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SIL news

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

'Thinking about Mandalas' From the President

Over the course of a year, David George Haskell, Professor of Biology at the University of the South, in Sewanee, Tennessee, observed the ecology of a metre-squared patch of woodland floor in an old-growth forest; and wrote a book about it. This small area he likened to a microcosm of the biosphere, in the manner of a Buddhist mandala. He had to cheat a little, for some of his observations concern the woodland clearing, the trees and rocks around it and the flight of birds above it, but no matter. He writes about the modern science of litter and mites, mosses and lichens, chickadees and hawks, spring flowers, wood and pollination, from the starting points of simple observations. He even took all his clothes off in the middle of winter to experience the cold and tell us about how birds and plants avoid it.

The result is an enchanting book, not only for the quality of writing and the ways it conveys up-to-date ecology and physiology, but also for its very concept. Few of us would now take time to muse over a small spot for a long period, and if we did, we might trivialise it as a 'spatio-temporal survey'. But such patience is worthwhile. In recent teaching I have attempted something in the same spirit by encouraging students to sit alone and watch in the same place for a couple of hours, and to make a careful drawing of something that interests them during that time. Most said they found it valuable, and some returned with perceptive drawings. I had the idea from a book by a philosopher, Alain de Botton, called *The Art of Travel*, in which he encourages us to leave our cameras at home, and to start to sketch our experiences, on the grounds that we then see much more. He maintains that the unthinking click of the camera shutter, and the accumulation of hundreds of images, really does nothing for us. De Botton took the message from the famous nineteenth century artist, art critic and environmentalist, John Ruskin. Very little is really new!

That leads my train of thought to our lot as scientists and the privileged positions we have. We are paid to think, to examine, to reconsider, to put order into things, to question their truth. We need not be bound by party manifestos, the rules of organisations, the dogmas of belief or the policies of institutions: at least not in our heads. At our desks we might be less free, and we might be starting to jeopardise the value of what we do. For we now rarely sit and contemplate because we are busy writing grant applications, filling-in forms, filing reports, and churning out lots of papers, many of which, dare I say it, would benefit from more care in writing, more time in thinking and less repetition. We bring to bear more and more esoteric statistics to make substance, however slight, of every set of data, from every project and workshop, and struggle to stretch them as far as we can to serve the workings of the machine that is now overtaking us. Science has been turned into a business and I think we are in peril.

What I see is that the values we might deride in bankers, tycoons and corporate lawyers, have been forced onto us. The amount of money we bring in, the volume of our publications, the pseudo-prestige of the journals in which we publish, the number of our accolades, the peer pressure of our increasingly inward-looking style of writing, all have their parallels in the corporate world. Peter Medawar, the distinguished immunologist and writer, noted that '*scientists are people of very dissimilar temperaments doing different things in very different ways. Among scientists are collectors, classifiers and compulsive tidiers-up; many are detectives by temperament and many are explorers; some are artists and others artisans. There are poet–scientists and philosopher–scientists and even a few mystics ... and most people who are in fact scientists could easily have been something else instead*'.

Perhaps his last observation might refer to the entrepreneur-scientists we have all had to

become, surviving in the system through our skills at playing the games of publication, maximising our h factors, and fund-raising, maybe at the expense of contemplation. A fourth book I might quote (the electronic revolution does not figure positively in this essay at all) is a highly sympathetic biography of G. Evelyn Hutchinson by Nancy Slack. Hutchinson built many of the foundations on which our work depends, but I cannot imagine him having much truck with the system that has now been imposed upon us, and with which we go along, but with increasing concern, I think, as we mature to our reflective years. I wonder if Hutchinson would have flourished in it. Scientists seem to me to have values that should be the envy of the rest of the world; we have our personal flaws, but our ways of working, in the end, produce a more honest, least biased, more humanitarian outcome than any that motivate the work of economists and politicians, in a world that has become dominated by these. Our values are gifts that we should carefully guard. In sitting and contemplating the microcosms of rivers and lakes, we should also be contemplating the mandalas of ourselves.

Hanging out the washing, Amani Field Station, Tanzania. 'If drawing had value even when it was practised by people with no talent, it was for Ruskin because drawing could teach us to see: to notice rather than look.' (de Botton, 2003)

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Brian Moss
President of SIL

From the Editor

I want to inform at the outset to our readers of an important change in bringing to you the Newsletter 62: for designing and making the *newsletter* ready for our readership, we have shifted to the Freshwater Biological Association (FBA) from the Management Office of Mr. Chris Schneider (info@sgmeet.com) in Waco, Texas, USA. Chris has been helping to design, format and prepare our newsletter ready for accessing it on Internet even before 2006 when I stepped in as *SILnews* Editor. I am highly indebted to Chris for his professional assistance in preparing the newsletter as well as resolving all conceivable issues that I was confronted with. Seemingly, in addition to SIL, Chris has had the advantage of working also for two other international, aquatic organizations: ASLO and Estuarine Research Federation. I thank Chris yet again for the help he provided us, and I look forward to similar cooperation with our new colleagues (Dr Karen Rouen and Ms. Rosalind Maberly) at the FBA, UK. I hope the reader will barely find a difference because of this change: he should be able to read the newsletter with same ease as earlier. I must remind our readers that the FBA is also our Publisher for the newly started SIL journal, *Inland Waters* (see elsewhere in this issue).

The present newsletter is important from another perspective, i.e. it appears on the internet only some weeks before the next triennial SIL Meeting takes place at Budapest, Hungary (4-9 Aug. 2013). On behalf of the hosting country, Hungary, Victor Tóth provides us some useful information about the upcoming meeting and the several plenary lectures that are planned. The readers should be pleased that almost half of the SIL Working Groups contributed to this newsletter with their WG progress reports and announcements. This is should also act as a stimulus for the groups that were less active or were holed up, for organizing WG seminars and meetings during the nearly three-year hiatus between successive SIL Congresses. The forthcoming Congress should also help to revitalize the working group contacts as well as their scientific activities.

We also report elsewhere in this issue of *SILnews* the results of the recently held elections to the SIL Secretariat. The Congress in Budapest will be a platform where we have the opportunity to thank members of outgoing team, including the SIL Chairman, Prof. Brian Moss, General Secretary, Dr. Morten Sondergaard, and others for all the hard work since their election about 6 years ago, i.e. on the eve of the Montreal Congress. This Congress in Budapest will be an occasion to warmly welcome the newly elected members of the SIL Secretariat. I personally hope to renew many contacts, as many of you, and meet and listen to many SIL members about their topical works.

Ramesh D. Gulati
Editor *SILnews*

32nd SIL Congress (Budapest, 4-9 August, 2013)

The triennial congress of International Society of Limnology (SIL) is the largest international gathering of limnologists in the world. To be held in Hungary for the second time (from the 4th to 9th of August, 2013), the 32nd SIL Congress is an exceptional occasion to meet with the fellow limnologists, including experts in different fields of limnology. The Congress provides a forum to discuss and exchange ideas relating to current research issues in limnology. These triennial congresses are outstanding conferences on limnology and ecology of freshwater aquatic environments, bringing together professionals from academic, industrial, governmental and non-governmental backgrounds. The 32nd SIL congress offers a valuable platform for limnologists, water managers and policy makers to share the knowledge derived from advances in science of inland waters and their importance for understanding our hydrosphere. We encourage scientists working on freshwater systems, from the molecular to the ecosystem level, to attend this congress and to present their scientific works and achievements.

The participants will hear cutting edge presentations from an impressive line-up of some of the world's outstanding limnologists and ecologists. The following seven workers have consented to give plenary talks in the field of their expertise.

Robert J. Naiman
Cathrine M. Pringle
John A. Downing
Martin Dokulil
Henri Dumont
Brij Gopal
Luigi Naselli Flores

Important events of the 32nd SIL congress are the Baldi and Kilham Memorial Lectures, which are given by particularly influential figures in the field of limnology. This year, Robert J. Naiman will present the Baldi, and Cathrine M. Pringle the Kilham Memorial lecture. Following is some information about the themes of five of these lectures.

Complexity and the Restoration of River Ecosystems (Baldi Memorial Lecture)
Robert J. Naiman

Understanding cultural-ecological characteristics associated with rivers, and using that understanding to effectively manage and restore river ecosystems, is an exceedingly complex challenge. While great strides have been made in the last half century in understanding rivers as ecological systems, human exploitation of river water and riparian zones have exasperated river management to the point that many native species are imperilled or have become extinct, invasive species are rampant, water and sediment quality are in significant decline, and economic pressures are placing unprecedented demands on the remaining resources. At the same time, societal expectations demand that river resources be restored or rehabilitated to functional states even while climate change, population growth, and the proliferation of chemicals place additional burdens on river resources in ways that are not yet fully understood. Therein lays one of the greatest challenges of this century. Can river systems be realistically restored or rehabilitated and, if so, what are the approaches and scales that have a chance of being successful? This year's Baldi lecture addresses that question by examining examples of river restoration, identifying attributes of those that have been successful, and formulating principles for improving river restoration in highly complex situations. The principles are designed to enhance resilience and promote adaptive capacity within cultural-ecological systems; systems that continue to evolve.

How resilient are neotropical stream ecosystems to species loss and climate change? (Kilham Memorial Lecture)
Cathrine M. Pringle

Case studies from Central America and the Caribbean show little is known about how ecosystems will respond to species loss and climate change over ecologically relevant timescales. Moreover, while ecosystems may appear to be resilient to environmental change, they can reach a critical threshold of rapid change and shift into new states that are difficult to reverse. This presentation will examine the resistance and resilience of neotropical stream ecosystems to species loss and hydroclimatic variability, drawing on findings from three long-term projects that I am involved with in Central America and the Caribbean.

The first two case studies will focus on stream ecosystem response to species loss in Puerto Rico and Panama. In Puerto Rico, all native migratory macroconsumers (shrimps and fishes) have been absent for decades in high elevation stream reaches above large dams. In Panama the entire assemblage of stream-dwelling tadpoles in high elevation streams was recently extirpated by a fungal pathogen. The third case study, will focus on stream ecosystem response to climatic variability in lowland Costa Rica, where climate change models predict increased variability in annual precipitation.

The following keynote speakers will also present plenary sessions during the 32nd SIL congress, addressing some of the hottest current limnological topics.

Impact of climate warming on European inland waters
Martin Dokulil

The speaker will briefly summarise changes in the European climate and possible future developments. Causes for climate warming will be critically evaluated. How climate warming impacts inland waters with particular reference to lake temperature will be discussed and evaluated. Potential impacts on deep lakes will be compared to shallow lakes. Effects on streams and rivers will be covered as well as changes in ground water temperature. Catchment processes affecting waters will also be considered. Potential present and future effects on the dynamics and biology of inland waters will finally be outlined.

Limnology meets Marine Biology in West Eurasia's brackish water lakes
Henri Dumont

Big river basins (and their lakes), if united by canals, can see their previously endemic fauna emigrate and mix, with some species possibly going extinct. If dammed in cascade, rivers turn into series of lakes, and this effect becomes stronger. The use of ballast water in modern shipping has added yet another way of moving biota over great distances in modern times. The speaker addresses these three effects in the case of the great brackish water lake-seas of Western Eurasia: the northern Baltic, and the southern Black Sea-Caspian Lake, and the rivers that empty in to them. A strange mix of limnic and marine species in involved in multiple invasions there, with ctenophores causing gigantic economic and ecologic problems everywhere, forcing limnologists and marine biologists to work together in tackling the same problems.

Limnology and management of water resources in the tropics
Brij Gopal

The growing demands on the water resources for competing human needs increasingly threaten the functioning and survival of all inland aquatic ecosystems. The resolution of the conflict between humans and natural ecosystems depends upon the ability of the limnologists to provide answers to questions like: How much water can be abstracted for human use from the rivers, lakes and belowground without affecting significantly their functioning and services as ecosystems? And how can the adverse impacts of anthropogenic pressures on these aquatic systems be mitigated or, even better, reversed? This calls for international support and cooperation for research and in-situ capacity building in limnology in the tropical countries as the studies, approaches and answers developed in developed and temperate regions of the world are unlikely to be appropriate or yield desired results.

Morphological analysis of phytoplankton as a tool to assess ecological state of aquatic ecosystems
Luigi Naselli Flores

Living in suspension, light harvesting, nutrient uptake and escape from grazing are the four pillars on which the pelagic life of phytoplankton is based. These factors exert their selective effects on organisms which are formed by a single cell or by colonies with a relatively low number of cells, thus influencing their phenology and resulting in the broad variety of shape and size of phytoplankton organisms. The moulding effect of environmental variables on phytoplankton morphology is particularly evident in highly dynamic environment such reservoirs or ponds. The analysis of phytoplankton morphology can thus be useful to understand the ecological conditions of a given water body. Examples of phytoplankton structures taken from limnological investigations carried out in Mediterranean aquatic ecosystems will be shown to illustrate how phytoplankton morphological plasticity may cope with different environmental scenarios.

This exciting mixture of exclusive plenary lectures will be followed by topical oral and poster sessions throughout the week, presenting the latest results of limnologist from across the world. As matters stands now, there will be 500 participants of the congress from 48 countries of the world. Unfortunately, due to lack of financial support, the younger generation is underrepresented, since only 136 young limnologists will be present at the congress. Majority (at least 2/3rd) of the participants will have an oral presentation in one of the 30 sessions of the congress.

The 32nd SIL congress will take place about two months prior to the World Water Summit, also to be held in Budapest. Given this special coincidence, it will be appropriate to also reflect upon how limnologists of the world can contribute to the scientific background of this historical meeting.

On a lighter note, *the organising committee of the congress* will plan several mid-congress excursions. Hungary abounds in sights into visit and things to do, whether you prefer to visit historical landmarks and natural phenomena, or you are interested in special activities like fishing, thermal spas and horse-riding. At the SIL congress we offer five daytrips to the most beautiful and professionally interesting parts of the country. The Thursday Evening Reception of the congress will be held in the rolling hills of Domony Valley, where everything will be planned so as to please the senses of the visitors. At the site you will find not only beautiful scenery, but also a welcoming reception with typical Hungarian dishes and drinks, a popular Equestrian Park with competition stables and training grounds and a Horse show. For more information please visit the homepage of the congress: sil2013.hu.

