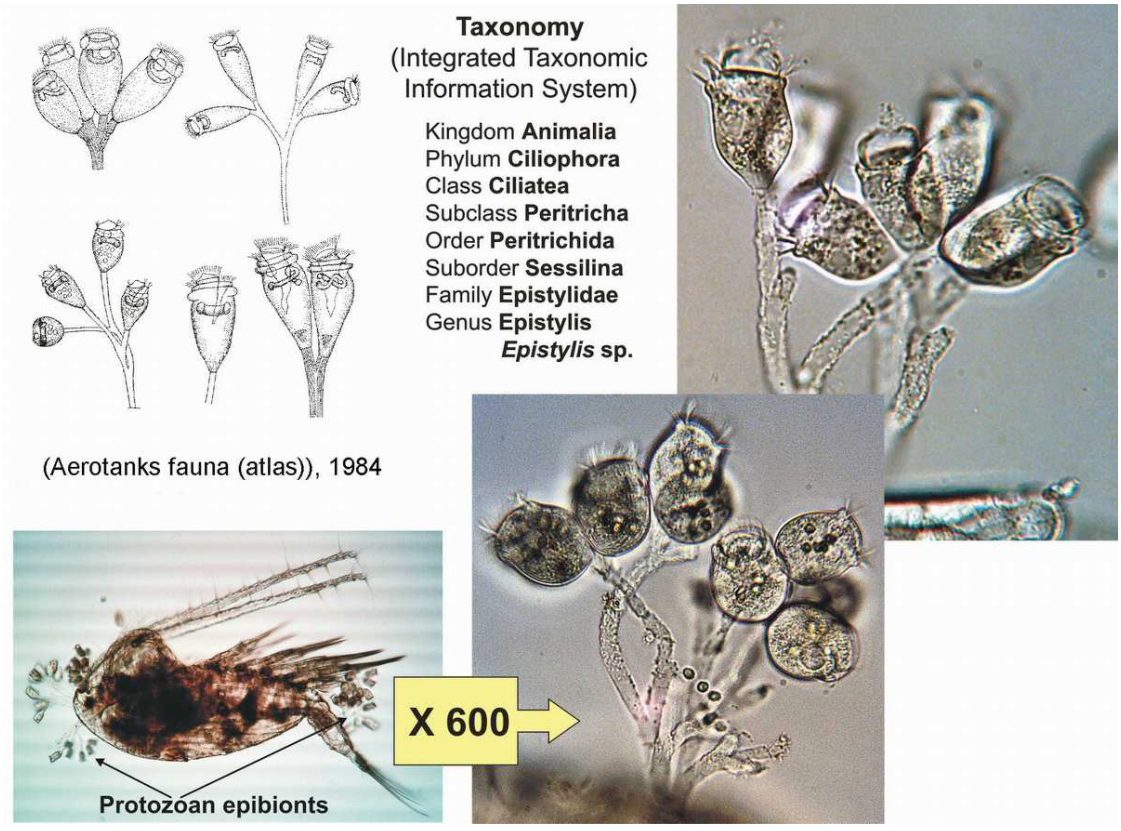

Fig. 1. Protozoan epibionts Epistylis sp. on A. salinus (Identification and studying of morphological features of epibionts were investigated using live observations and photographed by light microscopy (x600) with Lumenera INFINITY digital camera and MC-3254R/MFG 3ccd color video camera (AVT-Horn, Aalen, Germany) with Axiovision software (Zeiss Inc. version 3.1)

(in *A. salinus* population from 34% in lake Shira to 100% in lake Shunet). The majority of publications about epibionts mention an infestation prevalence of >5 % in the summer when water temperature and density of zooplankton are high.

The localization of the epibionts on host became chaotic when the infection prevalence was at its highest.

The epibiont *Epistylis* sp. occurred mostly on the cephalothorax (thorax and head), abdomen, swimming legs, caudal ramus, antenna I, leg V, all surface of *A. salinus*, the host (Fig. 3).

Willey and Threlkeld (1995) observed the algal and protozoan epibionts to coexist on crustacean zooplankton. We also found an alga, *Colacium* sp., colonizing together with the peritrichs on *A. salinus* in both the Khakasian lakes. This alga was found on the host in the lake Shira, and together with *Chlorangiopsis epizootica* (Chlorophyta), pennate diatoms *Synedra* sp. was also registered in the lake Shunet (Fig. 4).

Initially, we came across certain problems relating to identification and structure of the protozoan epibionts. The complex character of epibiosis in lakes is unique, with the highest infestation prevalence in summer and in ice period with co-existing the algal and protozoan epibionts. We will continue studying the epibionts, the mutual relations between the epibionts and their hosts, the role of the infusorians in a trophic chain and use of the epibiosis as bioindicator of water quality.

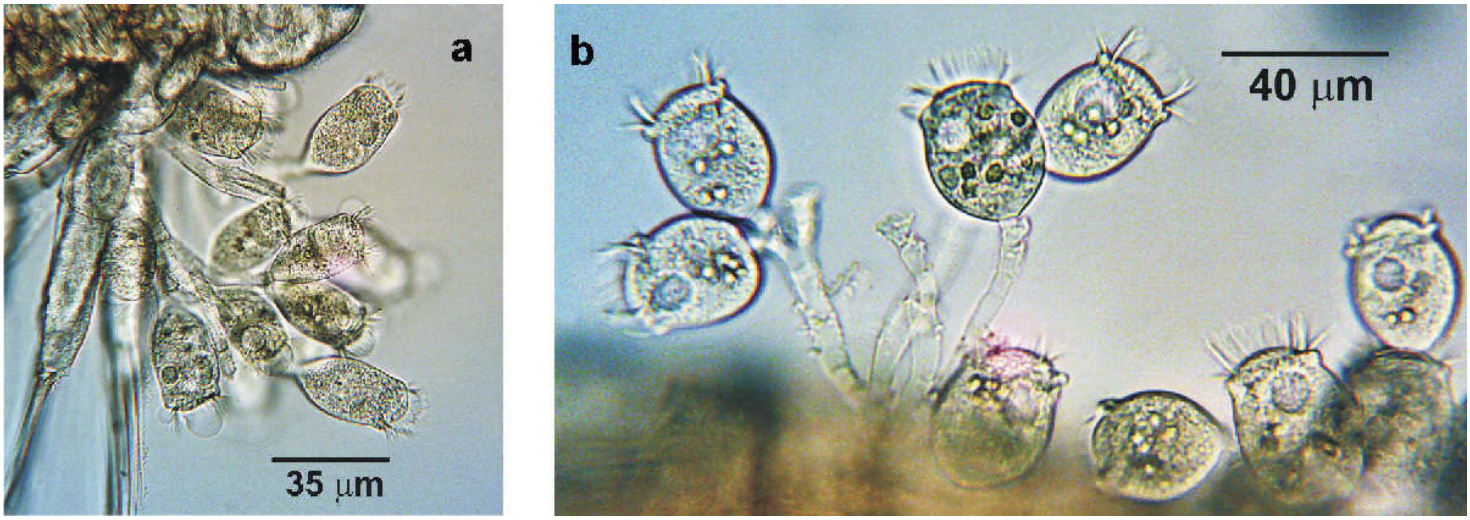

Fig. 2. The zooids Epistylis sp. in lakes Shira (a) and Shunet (b)