75th anniversary of the Istituto Italiano di Idrobiologia, Pallanza, Italy, now CNR ISE

The *Istituto Italiano di Idrobiologia*, now part of the Institute of Ecosystem Study of the Italian *National Research Council* (CNR ISE), is celebrating its 75th anniversary in 2013. The achievements built up by the Institute throughout these 75 years reflect the transformations of limnology and, more generally, of ecology over this period. Much research has been conducted at the *Istituto*, starting from the early pioneering works by Edgardo Baldi and Livia and Vittorio Tonolli investigating the ecology of zooplankton in alpine and prealpine lakes in the 1940s. Recent research takes advantage of cutting edge technologies and can focus on the genetics of plankton, including prokaryotes, while comparing it with the more traditional and broader scope of limnology and ecology. Because of its pioneering research, past and present, the *Istituto* got intricately associated with international networks. This attracted many eminent scientists from abroad to visit and work at the *Istituto*: Ramon Margalef, RichVollenweider, Tommy Edmondson and Rob Peters are just a few of the many who were intimately involved with

The Istituto Italiano di idrobiologia in 1938 (left) and now (right). The dock in front of the institute was built in the 1950s and the building was restored in the 2000.

the research at the institute and spent time on research by both working there, in Italy and abroad. The *Istituto* represented an important school of limnology for many, and still has this role despite the growing financial constraints and the short-sighted policies for ecological and limnological researches. A visit to the institute's website (www.ise.cnr.it/verbania) can help to place its research in the international context. Better still, perhaps, can be to consider the publications of the institute, which date back to its early days, when the "*Memorie dell'Istituto Italiano di Idrobiologia*" started publishing (first issue in 1940). Since 1999 on, the "Memorie *dell'Istituto Italiano di Idrobiologia*" became the "*Journal of Limnology*", which appears twice a year, with occasional supplements. The journal is online, open access and its website (www.jlimnol.it) can offer an insight into the trends in limnological research worldwide.

Still, this occasion is not only important to celebrate the long and important history of the institute in world limnology. It is also an equally crucial starting point for what is to come. The "fertile soil" of the institute offers great prospects to the 33rd Congress of the International Society of Limnology, to be held in Turin in 2016. Indeed, the institute is working as the crossroad where Italian limnologists can interact and come together to promote a scientifically sound and enjoyable congress. Italian limnologists, both as individuals and as members of scientific societies, already started to intensify their contacts and the activities along this important network in order to ensure that the 2016 event will be successful in the furthering of limnological knowledge and research.

Roberto Bertoni
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Election For the Officers of SIL: Results

Dear SIL Members:

The recent elections for the officers of SIL for the next triennium have produced the following results:

President: Yves Prairie
Executive Vice President: Sally MacIntyre
Executive Vice President: David Livingstone
Executive Vice President From Developing Country: Vera Huszar
General Secretary - Treasurer: Tamar Zohary
Editor (SIL Journal, *Inland Waters*): Jack Jones

We are very grateful, on behalf of SIL to all who stood for election and wish the new officers well in their new roles.

April 2, 2013
Brian Moss, President
Morten Sondergaard, General Secretary - Treasurer
Ingemar Ahlgren, Chair, Nominations Committee

Announcement, Inland Waters Vol. 3(1).

Volume 3, Issue 1, of Inland Waters is now available to SIL members at: www.fba.org.uk/journals/index.php/IW/index. This issue includes 4 standard submissions and the first 4 papers of a special series on Lake Simcoe, Canada. An introduction to the series by Michelle Palmer and others describes the scope of this effort, with a continuation of this series in Issue 2.

The goal of Inland Waters is to foster scientific communication of original work, primarily by SIL members, and especially to provide opportunities for SIL early-career scientists to publish. The journal includes standard manuscripts and focal articles entitled 'Research Briefs.' These short articles are intended to promote communication of emerging issues and are open access.

Manuscripts can be submitted at any time using the online journal system maintained by the Freshwater Biological Association. Inland Waters is an 'online first' journal, publishing papers online consecutively and subsequently in four printed issues per year. An Editorial Office will be open during the forthcoming SIL XXXII Congress in Budapest, Hungary (4-9 August 2013, http://www.sil2013.hu/) to provide information about the journal and assist with electronic submissions. Submission of manuscripts based on oral or poster presentations is strongly encouraged.

Inland Waters is listed in Science Citation Index Expanded and Current Contents. All papers from Issue 1 are indexed. The journal content and citations are tracked by Google Scholar and included in the Aquatic Sciences and Fisheries Abstracts.

John R. Jones
Editor-in-Chief
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David Hamilton
Senior Associate Editor

Reports

Group for Aquatic Primary Productivity (GAP)

The Group for Aquatic Primary Productivity (GAP) held its 9th International Workshop (GAP 9) in Málaga, Spain from September 16th to 26th 2012, with the theme: ***The effects of nitrogen pulsed-supply on primary productivity of phytoplankton and marine macrophytes: an experimental approach.***

The local organizing committee was chaired by Félix L. Figueroa of the University of Málaga and Jesús Mercado of the Spanish Institute of Oceanography (IEO) at Fuengirola. The workshop was organized through the University of Málaga, including the "Grice-Hutchinson" Experimental Centre, with some experimental groups being based at the Spanish Institute of Oceanography in Fuengirola and also at Cabo de Gata.

GAP 9 attracted 103 scientists from 16 countries (Australia, Brazil, Chile, Czech Republic, Finland, France, Germany, India , Ireland, Italy, Mexico, Norway, Portugal, Spain, The Netherlands, USA).

Following a day of keynote presentations, focusing on various aspects of primary productivity and its interactions with environmental forcing factors such as nutrient availability, UV exposure and ocean acidification, the participants split into different working groups that concentrated on different primary producer groups: phytoplankton of coastal waters; microalgal mass cultures; seagrasses and macroalgae; and macrophytes in lakes of differing salinities . These working groups spent the next 7 days carrying out experiments, and the preliminary results of these activities were reported on the last day of the meeting.

It is anticipated that there will be 5 review articles (based on the keynote presentations) and around 15 original research articles derived

Some of the GAP 9 participants taking time out at a beer factory in Málaga

Members of the Algal Biotechnology group hard at work at the University of Málaga

The Macroalgal group collecting material for their experiments. Co-Chair of the Local Organising Committee Félix L. Figueroa is in the red hat in the foreground.

from the workshop. These will be submitted to a special theme section of Aquatic Biology for publication early in 2014.

Attending members of the International Committee for GAP met during the workshop (Neale, Montecino, Beardall, Kromkamp, Figueroa). At this John Beardall indicated that he felt he and Vivian Montecino should step down as co-chairs and give a younger person the opportunity to step into this role. It was agreed that in future, the Local Chair of the Local Organising Committee will be subsumed onto the International Committee as Vice-Chair and would become the International Committee Chair for the following GAP. This has the advantage of always having someone on the IOC with experience in running a GAP Workshop. Currently the International Committee comprises Vivian Montecino (Chile), John Beardall (Australia), Patrick Neale (USA), Felix Lopez-Figueroa (Spain), Jacco Kromkamp (Netherlands), Katrin Teubner (Austria) and Ilana Berman-Frank (Israel).

Expressions of interest are invited from people and organizations willing to host the next GAP in 2015. Proposals should be received by the International Committee (they can be sent to john.beardall@monash.edu) by the end of July 2013 and include reference to experimental facilities and locations, options for funding and accommodation possibilities.

On a sad note, one of the funding fathers of GAP, Dr Tom Berman, tragically passed away in April 2013, while on a trip to the Galapagos. Tom made immense contributions to limnology during his lifetime, and no doubt there will be other tributes to him in various other fora. However, we remember him especially for being instrumental in setting up GAP as a SIL Working Group, with the first GAP workshop being held in Konstanz in 1982. Thereafter Tom worked tirelessly for GAP and was an enthusiastic attendee at all GAP workshops where he was an inspiration to all, but especially the younger attendees. He is deeply missed.

Full details of this (2012) and previous GAP workshops may be found at http://www.gap9.uma.es

John Beardall (john.beardall@monash.edu)
Vivian Montecino (vivianmontecino@uchile.cl)
Joint Chairpersons of the GAP International Organizing Committee

SIL WG: Plankton Ecology Group (PEG)

The SIL working group on Plankton Ecology (PEG) is among the oldest working groups of SIL. The PEG was founded in 1974. After meetings in the framework of the IBP (International Biological Program) were ended, many of its plankton members continued on a more informal basis to cooperate and exchange information. It was around 1977 that PEG became affiliated to SIL.

Since its inception, PEG has organised more than 20 meetings, which included both symposia and workshops, leading to initiation of cooperative studies. These meetings are generally thematic in nature and have the objective to both discuss and prepare critical review papers emerging out of these deliberations. The group has published several papers that are highly cited. The first meeting in Oslo 1974 and subsequent elaborations during meetings in Edinburgh, London, and Warsaw resulted in the paper:

Bottrel et al. 1976. A review of some problems in zooplankton production studies. *Norwegian Journal of Zoology* 24: 419-456. Cited 883 times according to Web of Science.

Following meetings led to other seminal publications:

Sommer et al. 1986. The PEG-model of seasonal succession of planktonic events in fresh waters. Archiv fur Hydrobiologie 106: 433-471.
Cited 952 times according to Web of Science.

Photo of excursion to Valle de Bravo during the PEG meeting in Mexico (February 15th - 2012), where participants are being informed about the millions of Monarch butterflies.

Larsson & Dodson 1993. Chemical communication in planktonic animals. *Archiv fur Hydrobiologie* 129: 129-155.
Cited 198 times according to Web of Science

Gulati & DeMott 1997. The role of food quality for zooplankton: remarks on the state-of-the-art, perspectives and priorities. *Freshwater Biology* 38: 753-768.
Cited 168 times according to Web of Science

During the PEG symposium "Predictability of plankton communities in an unpredictable world" (held on 7 - 9 April 2010 in Amsterdam under the auspices of the Royal Dutch Academy of Arts and Sciences), the idea and discussions started for an update of the 25 year old PEG model (Sommer et al. 1986). The resulting paper has appeared recently:

Sommer et al. 2012. Beyond the Plankton Ecology Group (PEG) model: Mechanisms driving plankton succession. *Annual Review of Ecology Evolution and Systematics* 43: 429-448.

Proceedings from the Amsterdam meeting have just been published in *Freshwater Biology* 58: 455-623 (Special Issue: Plankton Dynamics in a Fast Changing World), including a review on "Plankton dynamics under different climatic conditions in space and time" (De Senerpont Domis et al. 2013. *Freshwater Biology* 58: 463–482).

The PEG held a meeting in Mexico City (Mexico) from 12 to 18 February, 2012 (*see* SILNews 60 for a detailed report). In total, 125 scientists and students from nine countries participated (Belgium, Canada, Ethiopia, Israel, Italy, Mexico, Poland, The Netherlands and the UK). The meeting showed that in these days of fast scientific progress in diverging disciplines, umbrella meetings such as those of the WG PEG are extremely important in integrating different aspects of plankton ecology. The proceedings of the PEG meeting will be published in a special issue to *Inland Waters*; contributions are now in the review process.

The next PEG Workshop is planned on 7 - 11 September 2014 at the Institute of Biology, University of Bialystok, Bialystok, in NE Poland. It will be hosted by Dr. Andrzej Górniak (hydra@uwb.edu.pl). More information about this workshop is provided elsewhere in this SILnews (SIL WG Plankton Ecology Group: Announcement).

Another upcoming PEG activity is a special session on Cyanobacteria Ecology at the XIV Brazilian Limnology Congress that will be held from 8-12 September 2013 in Bonito, Brazil. The focal theme will be cyanobacteria ecology, including trophic interactions with zooplankton, bloom dynamics and management and other relevant issues. For more information, please contact prof. Renata Panosso (rpanosso@cb.ufrn.br) or prof. Carolina Soares (mcarolsoares@gmail.com).

A WG's household meeting is planned at the next SIL Congress (4-9 August 2013) in Budapest, Hungary. Information on date, time, room will be provided during the Congress.

The PEG is a very informal scientific group and a fraternity whose primary interests are to both exchange ideas and information and encourage an integrated approach to science of plankton ecology. A special request to all plankton ecologists, especially those from the first hours, is to send information to the PEG office (miquel.lurling@wur.nl) about past meetings, such as where, when, major themes etc. so we can archive this important information.

Looking forward to see you all in Budapest.

Miquel Lürling
PEG Chairman
miquel.lurling@wur.nl

Photo of participants to PEG meeting in Mexico-City (February 12th-18th 2012).

SIL WG Plankton Ecology Group: Announcement

Dear Plankton Ecologists,

With great pleasure we announce a Meeting of the Plankton Ecology Group (PEG) from 7 to 11 September 2014 at Bialystok, Poland. The theme of the upcoming meeting is "Plankton research in modern ecology". The organizer, Prof. Andrzej Górniak from the University of Białystok, invites all plankton ecologists of the world.

The main objective of the meeting is to present and discuss new approaches to plankton research. Special invitation is given for students and young plankton ecologists, as a participants in a special session "Young Academy".

The PEG2014 Meeting will take place in Białystok, the largest city in North-Eastern Poland, which is surrounded by wetlands, forests with numerous national parks and nature reserves, many of them famous for their aquatic ecosystems. A mid-meeting field excursion with visits to anastomosing Narew River valley, Augustow Canal and Wigry Lake National Park (a SIL protectorate from 1994) are included in the programme.

The Hotel Gołębiewski, a three star hotel, will be the venue of the meeting. The hotel is located in the centre of Bialystok City near the famous Baroque Palace and an old style park and cheaper accommodation in Student House will be available too. Touristic excursions from Cracow via Czestochowa Warsaw and Bialowieza Primary Forest will be offered before the meeting.

More detailed information concerning PEG Meeting at Bialystok, Poland, in 2014 will be available from early April 2013 via the following link from University of Bialystok:

http://biol-chem.uwb.edu.pl/IP/ENG/biologia/index.php.

Prof. Andrzej Gorniak,
hydra@uwb.edu.pl,
Organizing Secretary, PEG Meeting 2014

Former Limnological Station on Wigry before II world War and recent Museum of Wigry Lake

Rafting boats on Narew River

Wigry Lake

Wigry Lake (Aerial Picture)

Dystrophic lakes in Wigry National Park

The SIL WG *Aquatic Birds* is Twenty One Years Old

The Background

The widely accepted Vollenweider nutrient-loading-concept in limnology, made it obvious to a group of participants during the SIL Congress in Munich, Germany, in 1989, that the time had come for waterbirds to be treated in a Limnological context. This prompted the holding of the "First Symposium on Limnology and Aquatic Birds: aquatic birds in the trophic web of lakes" in Sackville, New Brunswick, Canada, in 1991. The symposium was a great success and led to the formation of the SIL Working Group on Aquatic Birds during the XXV SIL Congress in Barcelona, Spain, in 1992.