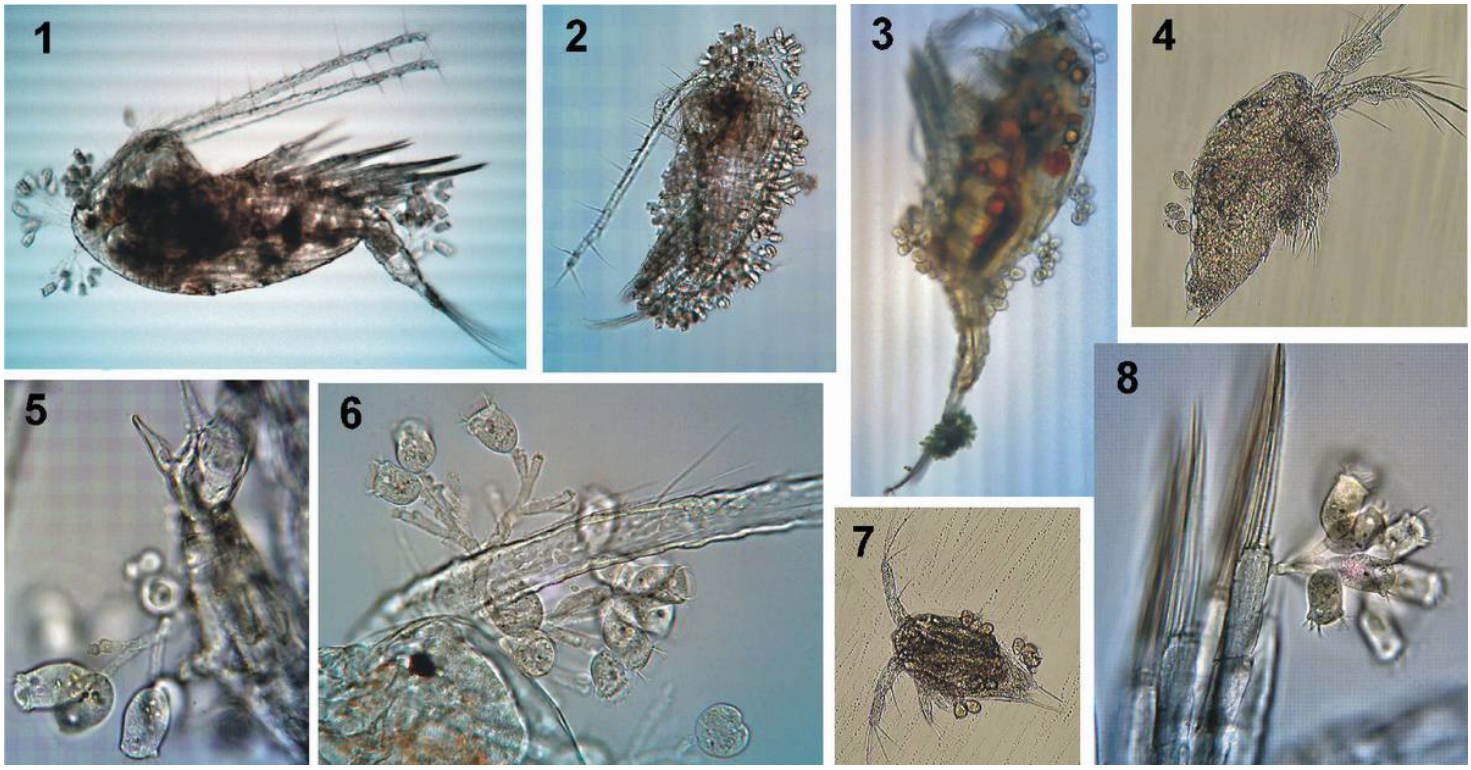

Fig. 3. The localization of Epistylis sp. on the body of adult A. salinus: 1 – head, abdomen; 2 - all surface of host; 3 – thorax; 5- leg V; 6 - antenna I; 8 - swimming legs. 4, 7 – on the nauplii

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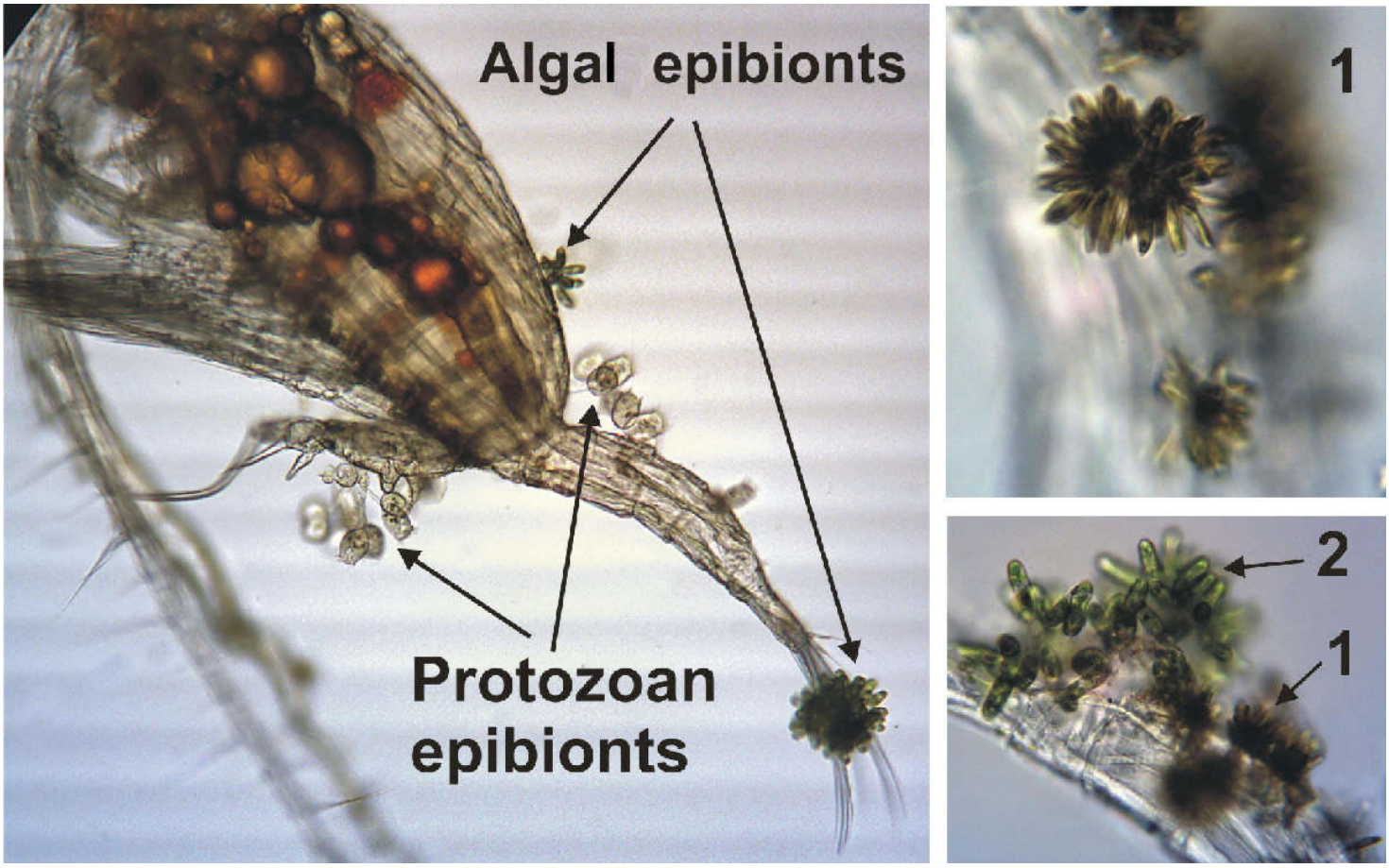

Fig. 4. The algal and protozoan epibionts on A. salinus (L.Shunet). 1 - pennate diatoms Synedra sp., 2 - alga Colacium sp. (Chlorophyta)

Are Cyanobacterial Blooms in South Africa Serious?