The main objective of the Working Group on Aquatic Birds is to integrate waterbirds into hydrobiology and treat these studies in a limnological context. To achieve this goal, the WG Waterbirds organizes conferences at regular intervals to expedite communications among limnologists interested in aquatic birds and ornithologists interested in the aquatic habitat. The average attendance is 60 persons (range 30 -120). Strikingly, the majority of participants is not SIL members. These conferences are held at least once every three years between the triennial SIL Congresses (see in Box below). After the group was formed, six such conferences on waterbirds preceded the last meeting at Kristianstad, Sweden in 2012.

Figure 1. Participants of The 7th symposium of the WG Aquatic Birds held in August 2012 at Kristianstad, Southern Sweden

1994	Hungary	Sopron
1997	Mexico	Mérida, Yúcatan
2000	Czech Republic	Trebon
2003	Canada	Sackville, New Bruswick
2006	Hungary	Eger
2009	Spain	Huesca

In addition, The Working Group regularly held workshops and paper sessions during the SIL congresses in São Paulo, Brazil (1995), Dublin, Ireland (1998), Melbourn, Australia (2001), Lahti, Finland (2004) and Montreal, Canada (2007).

Why a Symposium on Limnology and Aquatic Birds?

Waterbirds are often studied from a terrestrial perspective despite the fact that they spend much of their lives on or in water. They have been largely ignored by limnologists even though they can potentially have strong effects on aquatic ecosystems. Likewise, bird researchers are often not very familiar with aquatic systems even though the limnological processes going on in these systems have profound effects on the study of bird species. It is, therefore, important to merge these fields of science for a better understanding of the ecology of the waterbirds and its possible impacts on surrounding ecosystems

The 7th symposium of the WG *Aquatic Birds* was held in August 2012 at Kristianstad, Southern Sweden. It was followed by two one-day trips to a large number of lakes representing a wide range of trophic states. We observed eutrophic lakes and wetlands close to Kristianstad than in the very near boreal forest oligotrophic lakes and mires.

The lecture sessions were held at the new visitor center in the Kristianstad Biosphere Reserve, a five- minute walk from the city centre, at the edge of seasonally inundated wetlands flanking the River Helge. It is a birdwatchers paradise: here thousands of birds rest during the spring and fall migration. There were also summer nesting birds and wintering white-tailed eagles.

Participants from 13 countries as far away as North America and Japan attended the symposium (Fig. 1). There were four plenary and 15 oral presentations, and a poster session comprising 14 posters. The programme and the abstracts may be downloaded from the symposium website: http://home.hkr.se/~del/. The review process for publication of the symposium proceedings in *Inland Waters* is in progress.

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Under-ice mixing regimes and their potential importance in Lake Pääjärvi, Finland

Although the majority of lakes in the northern hemisphere are ice-covered, at least part of the year, traditionally winter has been considered to be an unimportant season in the lake ecosystem. Winter studies have also been partly neglected due to harsh or even dangerous weather and working conditions. However, during winter, important changes happen and the alternation between ice-covered and ice-free periods plays a significant role in biogeochemistry and biology of lakes (Baehr & DeGrandpre 2002).

We investigated the temperature and oxygen conditions in ca. 80-m deep Lake Pääjärvi in southern Finland during nine winters. During autumnal turnover, the water temperature and the concentrations of chemical compounds become uniform in the whole water mass. Because of its medium-size, the lake is susceptible to wind, so that its temperature typically decreases well below 4°C, the temperature of maximum density of water. Under such circumstances, the heat inputs in early winter from the sediment and in late winter from the sun lead to active hydrodynamics under-ice, which are in sharp contrast with negligible under-ice water movements (excluding possible through flow) in small lakes where water temperature in deeper layers remains essentially at 4°C. Already during the freezing, which in medium- and large-sized lakes proceeds from lake margins towards the lake centre, the shrinkage of open water area reduces mixing by wind and water temperature in deeper layers often starts to increase already before the complete freeze-over. The heat flux from the sediment continues under the ice cover and leads to horizontal advection of heavier water towards the deepest regions of the lake (Welch & Bergmann 1985).

During long winter, the advection of a thin warm water layer on the top of the sediment has enough time to accumulate significant amount of substances seeping from the sediment into the deepest parts of the lake. It also means focusing of low-oxygen water (Mortimer & Mackereth 1958, Pulkkanen & Salonen 2013) so that oxygen consumption over large sediment area of Pääjärvi becomes apparent within a relatively small water volume in the deepest part of the lake basin. In lakes with enough steep and consistent bottom slope, this greatly amplifies oxygen consumption in the deepest part of the lake and increases the probability of oxygen depletion. Thus, hydrodynamic focusing of low-oxygen water should be taken into account in modeling oxygen consumption in winter.

By spring, the temperature difference between water and sediment is largely diminished, but circulation that is similar to that in winter is induced by solar radiation. Its intensity is much stronger, but instead of months it typically lasts only for a couple of weeks. When solar radiation more readily penetrates through the ice, water temperature and density increase. Then heavier water masses sink down to the depth where they meet the same temperature, a process called vertical convection. Due to increase in temperature-specific water density along with the decrease of temperature below 4°C, the depth of convection in Pääjärvi proceeds deeper in the years with lower temperatures. Very small temperature differences, i.e. 2 to 3°C, are important. In three study years, when the water column had reached the lowest temperatures during autumnal overturn, convection actually reached the deepest parts of the lake. According to the textbooks of limnology, spring turnover begins only after the ice cover has melted and water surface is open to wind. Our observations show that under-ice turnover may be frequent in oligotrophic boreal lakes with a steep topography. Climate warming likely increases the frequency of cold water winters in large lakes (Saloranta et al. 2009), because theoretically freezing around the solstice allows the longest possible time for water cooling. Consequently, the probability of under-ice turnover also increases in the future. In eutrophic lakes, seepage of electro-

Lake Vesijärvi shedding its ice May 2. 2013

lytes from the sediment may generally restrict under-ice turnover, but even partial mixing of anoxic deep water layers may drastically reduce oxygen concentrations in the overlaying convective layer, which still cannot have oxygen from the atmosphere. In the early phase of convection, sedimentation losses of phytoplankton are reduced, but in deep lakes, further deepening of convective layer reduces mean availability of light and may thus diminish primary production (Vehmaa & Salonen 2009).

In shallow water of Pääjärvi, the depth of under-ice convection is limited by water depth and hence warming rate is higher than in the deeper parts of the lake. Under temperature of 4°C, this creates warmer and heavier water mass which flows from the littoral towards the deeper parts of the lake, where it finally comes in contact with water of the same density and intrudes between the upper convective layer and the stable deep water layer. During deepening vertical convection the intrusion layer also moves deeper. In one out of the three under-ice turnover years, such horizontal convection dominated the circulation in Pääjärvi. While vertical convection is local and exists only during daylight hours, horizontal convection is basin wide and more continuous. Its much longer circulation path may differently affect phytoplankton than in vertical convection.

In some cases, when ice at lake margins melts earlier than in the middle of the lake, the formation of thermal bar (Holland & Kay 2003) was also observed in Pääjärvi, but compared with larger lakes it is more ephemeral. Thermal bar isolates ice-free shallow and ice-covered deep water areas, which, in addition to temperature, have marked differences in nutrient concentrations and availability of light during the initial stage of phytoplankton spring development, affecting the development of phytoplankton spring population.

Data from Pääjärvi show that stereotypic view of stable and invariable winter conditions from year to year in lakes given in textbooks are incorrect. In medium-size lakes, under-ice water movements are significant and include wide variation. Our results help to understand how different circulation regimes, until now predominantly dealt as separate phenomena or even as curiosities, evolve and combine with each other under different conditions. The variation of circulation regime under the spring ice seems to be higher than in any other season and it depends on small differences in autumnal cooling of water, snow conditions and stochastic weather episodes during the melting period. Therefore, winter conditions are difficult to model and more detailed knowledge is needed to assess the ecological consequences of under-ice circulation regimes as well as their response to changing climate.

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Climate change and freshwater zooplankton: a food web perspective

A solid body of empirical, experimental and theoretical evidence has accumulated over recent decades indicating that freshwater plankton experienced shifts in phenology, abundance, diversity, community structure, distribution, body size and behavior in response to climate change (summarized in Vadadi-Fülöp *et al.*, 2012). Nearly all of these variables are relevant to food webs of which zooplankton is a key component. Climate change may fuel regime shifts in lake food webs, the most discernable of which is the abrupt shift from a macrophyte-dominated clear water state to a more unfavorable turbid state with algal blooms. Zooplankton herbivores play an important role in stabilizing the clear state (Lampert *et al.*, 1986). Increasing temperatures alter size structure of zooplankton community resulting in modified food web interactions and energy flow. Abundance of zooplankton also may increase/decrease indirectly via increased/decreased food resources. Ice cover and spring breakup dates define the magnitude of the spring abundance of zooplankton.

Below, I provide a short insight into the observed and projected effects of climate change upon freshwater zooplankton in a food web perspective (for details, see Vadadi-Fülöp *et al.*, 2012). Figure 1 represents the schematic model of climate change driven variation in community attributes of zooplankton and their predators/resources relevant to the food web. The possible outcomes are also outlined.

Large-scale climatic fluctuations, including the North Atlantic Oscillation (NAO), the Pacific Decadal Oscillation (PDO) and the El-Nino Southern Oscillation (ENSO), which may account for climate variability over large areas at least for a particular season, have been linked to zooplankton phenology and abundance. As a result of the positive phase of the NAO bringing about milder winters in Central Europe, the onset of the spring Clear Water Phase (CWP) is advanced, i.e. occurs earlier, in shallow and deep lakes (Straile, 2002).

Climate change can disrupt existing synergies of trophic interactions by triggering phenological events in an asynchronous way. Such a decoupling was reported from Lake Washington (Winder & Schindler, 2004), where an advancement in the onset of thermal stratification in spring also resulted in a forward shift of the phytoplankton bloom. While the rotifer *Keratella cochlearis* (Gosse, 1851) appeared to adapt its phenology, *Daphnia pulicaria* (Forbes, 1893) was not able to do so and declined notably in abundance. It was proposed that the different life-history strategy and thus the different hatching cues used by the cladoceran may explain the mismatch. Such a decoupling between predator and prey may cause the spring CWP to disappear, with implications for the food web.

Freshwater biodiversity has experienced a decline and climate change certainly has been a contributing force behind this decline.

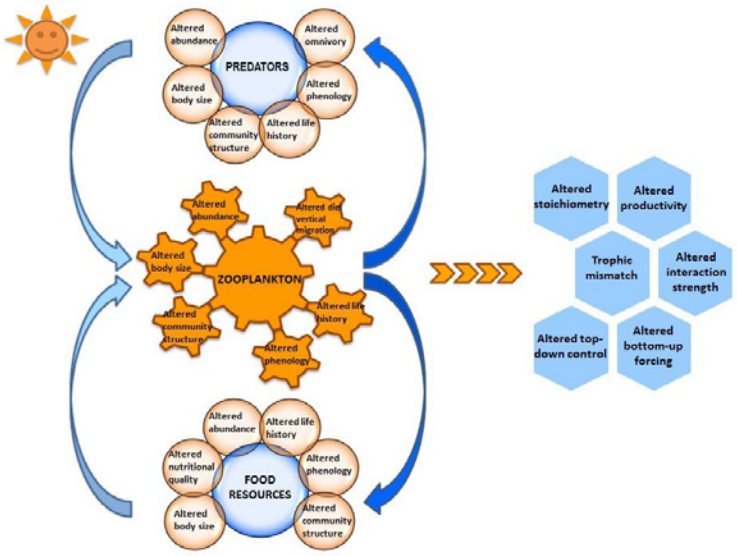

Figure 1. Schematic model of climate change driven variation in community attributes of zooplankton and their predators/resources relevant to the food web. This model is far from being exhaustive, rather aimed to outline some of the evidence accumulated over recent years.

Theory suggests that weak interactions in food-webs attenuate strong destabilizing consumer-resource interactions and thus tend to stabilize communities (McCann *et al.*, 1998). Decreasing biodiversity is likely to increase the overall mean interaction strength between species, and thus increase the probability that ecosystems undergo destabilizing dynamics and breakdowns (McCann, 2000). Temperature variability, however may favour species richness (Shurin *et al.*, 2010), and what is more, the diversity of the boreal region may benefit from a northward shift of species (Heino *et al.*, 2009).

Climate change also may shape the food web via bottom-up and top-down forcing. Under a warming climate an increasing contribution of cyanobacteria has been observed and projected, which does not favour herbivorous zooplankton (Paul, 2008). The blue-greens are poor-quality food for consumers (Wilson *et al.*, 2006), their filaments clog the feeding apparatus of filter feeders (Webster & Peters, 1978), and their toxins can be harmful to zooplankters (Hansson *et al.*, 2007). Such cyanobacterial blooms can restructure the food web by suppressing large herbivores (e.g. daphnids) and favoring small forms. Increasing ultraviolet radiation represents an emerging component of climate change. Beyond its direct effects on zooplankton, it alters phytoplankton growth rates, community structure and nutritional quality (stoichiometric changes) and thus it has strong implication for food web dynamics. In addition, ultraviolet radiation may alter the pattern of diel vertical migration of zooplankton in lakes with high transparency depth (Williamson *et al.*, 2011). As for top-down effects, climate warming has been reported to alter the spatio-temporal habitat overlap between predator and prey, the growing conditions, winter mortality, omnivory and body size of predators, all those resulting in an altered predation pressure on zooplankton.

Although our understanding how climate change shapes plankton communities and food webs improves day by day, there are still many challenges ahead. Our current knowledge has its spatial and temporal constraints, i.e., it is based on a rather limited number of waterbodies and much of the evidence derives from the spring period. Although there is a need for continuing monitoring programmes worldwide, the value of many existing time series has not been recognized yet partly due to the lack of access to these data. Owing to the predictive nature of this field, modeling studies remain key tools to shed more light on how climate change acts upon zooplankton and food web dynamics. Disentangling the effects of climate change and confounded impacts of eutrophication and other anthropogenic pressures remains to be of major concern. Moving beyond correlative approaches toward more mechanistic explanations; paying particular attention to running waters, plankton functional groups, ultraviolet radiation; combining empirical, experimental and modeling approaches will definitely challenge our way of thinking in this rapidly expanding field of limnology.

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The impact of climate change on *Daphnia* spp population dynamics: Consequences for ecosystem functioning

Because direct and indirect temperature effects are species-specific, zooplankton species may better reflect the influence of climate change on ecosystem dynamics than higher taxonomic groups. *Daphnia* spp. are ubiquitous in their distribution, typical and dominant cladocerans in the lentic ecosystems of temperate zones. They have relatively short generation times and well-documented ecological characteristics. Therefore, *Daphnia* spp. appear to be very useful for addressing questions regarding the effects of climate change not only on the plankton communities but on the entire ecosystem.

The effect of warm winters on Daphnia

The results of Wagner & Benndorf (2007) demonstrated that even a low level of warming, e.g. by 1.7°C, during a short but critical seasonal period, causes the coincidence of factors that disturb the *Daphnia* population dynamics and may destabilize the lake food web (Fig. 1). Winter is an important critical seasonal periods because the mean temperature in January-March has been found to determine the future seasonal dynamic of the *Daphnia* population and, consequently, the spring time occurrence of the clear-water phase as well as duration of the *Daphnia* midsummer decline. The effect of mild winters includes earlier spring conditions and, thus, earlier thermal stratification in the water column, which enhances algal production due to greater light availability and relatively higher water temperatures in spring. Thus, an increased temperature of the lake's upper strata and an abundance of high-quality food may support an early build-up of *Daphnia* populations. Consequently, the critical daphnid biomass essential to control phytoplankton in the spring-summer period is reached earlier than after a colder winter. This usually causes an early and prolonged clear-water phase. Such a clear-water phase leads to starvation and a decrease in the fecundity parameters of *Daphnia*, thereby considerably weakening their population potential and evoking a midsummer decline of *Daphnia* biomass as a follow-up-effect, which will be of fundamental importance for increase of cyanobacterial bloom during summer. In addition, an early and warm spring may cause earlier development and high growth rates of the invertebrate predators (e.g., *Leptodora kindtii* or *Chaoborus* larvae) and juvenile fish. The influence of these animals on the decline of the *Daphnia* population density during summer months depends on temperature effects, as temperature directly influences the predator-prey interaction through the predator's feeding rate (see references in the review by Wojtal-Frankiewicz, 2012).

However, the described patterns may appear mostly in ecosystems with relatively stable hydrological conditions (e.g., in lakes with low inflow rates). In dam reservoirs the dynamics of macrozooplankton populations seems to depend largely on hydrological regime during

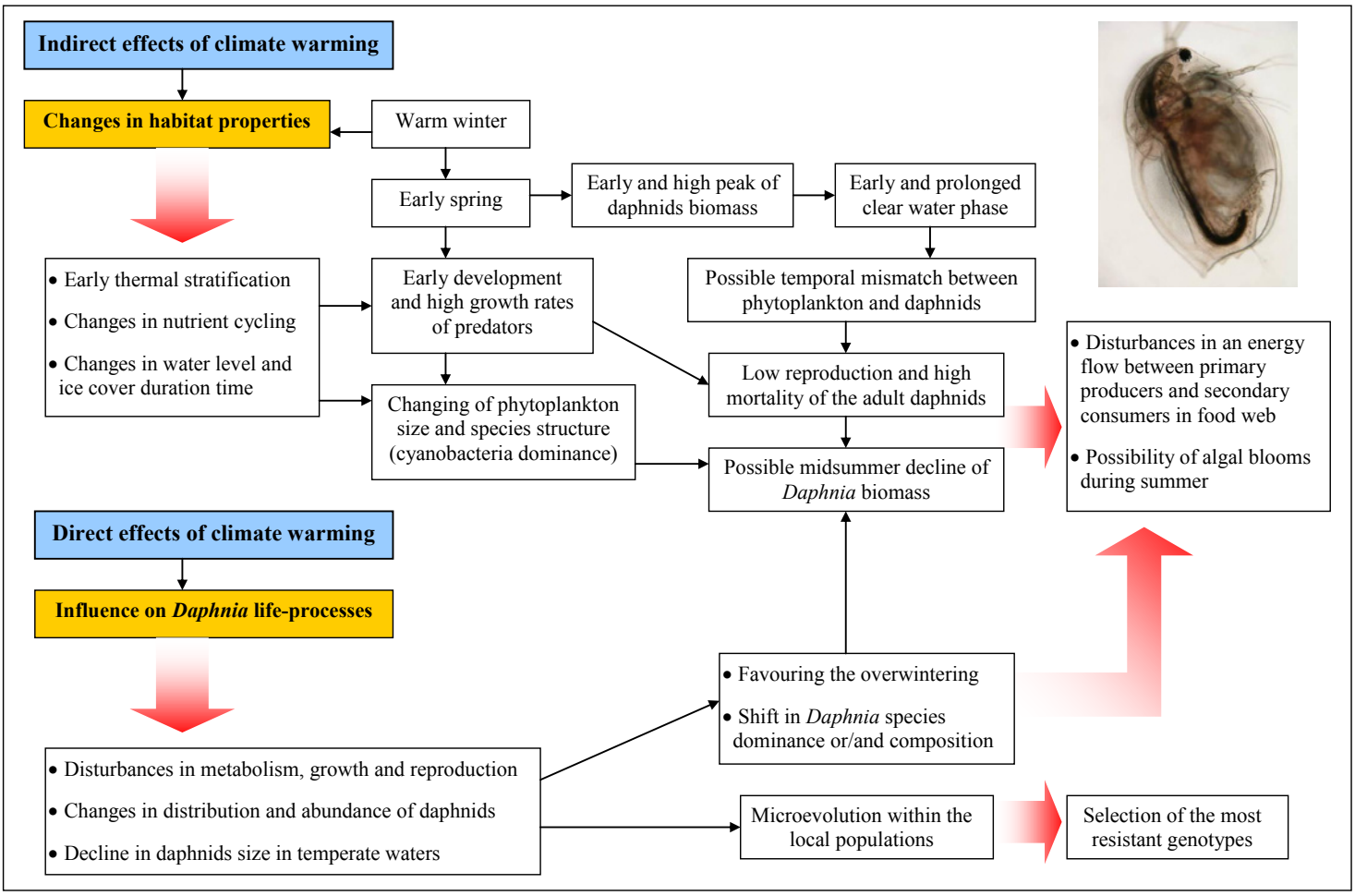

Figure 1. The direct and indirect impacts of climate warming on Daphnia population structure and dynamics, with the potential consequences for ecosystem functioning (modified from Wojtal-Frankiewicz, 2012; photo: Daphnia magna by A. Wojtal-Frankiewicz).

spring period. Increases in water levels are associated with fluctuations in zooplankton populations because of the flushing effects of floods on *Daphnia*. Eight-years (1999-2003, 2005-2007) monitoring carried out in the Sulejow Reservoir (Central Poland) has, indeed, confirmed that not only water temperature, but also hydrological regime is crucial for *Daphnia* growth and development in early spring (Fig. 2). In this study the Kohonen self-organizing map was applied, which is an unsupervised artificial neural network, and generally shows higher abilities in patterning the complex ecological monitoring data, than conventional statistical methods. This method allows to effectively distinguish homogeneous groups of samples (1-5) characterised by similar biotic conditions, and then identify the crucial abiotic factors responsible for the seasonal sequence of events (A. Wojtal-Frankiewicz and A. Kruk, unpublished data). Results have shown that in studies of climate change impact on plankton seasonal dynamics the hydrology should be taken into consideration since warming considerably influences flood regime of reservoirs and riverine ecosystems.

Winter conditions can strongly determine the genetic structure of *Daphnia* sp. populations. Mild winters usually favour overwintering daphnids, which are genetically less diverse than the population formed from ephippia, leading to an increase in the contribution of these genotypes to the population (Wojtal-Frankiewicz, 2012). In contrast, after cold winters Hülsmann and coworkers (2012) observed a higher proportion of new multilocus genotypes originated from ephippia, which considerably increased the genetic diversity of *Daphnia* populations. Such an increase in genetic diversity may influence the potential of the micro-evolutionary response of the daphnid population to selection pressures of climate change, as described below.

Reassuming, mild winters as the effect of climate warming may strongly shape the genotype composition of the *Daphnia* population, and thus determine their population dynamics later on during the season and efficiency of top-down effect on phytoplankton.

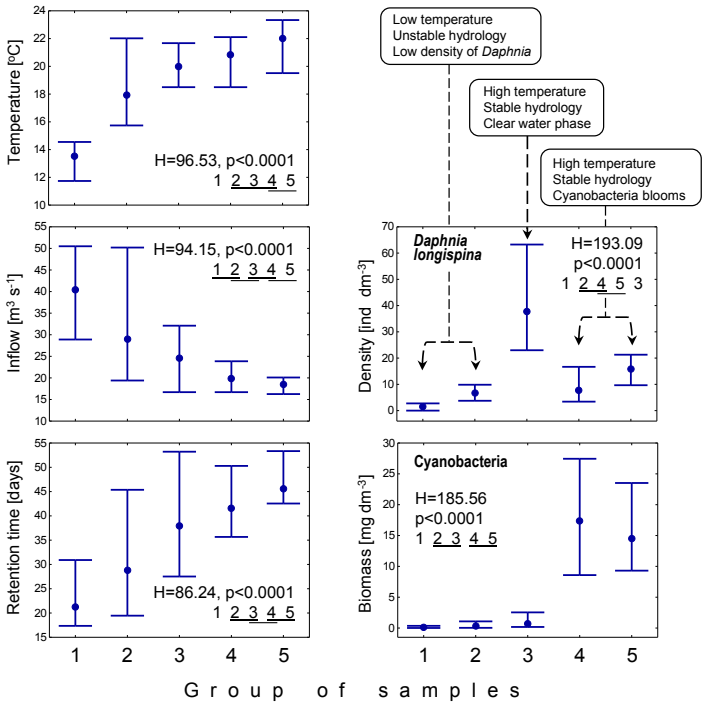

Figure 2. Water temperature, water inflow, retention time of water in the reservoir, biomass of Cyanobacteria and densities of Daphnia longispina in the Sulejow Reservoir. Point – median; whiskers – interquartile range; H – statistics of the Kruskal-Wallis test (df = 4, N = 308), applied in testing the differences between groups of samples (underlined with the same line if not different at p ≤ 0.05 in post-hoc tests) (A. Wojtal-Frankiewicz and A. Kruk, unpublished). Dominant season of the year: 1 = early spring (April), 2 = spring (May), 3 = late spring (June), 4 = summer (July), 5 = summer (August, September).

The evolutionary potential of Daphnia

Higher water temperatures that prolong the stratification period of lakes create favourable conditions for cyanobacteria - a potentially toxic food source for daphnids with a low edibility (Gliwicz and Lampert, 1990) and poor nutritive value (Martin-Creuzburg et al. 2008). Both field and experimental studies have recorded a negative correlation between the density of filtering Cladocera and the biomass of cyanobacteria. Thus, what consequences for *Daphnia*-cyanobacteria interactions may result from increasing, with the rising global temperature, and cyanobacteria abundance (Paerl and Huisman, 2008) observed in many freshwater ecosystems during last decades? Such a question is particularly important since literature demonstrates that warmer temperatures may enhance cyanobacterial toxicity by stimulating toxin biosynthesis (e.g. in *Microcystis* spp. elevated temperature increases the number of *mcyD* copies per cell, and transcripts of *mcyB*) (review by El-Shehawy et al. 2012 and literature cited therein). Some studies (e.g., Hairston et al. 2001; Gustafsson, and Hansson 2004; Sarnelle and Wilson, 2005) indicate that *Daphnia* species repeatedly exposed to toxic cyanobacteria in their natural habitat showed significantly higher survivorship when exposed to toxic *Microcystis* in the laboratory compared with species with no prior exposure. This is because daphnids have a high capacity for adaptation to environmental changes, what is determined by a distinguishing structural feature in the daphnid genome: an elevated rate of gene duplication resulting in tandem gene clusters (Colbourne et al., 2011). The gene-rich genome of *Daphnia* allows these species to activate rapidly those genes that are indispensable under the prevailing environmental conditions. However, the great genetic variability of *Daphnia* species may be not sufficient for the adaptation to climate change when the usual reaction norms of animals are no longer adaptive due to disruptions in the correlations between temporally spaced environmental variables (references in the review by Wojtal-Frankiewicz, 2012). In such cases, the reaction norms are optimized by microevolution. Indeed, the different sensitivity levels of *Daphnia* species to the harmful effects of cyanobacteria in the natural environment is the result of a selective pressure exerted by toxic cyanobacterial strains. Studies conducted in two polish water bodies: eutrophic Sulejow Reservoir, characterised by regular annual toxic cyanobacterial blooms, and mesotrophic Lake Białe, where cyanobacteria have only recently appeared and are low in their abundance, indicate that generations of daphnids from the Sulejow Reservoir has more effective antioxidant systems by high concentrations of glutathione (one of the most important intracellular antioxidant) and high activity of catalase, what protecting them against the accumulation of cyanobacterial toxins. Thereby, daphnids from the Sulejow Reservoir are become less susceptible to the toxic effects than the daphnids from the Lake Białe. The highly effective antioxidant system (e.g., capability of microcystin biodegradation by forming conjugates with glutathione) in those daphnids that have long coexisted

with cyanobacteria resulted from the selection of the most resistant genotypes (Wojtal-Frankiewicz et al., 2013).

Conclusions

The great genetic variability of *Daphnia* spp. results in their abilities of microcystin detoxification. This provides a strong evolutionary potential in the face of changing environmental conditions, and shows that elevated toxicity of cyanobacteria due to warming is not hazardous to the existence of *Daphnia* species. Nevertheless, daphnids appear to be very susceptible to anomalies in hydrodynamics of lakes which are directly influenced by weather changes.

The key position and role of *Daphnia* spp. in aquatic food webs suggest that disturbances of their seasonal patterns as an effect of climate change may contribute to the modification of biotic interactions in water ecosystems and may influence the system functioning with regard to aspects of water quality (Fig. 1). The consideration of these abiotic-biotic relationships is necessary for the regulation of ecosystem structure and processes toward increasing resilience and carrying capacity of these ecosystems (Zalewski, 2000). However, for a better understanding of the complex interactions between the impact of climate and responses of *Daphnia* species, the development of accurate and novel research approaches, such as molecular biology and mathematical modelling, and the involvement of different types of specialists are needed.

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Climate change and biodiversity loss: International Conference on Recent Trends in Climate Change Researches vis-á-vis Biodiversity (3rd-4th December, 2012, Bareilly, India)

Climate change is a global problem with global consequences. Record-breaking weather events one after the other are causing drastic changes all over the world. The global air temperature rose by 1°C each in January and April 2012 compared with the long-term average for these months. It is predicted that the natural forces will offset the expected warming caused by human activities, such as the burning of fossil fuels, which releases green house gases. Latest studies show that there is 75% chance the world can hope to evade the danger of global average temperatures rising 2°C above the pre-industrial era only, if it can keep its carbon emissions below 190 billion tons over the next 41 years. It is estimated that burning fossil fuels would emit carbon to the tune of 3% rise every year. This rise is considered to be dangerous by the United Nations Framework Convention on climate change. It seems that catastrophic effect of climate changes is faster than anyone had expected. The mercury is cracking and extreme warm periods across the country are predicted. Precipitation in India is likely to increase by 4-5% by the 2030's.