Worldwide and in South Africa, there seems to be an increase in the frequency of cyanobacterial and dinoflagellate blooms recorded (Guven and Howard 2006, Harding and Paxton 2001, Van Ginkel 2004). This may be the result of increased eutrophication and/or increased and more effective monitoring of phytoplankton in the water resources. A number of factors can contribute to the phenomenon, of which the impact of global warming (Guven and Howard 2006,) and the expected increases in water temperatures (Van Ginkel and Silberbauer 2007), especially the increases in minimum temperatures are but one of the potential factors contributing to the establishment of more cyanobacterial and dinoflagellate blooms.

The ingestion of water containing high concentrations of cyanobacterial toxin (in drinking or in recreational waters) presents a risk to human and animal health (WHO 1999). The increasing frequency of cyanobacterial blooms in South African impoundments and rivers is a cause for concern. Since 1990, the research focus, internationally and nationally, has shifted to expanding our knowledge of the driving forces behind cyanobacterial blooms and cyanobacterial toxin production. Toxic cyanobacterial blooms are a threat to the supply of safe drinking water in large parts of South Africa especially in areas where water purification is minimal or not fully functional as is the case in the Northern Cape.

Microcystis is the dominant bloom-forming cyanobacterial species present in South Africa (Wnorowski, 1995; Harding and Paxton, 2001; Van Ginkel, 2004). Additionally *Oscillatoria* spp. (Harding and Paxton, 2001, Van Ginkel 2004) and *Cylindrospermopsis* (Van Ginkel 2004) occur occasionally in bloom-forming condition.

Production of cyanobacterial toxins in five South African hypertrophic systems is several orders of magnitude higher than figures reported for northern hemisphere countries (Fig. 2). The 5 most hypertrophic systems in the northern parts of South Africa have total mycrositin toxin concentrations in excess of 1 µg/ℓ for more than 80% of the time (Fig. 1) and pose a serious health hazard to especially recreational users. If the Drinking Water facilities do not have the correct and efficient systems in place, even the drinking water from these impoundments cause a health risk to users. The maximum total microcystin concentrations measured are also much higher than those reported in Finland, Spain and North America.

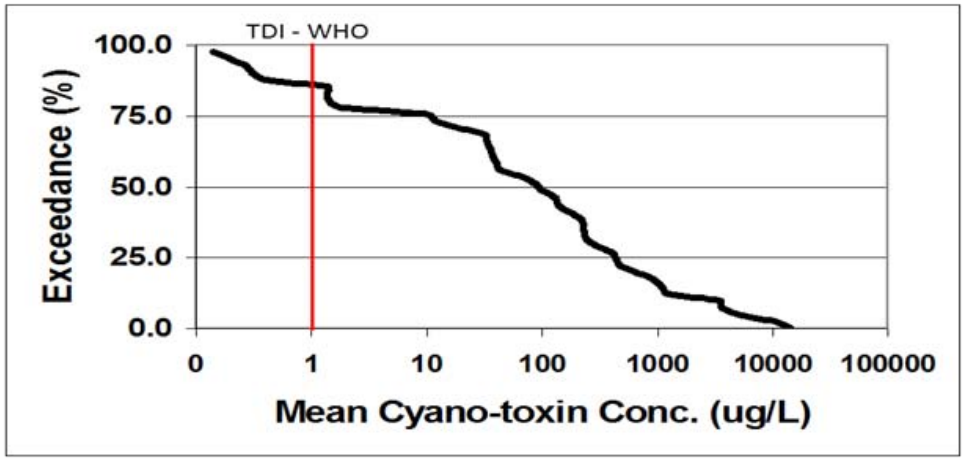

Figure 1. The percentage of time that cyanobacterial toxin concentrations (total microcystin concentrations) in 5 hypertrophic impoundments of South Africa (2003-2004) exceed the TDI (total daily intake concentrations) as specified by the World Health Organisation (WHO, 1999) (Van Ginkel et al. 2006)

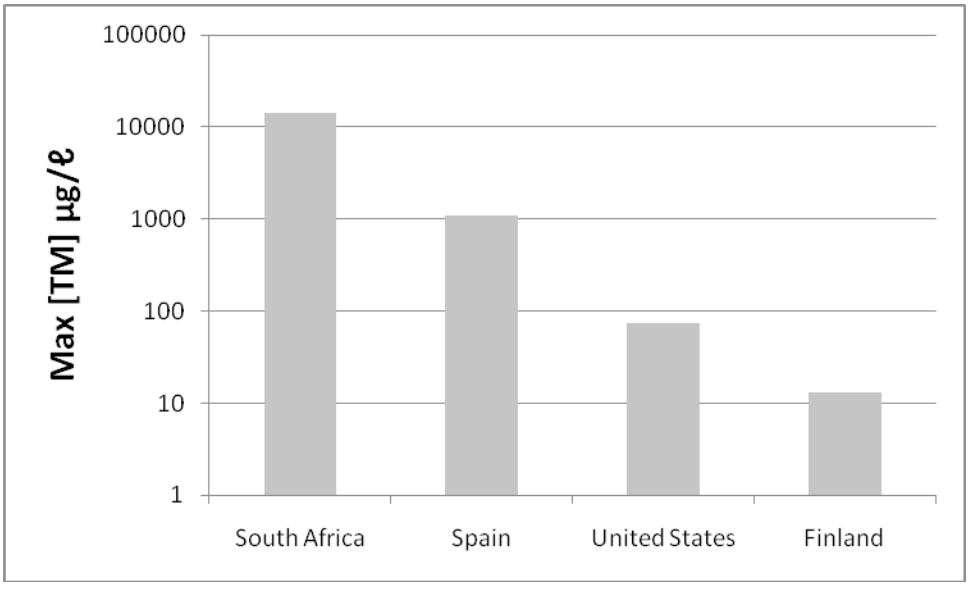

Figure 2. A comparison of the maximum total microcystin concentration reported in studies from Finland, USA, Spain and South Africa (Van Ginkel et al. 2006 and Quesada et al. 2004).

Total microcystins are mixed throughout the water column and even on occasions down to a depth of 20m, although, the main biovolume of *Microcystis* is, when present, only in the upper 10m. This indicates that released microcystin can be mixed into the whole system, without the cyanobacterial species being present at certain depths (Van Ginkel 2008). This has implications for drinking water facilities, which may measure the algae content of the incoming water. If no algae or cyanobacterial are present no prevention methods for cyanobacterial toxins are taken. *Anabaena*, although present is not associated with the presence of total microcystin.