Climate change and the dwindling biodiversity is becoming a matter of global concern. India is among the world's top twelve mega-biodiversity nations and stands quite high in the wealth of biodiversity containing about 20% of the world's biodiversity on merely 2% of the earth's surface (Belsare, 2006). It has been shown that the effects of climate breakdown is capable of introducing diseases like malaria into new regions. The recent ascent to higher altitudes of malaria in eastern Africa and Latin America reflects, in part, regional temperature increases (Epstein *et al.*, 1998) as also shown elsewhere (Lovinsohn ,1994). The inextricable linkage of biodiversity to climate in the global perspective compels us to believe that the real issue of the 21st century would obviously culminate in climate breakdown.

Looking into the gravity of the problem, an INTERNATIONAL CONFERENCE on "*Recent Trends in Climate Change Researches vis –a-vis Biodiversity*" was organized by the Department of Animal Science, M.J.P. Rohilkhand University, Bareilly on Dec 3-4, 2013 under the "*Centre of Excellence*" sanctioned by the Govt. of Uttar Pradesh in collaboration with the Indian Academy of Environment Science (IAES), Haridwar. The Conference was inaugurated with welcome address by

Prof. Neelima Gupta, Convener delivering the welcome address during the Inaugural session of this International Conference.

Prof. Neelima Gupta, Convener followed by address about the theme of the Symposia by Dr. D. K. Gupta, Scientific Secretary and about the activities of IAES by Prof. B. D. Joshi, President, IAES. The inaugural address was delivered by the Chief Guest, Prof. S. I. Shalaby from Eygpt (Specialist in Veterinary Clinical Pathology and Reproduction) and Presidential Remarks were given by Prof. Mohd. Muzammil, Hon'ble Vice Chancellor, MJP Rohilkhand University, Bareilly, which were followed by two plenary lectures. Prof. Gundu Rao from University of Minnesota, USA stressed the need for a well planned, robust, state-of-the-art biotechnology for sustainable development. Prof. R.D.Gulati from the Netherlands Institute of Ecology, The Netherlands expressed concern on global warming which is likely to alleviate the effects of restoration measures in lakes in the northwest Europe.

About over 450 delegates from different countries participated in the Conference. Foreign delegates included two from Egypt, one each from the USA, the Netherlands, two each from Ethopia, Iran and UK. Other dignitaries present in the conference included Padamashree Dr. V.P. Sharma and Dr. Gaya Prasad, Director, IVRI, Izatnagar as Guests of Honour and Vice Chancellor of the MJP Rohilkhand University Bareilly, in addition to some 6 Ex-Vice Chancellors and several professors from different Indian universities. Some of them delivered invited lectures.

Keynote lectures were delivered by Prof. VP Sharma FNA Delhi on "Climate Change and Urban Vector Borne Disease in India' who highlighted the impact of climate change leading to recent country-wide upsurge of malaria and dengue and possible solutions through research and development. Prof. MS Jairajpuri talked on "Biodiversity of soil Nematodes" discussing the role of nematodes as biological models for various kinds of studies. Prof. C. K. Varshney (JN University, N.Delhi) spoke on"Air Pollution and Plants: Implications for Agriculture and food security" who discussed possible measures for reducing air pollution stress.

Useful recommendations emancipated from the parallel technical sessions remained the highlights of the conference, with an appeal was made to counter Global Warming. It was informed that trends of Climate Change have already set in and have started impacting the Biodiversity and the life support system at Global level. Vice Chancellor, MJP Rohilkhand University, Prof. Mohd.Muzammil highlighted the need for environment sustainability to be a part of development policy to combat the phenomena. Prof. B.N. Pandey said, "Its high time that we apprise the US President Barak Obama about the repercussions of Global Warming."

The following Recommendations were made:

- In view of the fact that the trends of climate change has already set in and have started impacting the biodiversity and the life support system at global level- field observations and researches related to the phenomenon need to be enhanced at each level.
- Few diseases specially which are spread through vectors like mosquitoes are being treated as indicators of global warming, hence field as well as laboratory studies related to the distribution of such organisms need to be stimulated all over the world.
- Studies on all ecosystems and their abiotic as well as biotic components need to be studied at microlevel to mega-biodiversity level.
- Studies on some selected physio-biochemical parameters as indicators of climate change be identified and monitored regularly.
- Awareness programme related to the causes, impacts and remedial measures of global warming and climate changes must be enhanced at grass root levels, primary education level and common consumers for a positive approach towards environment management.
- Use of renewable energy sources be encouraged at all levels, specially in rural areas.
- Use of eco-friendly technologies in industries, agriculture, construction works should be encouraged at all levels.
- Impacts of global warming and climate change is best reflected by a few aquatic organisms and arthropods, therefore such indicator organisms must be identified at global levels and the impact studied in detail.

Felicitations, Memorial awards and Gold Medals were awarded by the organizing Committee of the Conference and the honorary fellowships of Indian Academy of Environmental Sciences were given to senior scientists in various disciplines of Environment and Bioscience.

In his valedictory lecture, Prof. M. Luqman Khan, Vice Chancellor of MaulanaMohdAli Jauhar University, Rampur, stressed the necessity of "Gene Revolution" in lieu of "green revolution" to compensate for biodiversity loss cause due to climate change. Later on, senior delegates present at the conference congratulated Prof. Neelima Gupta, the Convener, on successful completion of the conference.

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The 13th International Rotifer Symposium (Shillong, India), November 18–24, 2012

To paraphrase Rachel Carson, *what is the nature of the ties that bind scientists to their work?* Or, more to our point here, what is it about rotifers that persuade scholars to meet for a week of presentations focusing solely on these animals?

Beginning in 1976, and every three years thereafter, a group of rotiferologists (ca. 35 to 125) have met for a week of meetings on their beloved animals: thus began the International Rotifer Symposium (IRS). From the start these meetings have been gatherings of the passionate and the soon to be passionate. All of the 13 symposia were arranged by informal groups of workers from different parts of the world. Here we provide a brief history of the beginning of the IRS and report on the most recent one, which was held at North-Eastern Hill University (Shillong, India) 18 to 24 November, 2012.

Initial planning for a symposium on rotifers took place in 1974 at the SIL meetings in Winnipeg (Canada). Researchers attending that *ad hoc* meeting included Henri J. Dumont, W.T. "Tommy" Edmondson, Yvette Edmondson, John J. Gilbert, Charles King, Maria Rosa Miracle, Birger Pejler, Agnes Ruttner-Kolisko, Peter L. Starkweather, Robert L. Wallace, and a few others whose names now escape memory (RLW). It is doubtful that this caucus had any vision that the IRS would grow and become be so successful over the years.

It was Agnes who volunteered to host the meeting at the Biological Station at Lunz am See (Austria) (NB: This station was closed in 2003, but reopened in 2005 as the WasserCluster Lunz). Agnes established the program that has been followed by all subsequent meetings: Sunday gathering, Monday and Tuesday for papers and discussion, an excursion to local places of interest on Wednesday (Fig. 1), and Thursdays and Fridays for more papers and discussion. The 38 rotifer researchers (from 15 countries) who attended the first meeting enjoyed their time together immensely: so much so that by mid-week there was already talk of a second meeting … and by the middle of the second meeting, talk of a third, and so on. The rest, as it is said, is history. Thus, every three years, the 'rotifer family' (Henri's term for the group) has met for a week of scientific discussion, fellowship, and good times. For example, the so-called Committee Meetings that take place in the evenings always provide a time of discussion and collegiality over a round or two or three of local beverages.

The IRS went from the first meetings in Lunz to a second one in Gent, Belgium (H.J. Dumont), and then to Uppsala, Sweden (B. Pejler), Edinburg, Scotland (L. May), Garnano, Italy (C. Ricci), Banyoles, Spain (M. R. Miracle), Mikołajki, Poland (J. Ejsmont-Karabin), Collegeville, Minnesota, USA (E. Wurdak), Khon Ken, Thailand (L.-o. Sanoamuang), Illmitz, Austria (A. Herzig), Mexico City, Mexico (S.S.S. Sarma) and Berlin, Germany (N. Walz). In November, 2012 the family reunited with our host B.K. Sharma at North-Eastern Hill University (Shillong, India). Here we were greeted with many new faces.

The 13th IRS was only the second meeting to be held in Asia, the first being in Thailand in January, 2000. Unfortunately, for some scientists the travel distance was overwhelming; this kept the number in attendance to about 65, well below the record of ca.125 in Berlin (2009). However, the energy level of the participants and the diversity of the topics were as great as in all previous meetings. There were seven invited lectures that covered advancements in technique, concept, and geographic distribution of Rotifera. These talks included presentations on molecular tools, aging, aquaculture, species complexes, and the rotifers of tropical and temporary

Fig. 1. Lunzer Obersee (Austria), a study site of the old Biological Station at Lunz. (RLW, 1976).

Fig. 2. Cherrapunjee (India), the rainiest place on earth. (RLW, 2012).

waters. Following the invited lectures several oral presentations were given. Posters were set up on the first day and were available for viewing throughout the meetings. This permitted engaging discussions to take place over the entire week.

On Wednesday, 21 November, there was an enjoyable mid-conference excursion by bus that conveyed the participants to a variety of interesting local settings. One of these was the hilltop of Cherrapunjee (elevation 1330m). This spot is noted as being the rainiest place on earth, having an average yearly rainfall in access of 11 meters, but with little precipitation from November to February (Fig. 2).

Two workshops were presented on Thursday afternoon: (1) Sessile rotifers (H. Segers, E.J. Walsh, and R.L. Wallace) and (2) The application of population level parameters for ecotoxicology (S.S.S. Sarma, S. Nandini, & M.R. Miracle). All participants gathered to hear a brief overview of the sessile taxa, which include both photos and short videos of selected taxa. These excellent videos were the product of P. Mesuwan (Thailand), a student of H. Segers. Those interested in the sessile species then moved to B.K. Sharma's laboratory for a microscopic examination of various aquatic plants, which yielded several specimens, including species of the genera *Limnias, Ptygura*, and *Stephanoceros*.

The ecotoxicology workshop proceeded concurrently with the first. It began with an introduction of the use of rotifers as bioassay organisms in ecotoxicological evaluations. S.S.S. Sarma gave a presentation on the

use of different methods (both acute and chronic toxicity evaluations) and different rotifer species (both planktonic and non-planktonic taxa) currently in practice. This presentation was followed by S. Nandini, who gave a presentation on the use of rotifers in cyanotoxicity tests. She gave a detailed description of the problems in controlling cyanobacterial blooms. M.R. Miracle added recent modifications and test conditions for conducting experiments in ecotoxicological works using rotifers. The three presentations were followed by lively discussion on the advantages of using a life table demographic approach for quantifying toxic effects of pollutants on rotifers. The different suggestions including those related to the maintenance of stock cultures given by T.W. Snell were received well by the participants.

So just what are the ties that bind this family of colleagues so strongly together and to these meetings? Is it their fascination with these wee beasties? Is it the informality that has marked the rotifer meetings from the beginning? Is it the desire for interminably long waits in airports coupled with longer plane rides? Whatever these ties are it is clear that they are strong — strong enough to persuade 13 rotifer workers to engage in a great undertaking, for it is not easy to put one of these assemblies together so that they work well. B.K. Sharma supported by his wife and colleague Sumita Sharma worked hard to make this meeting a grand success. Some senior rotifer workers from different parts of the world (R.L. Wallace, T.W. Snell, L. May, M.R. Miracle, H. Segers, S.S.S. Sarma, B.K. Sharma, S. Sharma, A. Herzig, A. Hagiwara, E. Wurdak and J. Ejsmont-Karabin) were among those that received special recognition in the form of a memento, naming each as an "Eminent Rotiferologist."

Not surprisingly, by the middle of the Shillong meeting there was a speculation on where we will gather next. Rotifera XIV is currently planned for 2015 (Czech Republic). Thus far all of the rotifer meetings have been conducted in the northern hemisphere, where by tradition, a large number of rotifer workers have been carrying out research. Perhaps in the future workers from the southern hemisphere will be in a position to host these meetings.

The proceedings of the 1st IRS were published in *Ergebnisse der Limnologie*; the proceedings for the next 11 meetings were published in *Hydrobiologia*. However, the proceedings of the 13th IRS will be published in an issue of the *International Review of Hydrobiology*, which will be edited by B.K. Sharma, H.J. Dumont and R.L. Wallace.

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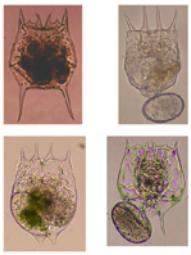
Report on the International Workshop on The Selection Criteria of Zooplankton for Aquaculture Biotechnology, February 5-22, 2013, Mexico



United Nations University
UNU-BIOLAC

A workshop on zooplankton taxonomy for aquaculture was held during 5-22 February 2013 at the National Autonomous University of Mexico at the Campus, Iztacala. The workshop was financed by the UN- University (UNU) through its regional Biotechnology Centre for Latin America and the Caribbean (Caracas, Venezuela). The workshop was conducted for 110 hours and consisted of lectures followed by practical analyses of the samples. The entire course was conducted in the Microscopy Laboratory, with adequate infrastructure; the laboratory is equipped with research microscopes, stereomicroscopes fitted with photomicrography, camera lucida, video projection, etc.

The course was restricted to students of master's, doctoral and post-doctoral levels and young teaching faculty members. Initial call to invite participation from mostly Latin American region was encouraging. However, due to last minute cancellations, some participants from Brazil, Venezuela, etc. could not join the course. Thus, the participants from Mexico and Chile finally made up a total of 25 students. There were 10 specialists to impart the training course (Mexico: Marcelo Silva Briano, Araceli Adabache, Adrian Cervantes, Martha Gutiérrez, S. Nandini, SSS Sarma; Belgium /China: Henri J Dumont; India: Y Ranga Reddy, USA: Elizabeth J Walsh; Canada: J Kolasa). They covered the major aspects of zooplankton, biology, culture techniques and systematics of Rotifera, Copepoda, and Cladocera, Turbellaria and groundwater Crustacea. In order to facilitate the participants to concentrate on one zooplankton group at a time, the subject experts were invited during different periods within the time frame of the course. The participants identified many different zooplankton groups to species level. The identification material came from different States of Mexico and from Chile.
The details of the workshop are given here:

Taxonomy and Biology of Copepoda

Dr Martha Gutiérrez, and Dr Adrian Cervantes conducted the first part of the workshop working with the participants on *Cyclopoida*. Basic identification procedure, morphology and taxonomy with special reference to *Cyclopoida*; developmental stages of copepods, differences among calanoids, cyclopoids and harpacticoids; sinkhole zooplankton: diversity and importance were among the subjects taught.

The second part of the course was given by Dr Y Ranga Reddy who taught the students about *Calanoida*. Basic calanoid morphology and taxonomy with special reference to the family *Diaptomidae*; subterranean aquatic domain, a virgin area of biological research; endemism in copepods with special reference to diaptomid copepods. They were also taught to identify calanoids and draw them using a drawing tube.

Lectures on ecology of Cladocera and Invasive species

Dr Henri Dumont lectured on the *Cladocera*, one of the major groups of freshwater zooplankton, giving an overview of their structures and relationships with other crustacean groups. Several genera and species (especially among the *Moinidae*) are currently mass-cultured for use as food in aquaculture and a majority of species is found in the tropics. He also lectured on the subject of invasive species, taking the large brackish water of the Baltic, and the Pontocaspian (the Black and Caspain seas) as examples. Invasive species of all animal and plant groups are becoming more and more of a problem, and many of them cause appreciable economic damage. This is also partly related to climate change. Among the cladocerans, members of the family Cercopagidae, formerly endemic to the Pontocaspian, are invasive. They made it to the Baltic and intervening rivers, and from there, with ship ballast water, to the Laurentian Great Lakes of North America. Further details on the taxonomy of *Cladocera* were covered by Dr Silva-Briano and Araceli Adabache. They gave a series of lectures on morphological taxonomy, basic biology, ecology, global

Fig. 1. Participants of the workshop

and regional diversity and molecular tools. The practical part consisted of collection of plankton samples, fixing and processing for identification of the taxa up to species level. Where possible, the participants received free of cost appropriate taxonomic keys and other study material.

Mid-workshop excursion was organized to sample cave fauna and river fauna. During the field trip, the participants and the invited speakers visited the caves, Grutas de Cacahuamilpa National Park in the State of Morelos for sampling aquatic invertebrates from a subterranean river.

Turbellaria

Dr Kolasa delivered three lectures: the first one was on the taxonomy and anatomy of Turbellaria, the second one on their ecology, and the last one a general introduction to both topics for a general zoology/ecology audience. In addition to the lectures, Dr Kolasa spent the remaining time with the participants in collecting zoological samples and identifying them in laboratory (extraction of organisms from samples, preparation for microscopy, identification, and standardized record entry). In addition, during the field trip, samples yielded new records of Turbellaria, which would form the basis for future collaboration with Dr. Kolasa.

Ecology and Taxonomy of Rotifera

Dr Sarma talked on the morphological identification of rotifers and practical techniques for separation of trophi and distributional aspects of phylum in Mexico. Students were taught to separate specimens from their samples and identify them using recent keys.

The workshop on rotifers was jointly conducted by Dr Sarma and Dr Elizabeth Walsh who gave lectures on the recent advances in rotifer taxonomy. These were: 1. Techniques in molecular systematics – DNA extraction, amplification, sequencing; 2. Techniques in building phylogenetics trees – Distance, Bayesian, Likelihood, Parsimony; and 3. Recent advances in understanding rotifer evolutionary relationships – review of recent works.

Zooplankton Cultures

Dr Nandini explained to the participants how to isolate two zooplankton taxa from live zooplankton samples and study their population growth for the duration of the workshop. After a presentation on the desirable characteristics of zooplankton as food for aquaculture, the students were able to analyze the advantages and disadvantages of the various taxa selected by them.

The following list mentions some of the zooplankton species identified by the participants with the help of the specialists:

Copepoda

Acanthocyclops robustus trajani; Acanthocyclops robustus einslei; Acanthocyclops robustus robustus; Aglaodiaptomus clavipes; Arctodiaptomus dorsalis; Leptodiaptomus cf. dodsoni; Leptodiaptomus cuauhtemoci; Leptodiaptomus novamexicanus; Mastigodiaptomus albuquerquensis; Mastigodiaptomus montezumae

Cladocera

Diaphanosoma sp.*; Daphnia prolata; Daphnia cheraphila; Daphnia párvula; Bosmina chilense; Simocephalus mixtus; Moina micrura; Moina macrocopa americana; Pleuroxus denticulatus; Kurzia* sp.*; Eurycercus* sp.*; Ceriodaphnia dubia*

Rotifera

Asplanchna girodi; Brachionus plicatilis; Brachionus bidentatus; Brachionus calyciflorus; Brachionus quadridentatus; Brachionus rubens; Brachionus urceolaris; Cephalodella sp. *Colurella obtusa; Colurella uncinata; Dicranophorus caudatus; Dicranophorus grandis; Epiphanes senta; Filinia*

Fig. 2 Session in progress

Fig. 3 Director of UNAM Campus Iztacala addressing participants of the workshop

longiseta; Hexarthra mira; Kellicottia bostoniensis; Kellicottia longispina; Keratella cochlearis; Keratella quadrata; Lecane aculeate; Lecane lunaris; Monommata arnditi; Platyias quadricornis; Polyarthra dolichoptera; Polyarthra vulgaris; Pompholyx sulcata; Squatinella mutica; Testudinella mucronata; Trichocerca elongata; Trichotria tetractis; Tripleuchlanis plicata; Wolga spinifera; Macrotrachela sp.

Turbelleria

Microdalyellia sp.*; Stenostomum leucops; Dugesia* sp.*; Mesostoma* sp.

There were three invited talks, open to all the students and faculty members: 1. Biology and Taxonomy of Turbelleria (J Kolasa), 2. Biological Species Invasion (HJ Dumont) and 3. Molecular tools to enhance the resolution of morphological taxonomy (EJ Walsh). These talks were attended by a large section of students and faculty members. During this time, Director of FES Iztacala, Dr Patrícia Dolores Dávila Aranda visited the seminar hall and spoke to the invited speakers and participants (See Photo).

A few specialists stayed back after the workshop ended. This helped the participants to freely discuss with the specialists various research topics in relation to the taxonomy and culture of zooplankton. At the end of workshop, the participants prepared technical reports (one report per participant), which were evaluated by the organizers of the event before issuing participation certificates.

At the end of the course, the participants were encouraged to give their feedback on the event. The participants made known that they appreciated the program and found it very useful for their knowledge and professional career. We hope that such generous support from UN University will also be available to conduct such workshops in future.

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Announcements

September 16-22, 2013, Lodz, Poland, International Symposium:

Ecohydrology, Biotechnology and Engineering: Towards the Harmony Between Biogeosphere and Society on The Basis of Long Term Ecosystem Research

Organized by:

United Nations International Year of Water Cooperation 2013
(Under the auspices of:
UNESCO International Hydrological Programme
Ministry of Science and Higher Education of the Republic of Poland
Polish Academy of Sciences)

Co-organisers:

U.S. Army Corps of Engineers (USACE)Institute for Water Resources, USA
The Chartered Institution of Water and Environmental Management (CIWEM), Rivers & Coastal Group, U.K.
International Society of Limnology (SIL)
Marshal's Office of the Lodz Region, Poland
Municipal Company of Water Supply and Sewage System in Lodz, Poland
Collective Wastewater Treatment Plant in Lodz, Poland
Infrastructure Company in Lodz, Poland

Supported by:

LTER-Europe Network (European Long-Term Ecosystem Research)
Project "Innovative resources and effective methods of safety improvement and durability of buildings and transport infrastructure in the sustainable development" (512/040003)
Project Life+ ECOROB, Ecotones for reducing diffuse pollution
Project Life + EH-REK, Ecohydrologic rehabilitation of recreational reservoirs "Arturówek" (Łódź) as a model approach to rehabilitation of urban reservoirs

Organisers: European Regional Centre for Ecohydrology u/a UNESCO Lodz, Poland
University of Lodz, Poland

Project Life+ EnvEurope, *Environmental quality pressures assessment across Europe project (LIFE08 ENV/IT/000339);*

Aim of the Symposium:

The symposium will provide a transdisciplinary, international forum to integrate efforts among ecohydrologists, engineers, social- and economic scientists to contribute to ecologically sound solutions, define the areas of possible augmentation of natural capital, compromising over life style and sustainability, and better commitment in achieving and maintaining harmony between the biogeosphere and humanity. It will also facilitate discussion on the conclusions of the 4th International Ecosummit (Columbus, Ohio, USA, 2012), presented in the "Columbus Declaration: Harmonization of Societal Needs with the EcoSphere in the Anthropocene Era".

Deadlines:

THE REGISTRATION IS NOW OPEN
Early Bird 300€ (250€ for SIL and PTH members; 150€ for students) May 31, 2013
Late registrants 350€ (275€ for SIL and PTH members; 175€ for students) 1st June, 2013
Abstract submission: May 31, 2013
Abstract review and information about approval: June 30, 2013
Manuscript submission: August 31, 2013

Call for Papers:

The Symposium Proceedings will be published in a special symposium issue of Ecohydrology & Hydrobiology Journal (Elsevier) www.ecohydro.pl
http://www.elsevier.com/journals/ecohydrology-and-hydrobiology/1642-3593

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www.ecohydrologyengineeringsociety2013.org

Rationale and general information:

The International Symposium ECOHYDROLOGY, BIOTECHNOLOGY AND ENGINEERING: TOWARDS THE HARMONY BETWEEN BIOGEOSPHERE AND SOCIETY ON THE BASIS OF LONG TERM ECOSYSTEM RESEARCH is organized under the honorary auspices of the UNESCO's International Hydrological Programme, and will be one of the activities of the UN International Year of Water Cooperation (2013). As part of this cooperation, **Director of the Division of Water Sciences and Secretary of the International Hydrological Programme (UNESCO-IHP) Blanca Jimenez-Cisneros, accepted the invitation to chair the Scientific Symposium** and inaugurate the Symposium. In addition, the **Secretary-General of the UNESCO Polish Committee, Mr. Sławomir Ratajski**, also expressed his support for the event and accepted the invitation to join the Scientific Committee of the Symposium.

The symposium is organized under the honorary auspices of the **Ministry of Science and Higher Education of the Republic of Poland** and **Polish Academy of Sciences.**

The symposium will be part of the **International Week of Bioeconomy** co-organized by the **Marshal's Office in Łódź** within **the Green Future Program**, integrating the research potential of the Łódzkie Region for bioeconomy - intelligent specialization on using biotechnologies for sustainable development and environmental management

Opening lectures will be delivered by:

- **Blanca Jimenez-Cisneros**, Director of the Division of Water Sciences and Secretary of the International Hydrological Programme (UNESCO-IHP)
- **Giovanni Bidoglio**, Head of the Water Resources Unit, Joint Research Centre, EU

The following guests speakers have been invited for plenary lectures:

- **William J. Mitsch**, Chair of the 4th International Ecosummit (Ohio, USA, 2012), Florida Gulf Coast University, USA
- **Patrick S. Bourgeron**, Head of ILTER Science Strategy Committee, Colorado University, USA
- **Brian Moss**, President of International Society of Limnology (SIL), UK
- **Johannes Cullmann**, Chair of the Intergovernmental Council of the International Hydrology Programme (IHP) of UNESCO, Germany
- **Martin Whiting**, Immediate Past Chairman of CIWEM Rivers & Coastal Group, Haskoning UK Ltd., UK
- **Robert A. Pietrowsky**, US Army Corps of Engineers (USACE), Institute for Water Resources, USA
- **Leon Braat**, Chair of Management Board, ALTER-Net, Senior Researcher International Biodiversity Policy, Alterra, Wageningen-UR, The Netherlands
- **Michael Mirtl**, Chair of LTER - Europe, Environment Agency, Austria
- **Enrique Playán**, Coordinator of the Water JPI, Irrigation, Agronomy and the Environment Group, Soil and Water Department, (EEAD-CSIC), Ministry of Economy and Competitiveness (MINECO), Spain
- **Stanisław Bielecki**, Rector of the Technical University of Lodz, Poland

In the Anthropocene Era we live in, almost 70% of the Earth's surface has been highly modified by humans, what eventually has led to emergence of "novel ecosystems". Today, when humanity approaches the limits of global carrying capacity, and the concurrent degradation of global environment and population growth aggravated by climate change, may end up with another "tragedy of the commons", the paradigm shift towards more sustainable management of natural resources seems to be the future of life.

Water has always been the key driver of biogeochemical evolution of biosphere. Together with the escalating global climate changes water has become and will continue to be the limiting factor to achieve sustainable development in many areas of the World. Current human activities seem to neglect the fact that our existence on Earth inevitably depends on our ability to profoundly understand, maintain and re-establish fundamental, long-term climatic, hydrological and ecological processes. Prioritizing short-term management, we risk increase of uncertainty of both ecological and social systems.

In 1997 International Hydrological Programme of UNESCO adopted ecohydrology as foundation of a new scientific approach and paradigm in integrated water management for sustainability. As a management paradigm, ecohydrology extends the perspective from environmental protection and controlling environmental hazards to identification of the hierarchy of regulatory processes, with special emphasis on the use, as a novel environmental management tool, interplay between water and biota. As environmental science, ecohydrology embraces engineering and technological abilities to increase efficiency of resource use, prolongation of living cycle of products and lowering emissions, and it integrates itself with the capacity of ecosystems. In the current phase ecohydrology proposes to involve long-term socio-ecological researches in defining the areas of possible augmentation of natural capital, compromising over life style and sustainability, and better engagement of engineering in the maintenance of ecological functions towards more sustainable development.

Both technology and system solutions have now progressed enough to develop a dialogue on integration of the efforts among

ecohydrologists, engineers and social and economic scientists to contribute to ecologically sound solutions towards harmony between the biogeosphere and humanity. This dialogue is extremely important in the light of the progressing global challenges. It contributes to the priorities defined by the United Nations International (UNESCO IHP) such as COOPERATION between hydrologists, practitioners and representatives of socio-economical sciences and ACTIVITIES INTEGRATION. Symposium will meet also the priorities of the European Commission in a matter of Water Framework Directive (2000/60/EC), the Habitats Directive (92/43/EEC), Nitrates Directive (91/676/EEC), Bathing water Directive (2006/7/EC), the Thematic Strategy on the Urban Environment ([COM (2005) 718), and others.

8th Workshop on Volcanic Lakes, IAVCEI-CVL8, Japan (July 25-31, 2013)

Aso, Kirishima, Noboribetsu and Usu volcanic systems

The IAVCEI Commission on Volcanic Lakes announces the upcoming 8th Workshop on Volcanic Lakes, CVL8, in Japan. The Commission on Volcanic Lakes stands for multi-disciplinary research on volcanic lakes, including limnology, geochemistry, geophysics, numerical modeling, volcanology, volcano monitoring, toxicology, biology… and is open to any new research topic.