The severity of cyanobacterial blooms in South Africa is evident from the number of livestock and wild animal deaths recorded since 1950 (Harding and Paxton 2001) and is further highlighted by the research of Van Ginkel (2004), Van Ginkel *et al.* (2006) and Van Ginkel (2008). In addition eutrophication-related contamination of water in the Kruger National Park with the associated large mammal (rhino and buffalo) deaths were reported during 2005 and 2007 (Oberholster *et al.* 2009).

These different studies indicate that cyanobacterial blooms can occur irregularly like the Orange River incident (Van Ginkel 2004) or can occur on a regular annual basis as is the case in the hypertrophic dams studied

by Van Ginkel (2008). Clearly, South Africans need to be concerned about cyanobacterial blooms as they are often seriously toxic events. Management techniques aimed at preventing widespread cyanobacterial toxin poisoning need to be developed and implemented in South Africa so as to ensure the safety of all water users of raw or treated water resources in South Africa.

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Charting a course for ecosystem services in Lake Kinneret, Israel

Introduction

Francois-Alfonse Forel, the founder of limnology in the 19th Century, in his pioneer study of Lake Geneva, was the first to recognize the relationship between humans and freshwater resources, especially that humans should be considered a major component of lake ecosystems. Forel's perspective on Lake Geneva is highly relevant even today, and his quantification of the local fishing economy was the foundation for the current thinking on ecosystem services. Still, we are faced today with the dilemma of deciding whether lake utilization for human society is possible without compromising ecosystem structure and function or whether ecosystem services should be reserved solely for the lake ecosystem, ignoring human needs and benefits partially or totally. Currently, Lake Kinneret, Israel, is in the midst of a controversy of the both state authorities and scientific communities regarding the management of expanding shoreline terrestrial vegetation associated with profound lake water level reduction.

Nature of the Problem

A wide belt of *Phragmites australis australis* and *Tamarix jordanis* community has become established along the shore of Kinneret as lake's water level dropped progressively by 4.7 m, during the last 10 years. Heavy rainfall last winter caused an exceptional water level increase, and the vegetation partly covered by water, decomposed and was accompanied by an outbreak of mosquitoes (including common Malaria Parasite carriers, *Anopheles spp*. and the fever West Nile Virus vector, *Aedes albopictus*, The Asian Tiger Mosquito), and unpleasant odors of sulphide and ammonia. In addition, public access to the lake has decreased since initial expansion of the plants and has been further hindered recently by decomposing plant matter. Faced with protests from the local inhabitants and economic loss from this popular tourist attraction, local government and scientists are faced with the dilemma of calculating and balancing the natural and economical costs of ecosystem services. One basic, hotly debated question is whether to cut and remove the vegetation that has invaded and colonized extensive areas of exposed lake bottom at popular recreational sites.

Management Proposal

An application has been submitted by The Lake Beaches and Cities Association (Interior Ministry) to The National Water Authority-Lake Kinneret Authority to remove part (29% of beach shoreline area) of the vegetation along the shore line during fall-early winter when water level is at its annual minimum. This proposal aims to eliminate smell and mosquito problems for the both recreationists and nearby residential population, and improve public access to the lake to enhance and restore the potential of the long designated recreation sites.

Mean width of the vegetation belt along the ~60 km shoreline of Kinneret is ca. 100 m to occupy about 200 ha. To facilitate recreational use of the lake, plant removal is proposed for only 15 sections of beach front, totaling 17.1 km (29% of total shoreline).There are three types of Kinneret beaches: 1) Twenty sections (each 150 m long), legally designated by the Interior Ministry as being in public

or private ownership and obliged to maintain a life saving hut with 75 m of bare beach on each side: Total length 3 km (5%); 2) Nature reserves where vegetation is totally protected. Removal of plants is neither planned nor permitted: Total length 40 km (66%); and 3) Open beaches for public recreational use, where vegetation (two target species) will be cut a few cm above the ground (no uprooting): 15 sections, total length 17.1 km (29%).

Photos 1& 2: Lake Kinneret: Terrestrial Vegetation (Phragmites. sp & Tamarix. spp) developed on exposed area of public beach partly covered by recent water level inundation. (photo: M. Gophen)

Areas of Disagreement

Sediment Compaction

Critics of the current management proposal argue that mechanical plant harvesting will compact soil because of the weight of the equipment and will disrupt the sediment through uprooting of vegetation, thus increasing availability of the nutrients for transport to the lake. The proposed removal of the vegetation will follow currently accepted practices employed throughout central and northern Europe to minimize any sediment disturbance. Cutting will not disrupt plant root structure. Harvesting plants on stable sediments and soils around Lake Kinneret will result in a low plant cover to prevent erosion.

Nutrients and Eutrophication

Sukenik & Parparov (2008) from the Kinneret Linmnological Laboratory examined nutrient content of terrestrial beach vegetation and potential loading to Lake Kinneret. They documented (KLL Report 2008) a situation in 1999-2001 that was similar to the present one. Ten years of drought had resulted in progressive decrease in water level, but high rainfall in the winter of 2002-2003 increased both lake level, by 2.4 m, and consequently plant decomposition. They estimated that vegetation colonizing exposed lake bottom during the drought accounted for 12,910 tons of organic matter, 181 tons of TN (12% of annual external loading), 33 tons of TP (33% of annual external load). Approximately 40% of the vegetation was concentrated in near shore areas of the nature reserve along the north-eastern region of the lake. Increased water level during the winter of 2002-2003 accounted for an additional loads estimated as 1.5 ton TDP, 26 tons of NH_4 and 158 tons of TDC of loading to the lake. Monthly inputs of TDP from decomposed terrestrial vegetation during May –June 2003 were an additional 25-38% to the normal averaged external lake loads. Selective removal of shoreline vegetation would clearly reduce plant-related loading to the lake.

Fish Habitat

Proposal detractors criticism note that vegetation removal could have serious implications for *Tilapia* recruitment. In studies carried out in lakes in Florida

and Kinneret in Israel we have not observed *Tilapia* nesting within dense emergent vegetation. *Tilapia* in Lake Kinneret (*Sarotherodon galilaeus, Oreochromis aureus, Tilapia zillii*) construct their nests on bare lake bottoms near shore, and the fingerlings, after being released from the parents' mouth, find refuge among submerged macrophytes (*Potamogeton spp. Myriophyllum sp. Ceratophyllum sp. Najas spp.*). We believe that removal of *Phragmites* and *Tamarix* will have no impact on the nesting behavior and fingerling survival of *Tilapia*. *Phragmites-Tamarix* as Habitat

A key issue is whether the entire area of plant cover has conservation value or whether it is concentrated at the edge of the vegetated extent. Investigations throughout the Mediterranean basin, including Greece, and elsewhere have clearly demonstrated that conservation value of dense *Phragmites* areas is limited to a narrow fringe at its outward margin, with little to no importance of interior areas. Therefore, the proposed selective harvesting will increase the edge length of the *Phragmites-Tamarix* community and actually increase its conservation value. It is also likely that the management plan will encourage growth of other species and increase plant biodiversity.

Conclusions

Management of the *Phragmites-Tamarix* community that has invaded the exposed bottom of Lake Kinneret has resulted often in heated discussions among the public, municipal authorities and scientists. The current disagreement centers around whether to remove plants selectively from areas designated as public recreational sites, or to leave the current colonized area intact as a conservation unit. Presently, although compromise is elusive, it is much needed because Kinneret is a precious lake within the this regional arid landscape. We hope that by involving the international limnological community, we can use additional perspectives on *Phragmites* management and development of sustainable multiple uses to manage this treasured ecosystem. We welcome all comments that will clearly channelize the current discussion.

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SIL Working Group on Wetlands

The year 2012 witnessed an unprecedented burst of activity centered on wetlands in different continents. The Ramsar Convention had its 11th triennial Conference of Parties in Bucharest (Romania) during 6-13 July 2012. It was preceded by the INTECOL's 9th International Wetlands Conference (Orlando, USA; 3-8 June 2012) and followed by the First National Conference on Wetlands of Brazil (Cuiaba; 6-8 August 2012). The Government of Nepal organised an International Wetlands Symposium (Pokhara; 7-9 November 2012). The 13th International Conference on Wetland Systems for Water Pollution Control (a biennial conference of the International Water Association) was also organised during 25-29 November 2012 (Perth, Australia). National conferences on wetlands were organised in New Zealand (21-23 March 2012), South Africa (Pretoria; 23-26 October 2012) and India (Kottayam, Kerala; 6-9 November 2012).

Although I was invited to the meetings in USA, Brazil and Nepal, it was disheartening that SIL or its Working Group on Wetlands was not officially involved in these wetland activities. The SIL Working Group on Wetlands has existed for many years but it went into hibernation after the death of Prof. Robert G. Wetzel. There are also other working groups, e.g. those on Aquatic Birds, Aquatic Biodiversity and Macrophytes whose interests overlap with those of the Wetland Group. The members attending the 31st SIL Congress in South Africa disagreed with the suggestion to merge the Working Groups on Macrophytes and Wetlands into one WG (SIL News 57) but called for their closer collaboration. Before the Executive Council considers the continuation of the Working Groups at the next SIL Congress (Budapest, August 2013), I discuss here some questions: can we do away with the WG on Wetlands? and what role can it play internationally? I hope that the members will respond and help re-activate it with vigour.

The Ramsar Convention, which started in 1971 with a focus on wetlands 'especially for the waterfowl', has over the past 4 decades expanded its scope by defining wetland broadly to cover all inland and coastal aquatic ecosystems (also the marine coral reefs) less than 6 m deep at low tide. SIL is the only international scientific organisation which encompasses the basic and applied aspects of all inland aquatic ecosystems. The Ramsar Convention had its roots in the Project MAR initiated in 1962 by the IUCN to compile a list of of European and North African wetlands of international importance, based primarily on ornithological data (see Matthews 1993). Perhaps very few of the current SIL members would know that SIL had called for conservation of internationally important aquatic systems as early as 1959, and initiated an inventory, with the support of the IUCN in 1961, under the title Project Aqua. The Project could be realised only after the support of the PF section of the IBP in 1969 (Luther & Rzoska 1969). However, SIL has not been able to play the role that it should in strengthening and implementation of the Ramsar Convention by providing scientific support to the Convention and at national and regional level to the Contracting parties.

The recently concluded COP11 of the Ramsar Convention identified the need of 'diverse target audiences' for *'scientific and technical advice, support and information at differing scales relevant*

to their responsibilities or interests, including at local or wetland site scale, river basin scale, and national, regional and global scales'. It also recognised that '*many wetland site managers and local communities among others*' … *'lack the resources or the networks through which to access such information and training*'. As further recognised by the Convention, the wetland managers and policy-makers also need relevant, credible scientific information on wetlands that can be utilised in responding to the related sectors of water, energy, biodiversity and climate change. It is this niche, for providing a strong scientific foundation for conservation of wetlands (in their broadest definition adopted by the Ramsar Convention) in different countries and regions and for networking in order to reach the target groups, that awaits the SIL to step in. Similar to other scientific International Partner Organisations like the Society of Wetland Scientists (SWS), the SIL could contribute significantly to the goals of the Ramsar Convention. Conservation, management and restoration of all aquatic ecosystems require a sound scientific understanding of their biophysical attributes, functioning and response to various natural and anthropogenic stressors on a landscape level. The wide-ranging expertise available within SIL is certainly appropriate to the needs of the Ramsar Convention.

Active involvement with international Conventions (also the Convention on Biological Diversity) would help the SIL to become more visible and attractive to the individual members. As pointed out by our incumbent President, scientific societies are no more attracting membership for the sake of subsidized journals or conferences. In addition to their main role of promoting exchanges between researchers in particular disciplines, the societies like SIL have a much larger role to play - that of communicating science to the managers, policy makers and the community, and that of training and capacity building beyond the framework of formal classrooms.

In this context, I see a potential for the revival and vigorous growth of the Working Group on Wetlands. It should also coordinate and collaborate with other Working Groups and prepare position papers on various issues relevant to the Ramsar Convention. I request all SIL members interested in being a part of the Working Group to write to me at ciwsa.nie@gmail.com. Please let me know of your interests and ideas for the activities that could be undertaken during the next year or two. The Working Group is open also to the individuals who may not be a member of SIL at present but would like to join later. We will start an email-list by the end of this year so that members can freely communicate with each other.

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Guanotrophication in shallow reservoirs of Sri Lanka

A visit to any inland reservoir in the country in any time of the year is associated with encounters of numerous waders and wetland associated birds in Sri Lanka, where the bird diversity is estimated to be 453 species, including 33 endemics. In certain parts of the country, birds are partly replaced by permanently roosting bats in trees along the catchments of reservoirs and this feature has been viewed as part of biodiversity in tropics. But, is that all? One important process that has gained the attention of limnologists is the contribution of bird faecal matter as a source of essential nutrient to the wetland ecosystems.

Nutrient transport by animals can contribute to the ecosystems' allochthonous input, altering the ecosystem functions and species composition through the food web (Polis *et al.*, 1997). 'The diet of wetland birds consists mainly of fish, mollusks, crustaceans, insects, etc., and the birds excrete nutrient rich guano, high in both nitrogen and phosphorus (Breuning-Madsen et al., 2010). The excrements are mainly dropped in narrow nesting areas, and thereby the soils and water can get heavily enriched with nutrients such as nitrogen (N), and phosphorus (P) and other elements e.g. potassium (K) and calcium (Ca). As a consequence, such allochthonous inputs to ecosystems can lead to substantial enrichment of the soil and water with N (Hobara *et al.* 2001) and P (Baxter and Fairweather, 1994), both of which are potentially limiting factors for the biological productivity of aquatic ecosystems (Vitousek & Howarth, 1991).