CVL8 is composed of two sections. The first section will be held near Aso Volcano (Kyushu, Japan) from 25 to 28 July 2013, and includes a two-day conference wherein the various studies on volcanic lakes will be presented. The first section includes field trips to Aso (Fig. 1) and Kirishima volcanoes and their lakes. For the second section of the workshop (29-31 July) we will move to Hokkaido, where we will visit the crater lake of Noboribetsu-Spa and the geothermal area of Usu Volcano.

The CVL8 Workshop will be held after the IAVCEI General Assembly in Kagoshima, but participation to CVL8 is also possible without participation to IAVCEI. We hope to welcome many **participants from the limnological research community** at the CVL8. Within the tradition and history of the Commission on Volcanic Lakes, founded after the August 1986 limnic gas burst of Lake Nyos in Cameroon, Western Africa, limnology has often played a major role. This tradition should be respected and upheld.

*If you wish to attend the 8th Workshop on Volcanic Lakes, Japan 2013, without taking part in IAVCEI, you should contact the Organizer Prof. Takeshi Ohba (Tokai University, Japan) directly via email: takeshi_ohba@tokai-u.jp

Aso Volcano and the crater lake are among the main targets of this workshop. Aso Volcano is a complex with many central cones within

Fig. 1. Nakadake crater lake at Aso Volcano, Kyushu, Japan. Picture by Nicolas Vinet.

Fig. 2. Oyunuma crater lake, Noboribetsu-Spa, Hokkaido, Japan. Picture by Nicolas Vinet.

one of the largest calderas in the world. The Nakadake peak is one of the central cones, hosting a deep pit crater and a high temperature and hyper-acidic lake (Fig. 1). At the previous workshops, we usually sampled lake water ourselves for inter-laboratory comparison for chemical and isotopic analysis. Due to the depth and steepness of the inner wall of Nakadake Crater, the direct sampling is extremely difficult. We need to limit our activities around the lake, and these will include visual observation and a safe remote sensing.

On its turn, the several lakes in the Kirishima volcanic area can be sampled. These lakes have a low magmatic component. At Lake Oyunuma in Noboribetsu-Spa (Fig. 2), Hokkaido island, we can sample the water of an active volcanic lake water. Lake Oyunuma is very interesting because the water temperature of bottom water exceeds 100°C and a molten sulfur pool is present at the lake bottom.

During the field trips, we can discuss and share the hot results of our research as well as the various sampling methods.

We hope you will join the CVL8 Workshop at Aso and Noboribetsu, and also enjoy the nature and splendid gastronomy of Japan.

Important Information

Abstract submission deadline: **24 April 2013**
Registration deadline CVL8: **2 July 2013**

Abstract submission by email:
cvl8japan@gmail.com

Registration fee:
First section (Aso-Kirishima): **45,000 JPY**
Second section (Noboribetsu-Usu): **50,000 JPY**
Entire workshop: **95,000 JPY**

*Attention: the flight between Kyushu and Hokkaido is not included in the inscription fee.

For further information:
http://www.iavcei2013.com/related_meetings/related_meetings.html#W01
http://www.sc.u-tokai.ac.jp/ohbalab/English/CVL2013/index.html
or email to:
takeshi_ohba@tokai-u.jp or cvl8japan@gmail.com

Local Organizing Committee

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Yasuo MIYABUCHI (Kumatomo University, Japan)
Akihiko TERADA (Tokyo Institute of Technology, Japan)
Issa (Tokai University, Japan-IRGM, Cameroon)
M. JUDE (Tokai University, Japan)
B. CHAKO (Tokai University,Japan)
M. KUSAKABE (Toyama University, Japan)

CVL Scientific Committee & Steering Committee

Leader CVL: Dmitri ROUWET (Istituto Nazionale di Geofisica e Vulcanologia (INGV), Sezione di Bologna, Italy)
Secretary CVL: Takeshi OHBA (Tokai University, Japan)
Steering committee members: Bruce CHRISTENSON and Agnes MAZOT (GNS, New Zealand); Franco TASSI (Università degli Studi di Firenze, Italy)

Course Leeds University--River Basin Processes and Management

This programme is for people wishing to advance their skills and career options in River Basin Processes and Management. River basins are of fundamental importance to the world's population, and industry and academia throughout the world demand research training in water dynamics and management. The University of Leeds has a world-class reputation for water-related research and for GIS development in an environmental context and this MSc programme builds on this success.

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Publication of New Books: Three new Phycological Monograph on Algae and Diatoms

The Publishing Department of the Institute of Botany of Polish Academy of Sciences ("The Publishing House") announces publication of 3 **Phycological Monographs, all published in 2012**.

1. "*Current advances in algal taxonomy and its applications. Phylogenetic, ecological and applied perspective*"; K. Wołowski, I. Kaczmarska, J. M. Ehrman, A. Z. Wojtal (eds.); ISBN: 978-83-62975-03-7.
W. Szafer Institute of Botany, Polish Academy of Sciences; Kraków (2012); Format: B5 (17,00 x 24,00); black and white figs. 52; col. figs. 24; pp. 304; price EUR 29,00 (postage included).

2. "*Diatom diversity in streams of the Tatra National Park (Poland), as indicator of environmental conditions*"; B. Kawecka; ISBN: 978-83-89648-91-4
W. Szafer Institute of Botany, Polish Academy of Sciences; Kraków (2012);
Format: B5 (17,00 x 24,00); hardcover; black and white figs. 49; col. figs. 6; pp. 216; price EUR 26,00 (postage included).

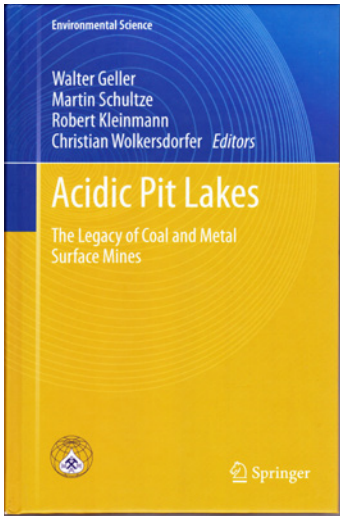
3. "*Illustrated guidebook to common freshwater red algae*" Pertti Eloranta, Janina Kwandrans. W. Szafer Institute of Botany, Polish Academy of Sciences, Kraków (2012); ISBN: 978-83-62975-10-5.
Format: 21,0 x 21,2; col. figs. 42; pp. 52;price EUR 29,00 (postage included)

Book Review

Acidic Pit Lakes - The legacy of coal and metal surface mines.

Walter Geller, Martin Schultze, Robert Kleinmann, Christian Wolkerdorfer (eds) Springer, Heidelberg, New York, Dordrecht, London, 2013. ISSN 1431-6250. ISBN 978-3-642-29383-2, ISBN 978-3-642-29384-9 (eBook) xvii + 525 pp. Hardback Price: US $ 175

This 525-page book, a monograph on Acid Pit Lakes, appeared in July 2012 as *Environmental Science and Engineering Series*, published by Springer. The 6-chapter book provides a large amount of information on post mining landscapes, ranging from their geology through chemistry to biology. Acid pit lakes are common in mining dominated landscapes. They are composed of closed mine sites in large dumping areas, where surface and ground waters are adversely affected by acid mine drainage (AMD). There are > 40 contributors to this book, belonging to different geographical regions; more than two-thirds of them are from Germany, which also contains a lion's share in the book contents. The six main chapters of the book are followed by an extensive References List that exceeds 60 pages. There is also a detailed book *Index* that explains general terms used in the text, names of the mines, lakes and streams, organisms and taxa and limnological vocabulary with page numbers.



The 10-page *Introduction* Chapter is authored by Walter Geller and Martin Schultze, the senior editors. It deals with how pit lakes are formed, their occurrence, distribution in different regions and technology of hard rock open cast-mining and strip-mining. Morphology, hydrology and limnology of such lakes are briefly described,

with some coloured illustration. The case studies that follow in Chapter 5 are referred to. The Chapter 2 contains only 7 pages, describing the terrestrial environs of pit lakes; it also deals with morphology, age and development of pit lakes as well as how the ground water influences the pit lakes. The intense interaction between the groundwater pit lakes is briefly mentioned. In fact, all the subsequent chapters mention how important ground water is for the pit lakes.

Chapter 3 with more than 200 pages, the longest in the book, is of great interest to those looking for comparisons of limnology of normal surface-water lakes with the pit lakes. There is a detailed account of the physical properties of acidic pit lakes, including their electrical conductivity, density, light regime, vertical stratification patterns, wave action, mixing, etc. The conclusion drawn is that there is a need for numerical models to improve prognostication of the evolution of water quality in the pit lakes and for their remediation. Such tools may also help predict changes in "natural" lakes and climate variability. A selective reading of the part on "limnochemistry of water and sediments of acid pit lakes" reveals that Germany, the world's largest producer of lignite, generates 47 % of its power from hard coal and lignite. Thus, such abundant water bodies, are very vital for Germany, and have, therefore, received considerable attention of limno-chemists and limnologists in the country. Our understanding of the unique pit-lake chemistry has rapidly progressed during the past 15 years, mainly through researches in Germany and Australia. Although the results from these two countries can be generalized, a more international database is needed to identify better the relationships between geological conditions and water chemistry of these lakes. In a subsequent section on phosphorus (P) retention in the mining lakes, it is interesting to note how important the Fe:P ratios of the sediment are in such lakes. Even a minor mining activity that causes a Fe surplus, leads to significantly increased P retention. I enjoyed reading Section 3.3 *The Biology and Ecosystems of Acidic Pit Lakes* (pages 107-186). Even though the dissolved metal concentrations are typically elevated in acid pit lakes, compared with natural lakes, they are not necessarily toxic for freshwater biota. Interestingly, the food-webs of these lakes are highly truncated, having only a few trophic levels. This sub-chapter 3.3 subsequently describes trophic interactions and flow of energy. One can virtually generalize that at pH <3.0 *Ochromonas* spp. and *Chlamydomonas acidophila* dominate the phytoplankton community of these lakes. The number of phytoplankton taxa varies from about 4 to 30 at pH values in the range 2.3-4.0. Primary production rates are low and do not usually exceed those of photosynthetic bacteria. Despite the capacity of iron to bind P, increase in phytoplankton biomass can lead to eutrophication. Free carbon dioxide is available as inorganic C (DIC) source for photosynthesis. Benthic production in such waters is dominated by diatoms, usually *Eunotia* and *Pinnularia* species. The zooplankton encountered (Table 3.13: pages118-119) usually contains a few species of *Rotifera*, even at pH values as low as 2.3. The *Cladocera* are usually absent at pH <4.7, except for the occasional chydorids. Daphnids and sidids are usually not found at pH less than 5.7. pH is a major factor determining the distribution and composition of zooplankton, e.g. crustaceans, which need calcium carbonate for their carapax, suffer severely from low pH, CO_2 being the main C source in these waters. This interesting chapter, rich in information on life in these unusual aquatic habitats, mentions about mixotrophy, the strategy to overcome resource limitation--some of the organisms use DIC while others use both DIC and DOC as energy source, e.g. *Chlamydomonas acidophila*. Phagomixotrophic flagellates act as predators on both bacteria and algae. *Ochromonas* in these mine-pit waters grows heterotrophically. Bacteria populations in acid-mine lakes in Lusatia, Germany, are mostly chemo-organo-heterotrophic, i.e. they assimilate organic compounds and "gain energy from respiration". The lack of *Daphnia* spp., as well as higher invertebrates and vertebrates, has considerable consequences for structure of the food webs and flow of energy therein. The length of food chain is limited to two trophic levels. Therefore, neutralization of these lakes, i.e. abatement of acidification through alkalinity generation, is needed even at the expense of deliberate eutrophication.

The readers interested in macrophytes invasions will find interesting information in Section 3.3.2 (pages 149-159). The occurrence of green algae (Order *Zygnematales*) in lakes impacted by acidic precipitation shows that water temperature primarily governs the growth of such algae. Benthic community production seems to be generally limited by P and seriously stressed by Fe deposition. Primary production rates of benthic diatoms using ^{14}C method under very low light conditions were observed to reach 0.2 $mgC.mgChl^{-1}h^{-1}$. The compensation irradiance of the photosynthetic benthic community was 6.8 $\mu E\ m^{-2}\ s^{-1}$.

Predatory corixids, aquatic insects, meiofauna, mites and nematodes are all common in the acid pit lakes but there is little information on microzoobenthos. In contrast with natural lakes, where sedimenting material is mainly dead organic matter, the sedimenting matter in acid lakes is largely ferric iron.

Lastly, in Chapter 3, modeling of pit lakes (p 186-224) presents a unique challenge to modelers— partly also because, unlike natural lakes, the bottom of pit lakes does not have a typical organic layer. The conclusion derived is: physical and geochemical properties of pit lakes cover a broad spectrum of spatial scales. The gaps in our understanding of many of these important properties demonstrate that models will be always limited in their ability to mimic the nature. However, it appears that with the continuing rapid increase in the speed and capacity of our computers, the performance of models will certainly continue to improve and the model predictions become more reliable.

Chapter 4 is a 40-page description of *Remediation and management of acidified pit lakes and outflowing waters*. As Chaper 1, this chapter is authored by Water Geller and Martin Schultze. Mining pits filled with AMD can be best treated with lime or by large scale chemical treatment. A combination of chemical and biological treatments appears promising, as also filling and flushing with river water, or with water from mines still in operation. Chemical treatment neutralizes the acidic-water bodies but sustainability of the measure- in view of the continuing inflows of acidity from dumps- can be an issue in such cases. Re-acidification after some years requires secondary chemical treatment. Fish kills during such treatments can be avoided especially by prohibiting the use of aggressive, alkaline chemicals, e.g. NaOH or quick lime. Sulphate reduction with metal sulphide elimination works well in lab but in lakes the oxidation of ferrous iron coming up from deeper layers to ferric iron presents problems. Biological remediation of such lakes seems to me to be less clear because of major difficulties in such shallow waters. Such a treatment involves addition of organic matter (1-10 $Kg\ m^{-3}$) but an overdose of addition leads to formation of H_2S, so that organic matter needs to be added in steps. Metal contaminated flows from mines and pit lakes need to be discharged within legal limits into the receiving rivers. Different approaches, the mechanisms and measures to improve water quality, especially to diminish the acid-water problem are summarized on page 259 in Table 4.5.