Since ancient times, water from Sri Lanka reservoirs has been used for farming specially growing rice and it is apparent that birds and bats have been silently enriching the soil and water used for farming. Today however, ecosystem functioning of most reservoirs is rapidly changing due to negligence, spread of invasive aquatic flora and alteration of irrigation paths by diversions, filling and constructions. Bird species associated with reservoirs are accordingly changing-- specially the open-water loving species such as small grebes (*Tachybaptus ruficollis*) are gradually declining. On the other hand, increased numbers of some species are evident. Also, human activities have resulted in certain wetland associated bird species to be opportunistic (Gunaratne et al. 2009). For example in Sri Lanka,

Purple coot or swamphen (Porphyrio porphyrio) feeding on mat of water hyacinth.

reservoir-associated bird species such as Asian open bill (*Anastomus oscitans*), and purple coot (*Porphyrio porphyrio*) have been identified for most dry zone reservoirs in Western and North-western Provinces. A recent study on the impacts of Asian open-bill nesting in a cascade seasonal reservoir system known as Anavilundawa has revealed the impact of faecal matter on water quality. Anavilundawa is a RAMSAR site, a sanctuary famous for migratory birds. As the reservoirs of this cascade system are shallow, there are wetland-associated trees within the reservoirs. In Anavilundawa reservoir system, a large flock of open-bills congregates to breed in trees within reservoir and during that process excrete directly to water. The open-bill numbers are increasing and during the study period between March 2008 and March 2009, approximately 400 birds nested at a time. Water taken from the breeding ground area indicated elevated levels of nitrate (0.55 ± 0.08 mg/l), ammonia (1.93 ± 0.70 mg/l), phosphate (0.99 ± 0.12mg/l)) and alkalinity (207.7 ± 13.6mg/l) while dissolved oxygen (2.03 ± 0.16 mg/l) declined in the immediate vicinity (Figure 1). The elevated nutrients also resulted in increased floral cover which was mainly exotic water hyacinth (*Eichhornia crassipies)*. However, this process could also work the other way too, where presence of birds influencing the eutrophication of reservoirs positively by feeding in the water but by excreting on land and water directly.

The role of invasive flora in reservoirs of Sri Lanka entered a new stage with the findings that they help in ameliorating eutrophication. The general perception regarding aquatic invasives is negative and most management recommendations target containment or eradication of these invasive forms. Therefore, second thoughts on impacts of such management is necessary specially how we go about disturbing the ecological relationship established by the invasives with other biota and abiotic environment. This is critical as most aquatic invasives have been in the system for over 50 years and are thus a part of the dynamics of the systems. Although anthropogenic activities such as farming have resulted in mass inputs of nutrients into reservoirs, their resilience in most cases could be due to amelioration of nutrient inputs by aquatic plants. Most aquatic plants in reservoirs are invasive species, but the water quality improvement agent is apparently the invasive aquatic plants. Such ecological interactions if disturbed, may result in a rapid deterioration of water quality.

Asian open bill nesting

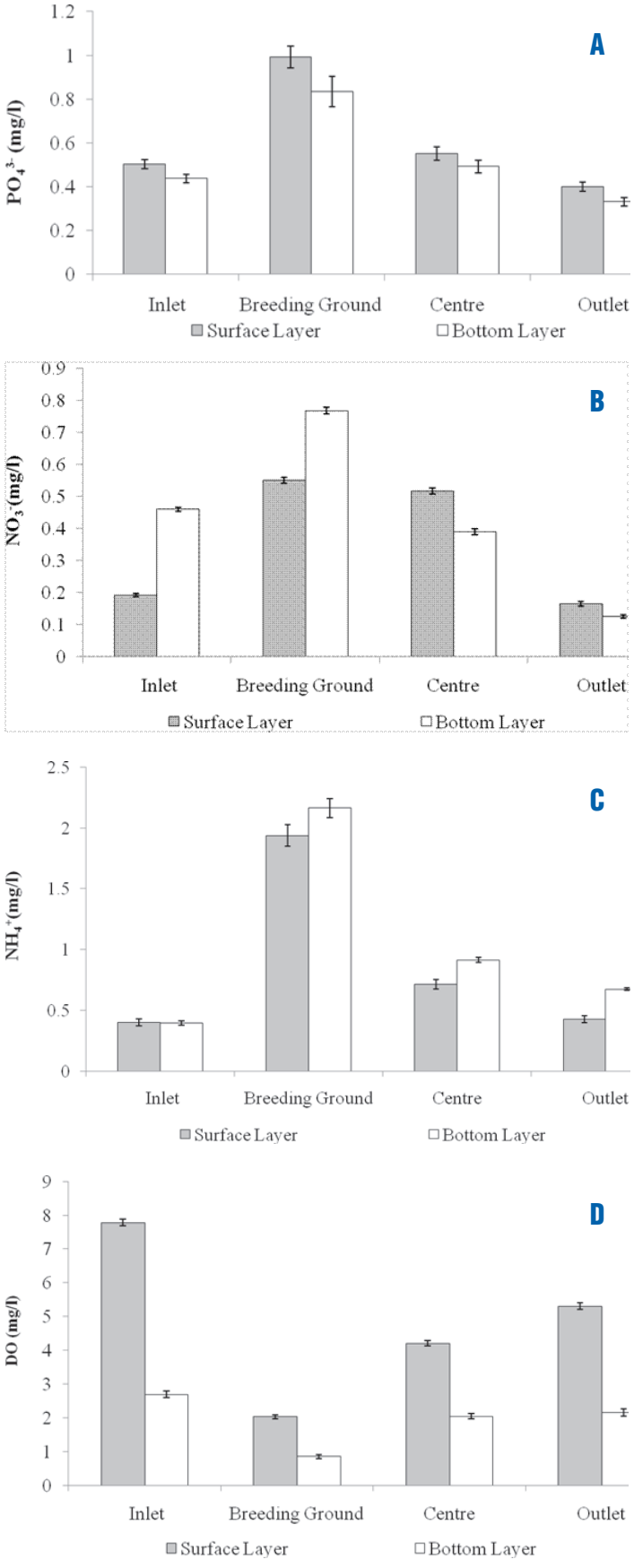

Figure 1. Surface and bottom water quality in various sampling sites in Anavilundawa reservoir. (A) Nitrate content; (B) Phosphate content; (C) Ammonium content; (D) Dissolved Oxygen content

Asian agriculture is at a juncture where hapless use of fertilizers and other synthetic chemical compounds have made most lands virtually uncultivable. Therefore, understanding the natural processes of nutrient enrichment is important as they are non invasive. Similarly managing the reservoirs for their biodiversity is justified indirectly as it is clear that these complex ecological interactions determine the character of reservoirs of Sri Lanka.

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The Institute of Ecosystem Study joins the Researchers' Night 2012: a test of "limnological awareness"

The mega event *RESEARCHERS' NIGHT: Exploring science through fun learning* takes place every year in about 300 cities all over Europe (http://ec.europa.eu/research/researchersnight/index_en.htm).

The Institute of Ecosystem Study, formerly Istituto Italiano di Idrobiologia of Verbania Pallanza (Italy), located on the shore of Lago Maggiore, joined the event, opening its doors to give everyone a taste of the Limnological Research performed there.

The goal was to allow visitors to get in touch with the activities of limnologists, from field sampling to lab testing. In the patio an exhibition of ancient and modern instruments was arranged; visitors could try them, sampling water from a couple of large barrels, one "oligotrophic" and one "eutrophic". The kids learned the difference between the two trophic conditions by dipping a Secchi disk in the barrels.

In the seminary room, researchers working on phyto and zooplakton, bentos, fish, and paleolimnology arranged stands displaying microcosms, samples and instruments to put visitors in touch with the practical aspects of limnological research in its various fields. The guests were also guided through the less visible aspects of limnological research in the laboratory of microbial ecology, observing the techniques of DNA extraction and amplification, bacteria under microscope epifluorescence, and the macroscopic effects of bacterial activity on culture media. Visitors also had the chance to see movies made in the early years of the Institute, restored and screened, featuring the history and activities of the Institute. For the occasion, a series of "unusual postcards from Lago Maggiore" was also prepared, picturing the lake from uncommon perspectives. Just to mention a few, the lake is portrayed as it most likely appeared 7 million years ago or through the uncountable microscopic organisms thriving in the lake water. (The postcards, in Italian, are available at the URL http://www.ise.cnr.it/verbania/ebooks/Cartoline insolite dal Lago Maggiore.pdf).

Surprisingly, we had more than 500 visitors, a high number considering the small size of the city where the Institute is located (38000 inhabitants). This result shows that the appeal of limnological research is really large, at least for those who live on the shores of a lake. It also exposes that the policy of closing down environmental research stations, now spreading in Europe, is short-sighted not only for the impact it will have on research and monitoring but also since it undermines the interests and the curiosity of the wider public. The *RESEARCHERS' NIGHT* was a good test to assess the public interest in lakes and a scientific approach to them. The "limnological awareness" shown by the public is undoubtedly a good omen for the SIL Congress to be held in Turin in 2016.

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Researchers' Night 2012: sampling in a couple of "indoor lakes".

Announcements

Tonolli Awards for young limnologists from developing countries

SIL is pleased to be able to offer a small number of Tonolli awards to young limnologists from developing countries to support individual research projects. The rules for the awards are on the SIL website (http://www.limnology.org/committees/tonolli.shtml) from which an application form can be downloaded as a pdf file. The form gives details of how and where to send the application and instructions for referees supporting the application. The awards will be from 500 to 2000 US dollars and the total sum available is 5000 dollars. The deadline date for applications is December 31 2012.

Progress on Mexican Zooplankton Studies

Proposed international training course on the Selection criteria of zooplankton for aquaculture biotechnology

The discussion on the difficulties in the identification of tropical zooplankton was well summarized by Henri J. Dumont and Jose G. Tundisi nearly three decades ago (Hydrobiologia 113, 1984). H.J.D. also noted the diminishing interest in the taxonomy and lack of experts in zooplankton taxonomy worldwide. So, he offered a series of international training courses on zooplankton taxonomy and biodiversity for 13 consecutive years, with financial support from the Belgian Government (ABOS, General Administration for Development Co-operation). This revived taxonomic interest in zooplankton in Africa, Asia and Latin America. Some of the trainees of the zooplankton training course in Belgium subsequently extended similar training programs in their respective countries. For example, Dr. La-orsri Sanoamuang has conducted similar training courses in Thailand. In Mexico too we held a series of training courses on the identification of zooplankton, mostly for national participants, though we had occasionally participants from some other countries too, e.g. Cuba and Costa Rica.

Information on taxonomy is essential in order to identify or to select zooplankton for basic and applied research. One of the important uses of zooplankton is their role as live food in aquaculture. Although aquaculture and ornamental fish culture is common in Mexico and in other Latin American countries, scientists are severely limited by their inability to recognize appropriate taxa for mass culture in order to reduce early larval mortality. During this course we plan to offer the participants the possibility to improve their taxonomical skills, to collect zooplankton from a nearby lake and to identify taxa that could be useful as fish food and to culture these species in the laboratory.

Latin America offers an exciting academic and scientific atmosphere for studying zooplankton. Researches in basic ecology and taxonomy of zooplankton have been gaining momentum through the organization of international meetings on the Rotifera, 2006 (Mexico City; Sarma et al., 2007); Cladocera, 2008 (Aguascalientes City, Silva-Briano & Sarma, 2010); Copepoda, 2011 (Merida City, Proceedings in process); and SIL-Plankton Ecology Group PEG, 2012 (Mexico City) (Lürling et al., 2012). There have also been a series of regional meetings on plankton research. The use of zooplankton in aquaculture in Latin America and the Caribbean is on the rise as well (e.g., International Zooplankton Production Symposium, Chile, 2011).

Realizing the importance of zooplankton in basic limnology and in applied fields such as aquaculture, ecotoxicology and in the assessment of water quality, the United Nations University through its regional Biotechnology Centre for Latin America and the Caribbean (Caracas, Venezuela) has offered the necessary funding to organize an international training program for the identification of major groups of zooplankton including Rotifera, Cladocera and Copepoda for use in aquaculture biotechnology. The National Autonomous University of Mexico (UNAM) at the Campus Iztacala (North Mexico City) will be the venue for this training program.

The course is scheduled to be held from the third week of January to second week of February 2013, i.e. for 3 weeks. About fifteen participants from the Latin American region will be selected. In addition to the zooplankton taxonomy experts already available within Mexico, some specialists from other countries will also be invited to impart the course in both theoretical and practical aspects of zooplankton identification and culture techniques. Some of the experts (Henri J. Dumont for mainly Cladocera, Y. Ranga Reddy for Calanoid copepods and Jurek Kolasa for flatworms) have already been approached for this purpose.

The costs of air travel and local hospitality of the participants and professors will be covered from grants provided by the United Nations University through its Latin American Centre in Venezuela. The training course consists of both theoretical and practical aspects of identification of major groups of freshwater zooplankton up to the species level and to learn culture techniques for aquaculture.

Those who are interested to obtain more details of this international training course, may contact us by e-mail.

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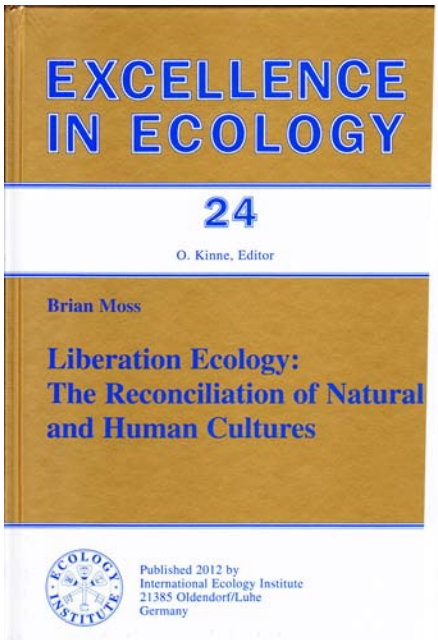
Book Review

Liberation Ecology: The Reconciliation of Natural and Human Cultures. Book No. 24,

*by Brian Moss (ECI laureate 2009 in limnetic ecology). Published 2012 by International Ecology Institute, Oldendorf/Luhe, Germany. ISSN 0932-2205. € 44*in Ecology: Book*



A short note about the author and the book on the back-cover tells the reader that "Prof. Brian Moss has invested his scientific and scholarly skills into studies on freshwater ecosystems from the Arctic to the tropics". This note tell us further about Brian's outstanding work on the eutrophication of shallow lakes, and his ability to explain how entire freshwater ecosystems behave under anthropogenic pressures such as nutrient loads or climate change. We all know that Brian Moss is among the pioneers on lake biomanipulation studies, especially for his use of trophic cascade theory to address ecological problems. Those of us who have had the opportunity to listen to his lectures know that Brian has, indeed, the talents and abilities to present cutting-edge science with ease and a touch of poetry and exhibition of analogies from the world of art. He is both unconventional and innovative in his thinking and writing.

This EE Book 24 has 433 pages, of which the last fifteen provide a detailed index. Each of the 12 chapters has an unusual heading: for example Chapter 1 is headed as "The Emperor's New Suit." It deals with liberation ecology in daily life: Brian dwells upon a variety of issues, e.g. from problems of meager spending on the environment by the governments to issues of his living in the recent past in an industrial town with a lot of sulphur dioxide in the air. Interestingly, he compares the career backgrounds of national leaders of the world's countries in 2009 and shows that only one of the leaders had "any sort of environmental training". Chapter 2 "Six Days and Fifteen Billion Years" a 23-page chapter has a few pages dealing with Archaea, bacteria and Cyanobacteria and evolution of photosynthesis and microscopic eukaryotes. It is rather difficult to review the chapter contents and extract ecology: although the context is ecological, it is such well woven and mingled with other aspects so that is difficult to explain where the ecology starts and where it ends.

Chapter 3 "Testing to Destruction": describes the gas turbine engine, before moving to natural selection and analogy of washing lines that Brian draws between these lines and the great order in the DNA structure. In addition, we are told about many examples of natural selection in action but the one concerning water snakes in Lake Erie is about 1.5 m long snake that feeds on fish is an interesting one (pages 74-75). Chapter 4 "Music to Which All Other Arts Aspire" a parallel is drawn between organisms in an ecosystem, listed as species, with separate instruments of an orchestra. It is an interesting chapter with a lot of information on ecosystems, which are grouped into biomes corresponding to different climate zones. Here, a few pages are devoted to Priest Pot, a small lake, and typical sequence of events in a north temperate lake are illustrated. More musical analogies are drawn. Notes to this chapter tell us about bacterium that can substitute arsenic for phosphorus in its cells.

Chapter 5 "Utopia and Gaia" is interesting in that it compares composition of the atmosphere of earth with Venus and Mars, and the relative abundance and total amount of chemically reactive gases released into atmosphere. Chapter 6 "Snow Ball and Sauna" tells us a bit about earth's history, its earlier colonization by algae and fungi and a variety of marine organisms that got preserved as fossils > half a billion years ago. It is exciting to note that fossils that have been dated illustrate the likely pathway by which fish colonized the land through lobbed fin species some 375 million years ago. It is also interesting to note how 50 times more CO2 can dissolve in water than oxygen that is repelled to atmosphere. The rest of the chapter provides a fascinating account of ecology that is more terrestrial.

"All Things are Connected" (Chapter 7) tells us about biodiversity in temperate streams and rivers. Grand generalizations derived in this chapter relate to mineral resources accessible to living organisms are finite and that recycling and regeneration are needed to maintain supplies. Chapter 8 is headed as "Becoming Human": it provides the golden rule in a variety of systems (religions) of belief and further presents information on a variety of humans, the tools they developed. The evolution of these tools tells us about the progress of mental processes and beliefs. Finally, DNA studies from many organisms show that we share 99% of our set of genes with the bono bono a chimpanzee species. It is a rather detailed chapter on human evolution giving a detailed list of currently described hominine species and our current understanding of the relationships among these hominines. While reading the evolutionary accounts, I was so engrossed that I forgot that it is an ecology book. "The Not-So-Noble Savage" (Chapter 9) begins with poetry and a poem, the exploits of Hiawatha, the North American Indian leader, around the southern shores of Lake Superior. I did not find any ecology on the first 10 pages, but the last of these 10 pages deal with noble savage, a popular idea among those with deep, concern of the environment. The page 11 of this chapter begins with Ecological Awareness and Conservation Ethics. There is a mention to wetlands, the Broads in eastern England—the basins dugout during 9th and 13th centuries AD. The rest of the chapter comprises several small accounts of people in S. Africa and about the people living Broadlands of Norfolk and Suffolk, etc. Some of the intricate and heterogeneous details are rather difficult to describe in nutshell for this book review. I was more focussed on searching for ecology, which was thoroughly dispersed and perhaps more in the background.

"An Every Day Story of the Country Folk" (Chapter 10) is about dogs and domestication, and agriculture. It gives an illus-

trated account (Fig. 10.5, Page 292) of domestication of plants and animals as early as 12000 years ago in many geographical areas. It tells us how overpopulation forced innovation to produce greater food supplies. As the society became hierarchical, some became richer and assumed other responsibilities. The poorer still worked in the fields. Such developments opened the way for the eventual development of town and cities and the city states, and the concept of kings and emperors was born. Brian takes us through long and fascinating but a chequered journey, covering more than 12.000 years from the Neolithic, Bronze and Iron ages, to the present day with satellite imagery, to view the crops growing, and how the plantations got excised from the former forests. I liked very much my reading this chapter. Cursory though, the reading was very enjoyable and very absorbing throughout. This chapter was certainly written with an ecological back-drop, e.g. for the needs of agricultural development.

The reader will like to read about Caravaggio's lantern and the works of Michael Caravaggio in the Chapter 11 "The Warring States." There is certainly Ecology that has been imperceptibly mingled with arts and more, e.g. in how human societies are paralleled by the ways that organisms interact in ecosystems. Brian draws an analogy between the explosive population growth since the 1950s, or so, with ecosystems, creating a situation where nothing limits production. Brian puts it very aptly that "promotion of GDP is a way of covering up the symptoms of the problem instead of dealing with the cause". In short, this chapter gives a very a fascinating account of Aldo Leopold (1887-1948), an American ecologist. The illustrated indices about GDP vs. Happy Life Years per person and GDP vs. Happy Planet make an interesting reading and good for thought.

For "Götterdämmerung and the Alternate States," Chapter 12 (last chapter), I spare the readers a review of first 14 pages of the chapter that relate to art, and Richard Wagner's music dramas and his works of 1840's, etc. I could afford to miss this part and jump to the Alternative States. The next 2 or 3 pages narrate the works of Malthus and his essay on population increase, and the depleted resources, including water and the space we live on. The closing 40 pages relate to alternative states in shallow lakes, and the related developments in the field of ecology in which Brian is considered as a pioneer. He excels here. A part of it deals with alternative states and human societies: current urban based, westernized technological society, the alternative sustainable society stabilised by group survival, restraint, etc. Lastly, the Epilogue is a 2-page poetic end (Brian Moss 2008) to the >400 pages of this unconventional book that tickles one's fancy, and has a captivating effect.

Brian Moss has the knack to provide us with a delicate blend of ecology with physical and biological processes on one hand and arts and anthropology on the other. He successfully demonstrates how man-made disturbances have led to disruption of many a physical and biological process. He provides a comprehensible account of these phenomena for the non-professionals. At the same time, the book remains quite informative to the academic, which was probable the main thing in the mind of Brian while writing this somewhat unusual book. Brian succeeds in achieving the aims of the International Ecology Institute - cross-disciplinarity, a balance of specialist and generalist research, conveying important ecological issues to all, and reconciling human progress with the protection of nature. I quote a sentence on the back cover — "the author provides a work of inspiration for those hoping to steer humanity back towards sustainability."

It was more than worth the effort to review this, even though it was rather tough to leave the pages on art and anthropology untouched, partly also to limit the extensiveness of this review. The book is very moderately priced and would add to the collection of many an ecologist, just as many a non-ecologist who would like to possess this book for its courageous new look at ecology. I cannot refrain from congratulating Brian Moss for this distinctive book, being so extraordinary from page 1 to until the poetic Epilogue.

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