Chapter 5, entitled *Case studies and regional surveys*, is 171 pages long,

forming one-third bulk of this book. Sections 5.1 -5.7 of this chapter deal with studies on acid pit lakes in Germany, Poland, Spain, Portugal, Australia, USA and Canada. The Section 5.1 starts straight away with German lakes. I missed a general introduction to all these regional studies. The first 25 pages deal with the hydrography, water chemistry, origin and distribution of lake: most have their origin in open cast lignite mining, located in areas poor in natural lakes. The acidification of lakes is the main concern with respect to their water quality. The filling of these lakes with river water and water from mines in operation was observed to be a successful approach for acidification reduction in German pit lakes, in addition to chemical in-lake treatment in cases of re-acidification, which generally involves applying lime, soda and other alkaline substances.

Roman Zurek (5.2; pages 291-315) describes the open pit lakes in Poland. The country has hundreds of small sand pits, gravel pits and quarries that are locally important. Larger, brown coal (lignite; see also Table 5.4) and sulphur open-cast mines are of regional and national importance. The post-mining lands in the country were reclaimed during the 1970s and 1980s for agricultural use and as woodland forests. The efforts to create new lakes have continued past the 1990s. Interestingly, the author concludes using a phrase from Prof. Walery Goetel, a specialist on the science of systematic biosphere protection said "What man devastated, man must repair". The idea has, however, not been followed because thousands of abandoned, contaminated and devastated opencast mines still exist.

The Iberian Pyrite Belt (IPB; Section 5.3.; pages 315-342) extends from the south-western corner of Iberian Peninsula, from the north of Seville to south of Lisbon (Portugal). The hydrology of IPB is typical of the Mediterranean region. The following part that deals with pit lakes in the IPB, reports basic limnological, hydrogeochemical and microbiological features of these lakes. Most of these waters have highly acidic water (pH 2.2-3.5) with high sulphate and metal concentrations. Favoured by depth and meromixis, anoxic monimolimnion towards the bottom, seems to predominate in most such lakes. Stratification patterns in these lakes are attributed to pit lake morphometry, oxidation of Pyrite by Fe (III) in the anoxic water, dissolution of secondary salts from flooded galleries, influx of ground water, etc. Many of the mine pits were flooded and abandoned during 1960s-1990s but others have existed for more than a century. Australian contribution (sub-chapter 5.4, pages 342-362) to the book is significant in that it comes from a region that is a top producer of important minerals in the world. Most mining activities are centered in Western Australia, Queensland and New South Wales. About 60 % of 517 mining operations contained potentially acid-generating wells. Pit lakes in Australia occur across a divergent set of climate conditions. High evaporation losses seem to result in formation of hypersaline pit lakes—arid conditions do not allow rapid filling. It is surprising that there is no central data base existing or for future pit lakes in the country. The research studies are limited and opportunistic. Limnological variables of some lakes are summarized in tables. Some examples of Australian mining lakes with information on management, remediation and rehabilitation are presented. For future, many of such lakes are considered a liability for the industry, the Government and communities because the lakes pose several problems to the environment and society. Although monitoring of pit lakes is limited in Australia, it is usually associated with legislative compliance- rather than for an enhanced understanding of these systems.

Moving on to the USA (sub-chapter 5.5, pages 362-376), the case of Burkeley Pit lake in Butte, Montana, is referred to as a worst case scenario, with high acidity (pH,3.0) and toxic concentrations of specially Zn and Cu, >500mg l^{-1} and > 100 mg l^{-1}, respectively. This site received wide-spread publicity in November 1995 when carcasses of over 340 migratory snow geese were recovered from the surface of the Pit Lake. The mining in Berkeley Pit ceased in April 1982 when also the dewatering pumps were turned off. Limnological studies on the lake included morphometrical, climate, and vertical stratification, mixing being prevented by salinity increase in the deeper layers but about 1.5 years later a lake began to form and until 1996 the lake filled at an average daily rate of $20x10^6$ litres . Historically the pit has shifted between holomixis (e.g. complete mixing in 2010) and meromix. It seems that the US EPA has mandated that the water level in Berkeley Pit cannot be allowed to reach surface elevation (1649 m). High dissolved Fe (III) in the water absorbs light rapidly in the upper 1.5 m (extinction coefficient 3.42 m^{-1}) so that it limits primary productivity. The lake's biological productivity is also low and its bioremediation involved some experiments with unclear results. It may be not until 2020 when a large scale treatment of Berkeley Pit water will begin.

The sub-chapter 5.6 (pages 376-387) deals with Mining Lake 111 (M111) in Germany. This pit lake serves as a model pit, located in the former Grube Agnes region, in the lignite mining district of Lusatia. ML 111 is probably the most intensively studied pit lake in the world. There is a very good account on the limnology of the lake on pages 376-387, including information on lake's food chain as well. Although the lake is classified as oligotrophic with limiting P-levels and high iron levels that limit light penetration, pelagic primary production in the lake ranges between 50 and 100 mg C $m^{-2}.d^{-1}$, with little seasonal variation. There are two rotifer species (*Elosa woralli* and *Cephalodella hoodi*) that are vertically segregated in hypolimnion and epilimnion, respectively. They feed on phytoflagellates, with *C. hoodi* also switching to mixotrophic feeding. Bioremediation work has included experiments to achieve neutralization of the lake but with poor success. For a strongly acidic lakes like M111, microbial measures for acid pit lake treatment do not seem to be a success option. However, with lower acidity loadings, biological remediation, e.g. use of bioreactors, is still a promising but yet an uneconomical alternative.

Three Canadian lakes (section 5.7; pages 387-408) range from alkaline to very acidic waters. Study projects were intended to showcase the ecological engineering concept to provide long-term solution to mine waste water management. The productivity in the lakes is principally related not to the acidity or metal content but to the lack of C and P. Main goal of the studies is to produce reducing conditions in the sediments where microbial consortia can reduce the oxidized iron and zinc, and sulphide if sulphate is present. The work on the lakes was largely financed by mining companies. The research projects lasting a decade received concurrent university and/or government support. The sites that still exist are a proof of the feasibility of eco-engineering measures.

Sections 5.8 and 5.9 of the Chapter 5 contain two reports from Germany: 1). on acid mine inventories, and their impact on ground water quality and pit lakes in Rhineland Lignite Mining District, Germany; and 2). on case studies of the Pit Lakes Restoration in Lusatia. The later study compares per ha the benefits and costs of rehabilitating acid lakes as well as assesses and pleads for their restoration prospects. The first study shows that determining the average amount of oxidized pyrite at a mine or overburden dump is essential for predicting subsequent water quality of groundwater and pit lake. The overburden material has to be limed before dumping to avoid acidic groundwater. The second study concludes that there is a strong support for creation of the lake district because market benefits associated with this scenario, assuming nine clean lakes, are substantial-- ranging from € 10 to16 million annually.

I did not quite figure out why these two projects are discussed here, i.e. almost at the end of this chapter rather than at the start of Chapter 5, next to the section 5.1, which also deals with German lakes.

Chapter 6 is headed as *Lessons Learned, Open Questions and Concluding Remarks*. This 14-page chapter (pages 437-450) is a summary chapter compiled by Walter Geller and Martin Schultz, who also wrote the starting chapter on *Introduction*. The authors refer comprehensively to Sections 3.1 (Physical Limnology) and section 3.4 (Modelling of Pit lakes). Because of very high Fe:P ratios in the upper sediment (ratios as high as 370) the whole-lake P retention can be about 15% higher than predicted by the OECD-Vollenweider model. As far predictive models of pit lakes, the reliability and accuracy of predictions about the lake water quality development depends strongly on the quality and completeness of the input data. The high concentrations of NH4+ in the lakes resulting from inhibition of nitrification are toxic to fish. It seems rain-induced acidification of lakes reduces phytoplankton taxa to about 50%. At pH of 2.3, the number of genera is reduced to just 4, with *Ochromonas* and *Chlamydomonas acidophila* dominating. The extreme acid conditions also restrict the occurrence of macrophytes to *Myriophyllum heterophyllum* and *Juncus bulbosus*. A few invasive species may be also encountered. Rotifers as *Cephalodella hoodi* and *Elosa woralli* and cladocerans (*Chydoricus sphaericus*) will dominate as they can resist high acidity. Zooplankton species in the acid pit lakes and rain-acidified lakes considerably differ. Mixotrophy is a common feature of the unicellular phytoplankton and some zooplankton species. Interestingly, both the benthic primary production and heterotrophic bacterial production rates in acid lakes may be higher than those of pelagic primary production. Those responsible for reclamation and remediation of these water bodies seek effective, low-cost technological approaches to improve water quality. Lakes that are highly contaminated with acidity and metals can be restored by placing the wastes back into the pit and by sealing off the bottom with clay cover. Ecological engineering is an emerging field that offers an alternative chemical in-lake treatment. Lastly, there is a mention in the chapter about the economic value of pit lakes in Germany, where there seems to be a strong support for creation of a lake district using the mine pits. However, chemical remediation that must precede such efforts involves huge amounts of ground limestone, dolomite and hydrated lime. These costs and needs are on recurring bases for at least a decade. Such findings in Germany have implications for policy makers in the Elbe Region basin.

I congratulate Walter Geller *et al*. for their monumental task of editing the book, in addition to authoring the several book chapters/parts. Walter was very reflective and apt in his dedication sentence on the page preceding *Preface: To my grandfather, who worked in the pütt*. All in all, I enjoyed reading my review copy of the book. My extensive review of the book should serve as a proof of this. I not only refreshed my knowledge but learnt several new facts about the life in these highly acidic-water pit lake environments and all that sustains life, the food chain and ecosystem processes in such lakes. Remediation and rehabilitation of these lakes have obviously the accompanying recurring costs to keep these aquatic systems in healthy state. These costs are exorbitant but the new technologies and models offer new solutions for the future. Sustainability of the corrective measures for rehabilitation of the acidic pit lakes needs to be validated in the course of time. The book generally reads quite well and I hardly came across any typos or other errors Of course, there is a certain diversity of writing styles that is noticeable with the changing geographical regions, especially Chapter 5. I would unhesitatingly recommend this book to limnologists, biologists, water chemists and lake restorers--in fact to one and all, interested in these unique acidic environments.

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Obituary

Dr. Robert S. Campbell (9 September 1913-28 Nov. 1912)

Dr. Robert S. Campbell was a scholar, a mentor, and a dedicated educator who had a national and international impact on the fields of limnology and fisheries biology and inspired hundreds of students to study conservation. He passed away Nov. 28, 2012, in Missouri at the age of 99. Dr. Campbell was born Sept. 9, 1913 in Saskatoon, Saskatchewan, and later became a naturalized citizen of the USA. He obtained an MS degree with D.S. Rawson at the University of Saskatchewan and PhD in limnology working with P.S. Welch at the University of Michigan. He taught at Central Michigan University until 1944, when he joined the Department of Zoology at the University of Missouri, and later served 8 years as Chairman. He instituted a fishery research program in the Missouri Cooperative Wildlife Research Unit—one of the first Units to do so. He maintained his interest and publications in fisheries as he continued research in limnology, which is summarized in 40 publications. He is recognized for his definitive work on succession in strip-mine lakes and for his work on the effects of thermal effluents on reservoir water quality. He maintained membership in seven national and international societies in the fields of limnology and fisheries. He served as president of the Midwest Benthological Society and on the editorial board of the Journal of

Wildlife Management and the Transactions of the American Fisheries Society. Dr. Campbell was honored for his research and teaching as the recipient of the Outstanding Professional Achievement Award, University of Missouri Wildlife Club, 1966-1967; the Educator of the Year Award, Conservation Federation of Missouri, 1970; the E. Sydney Stephens Wildlife Professional Award bestowed by the Missouri Chapter Wildlife Society, 1972; the Faculty Alumni Award, 1977; and the Missouri Chapters of the American Society and the Wildlife Society, 1978. Dr. Campbell was a dedicated teacher and counselor of undergraduate students. Many will remember him for introducing them to the field of Fisheries and Wildlife through his course, the Ecology of Wildlife and Man, in which he taught as many as five hundred majors and non-majors each year. His dedication to teaching was recognized as he was honored with the Alumni Association Distinguished Faculty Award, 1978.

Jack Jones
Editor, *Inland Waters*

News from Siberia

Siberian Scientists Honour Dutch Limnologist

Dutch limnologist, Dr. Ramesh D. Gulati, the distinguished editor of SIL News, was inaugurated as an honorary professor of the Siberian Branch of Russian Academy of Sciences (SB RAS) during its annual meeting on 25 April 2013. After the ceremony, Ramesh Gulati presented a lecture on *"Man-made changes & how they affect lakes undergoing restoration processes, e.g. lake biomanipulation".*

The title of honorary professor of the Siberian Branch of the Russian Academy of Science is awarded for an outstanding contribution to science and for development of international cooperation. All members of the General Meeting of SB RAS elect the honourable professors. Twenty-two outstanding scientists have been awarded the title of honorary professor since 2001 (the year when the title was established). Among them there are several Nobel laureates, and scientists from different countries and research areas. Ramesh Gulati is the first *aquatic ecologist* who gets this title.

Dr Gulati was also elected to the editorial board of the Siberian journal, Contemporary Problems of Ecology. The journal was established and is published by the Siberian Branch of the Russian Academy of Sciences. Recently the journal was indexed by the Web of Science. During the meeting of the members of the editorial board of the journal expressed their hopes that the experience of Ramesh Gulati will help to promote this journal to the international scientific community.

At the end of his brief trip to Novosibirsk, Ramesh participated in a seminar on 'Limnological investigations in Siberia: achievements and perspectives'. Scientists from several Siberian cities presented results of investigations on various Siberian lakes. The huge area of Siberia has thousands of lakes, ranging in salinity, complexity, and degree of anthropogenic influence. Some are unique treasures of freshwater and diversity (e.g. Lake Baikal and Lake Teletskoye). Some are already well known as model systems for saline lakes (e.g. Lake Shira). However, sometimes the local knowledge, experience and expertise are hidden from international society due to linguistic, cultural or infrastructural obstacles. We expect that the inauguration of the Ramesh Gulati as an honorary scientist will strengthen the link between Siberian limnology and the international scientific community.

Andrey Degermendzhy
Academician of Russian Academy of Sciences
The Head of the Institute of Biophysics SB RAS

Egor Zadereev
Scientific secretary at the Institute of Biophysics SB RAS
Member at large of the International Society for Salt Lake Research

The President of the Siberian Branch of Russian Academy of Sciences, Academician of Russian Academy of Sciences Alexander Aseev officially congratulates Ramesh Gulati with the honorary title (April 25, 2013). (Photo: Courtesy of the Centre of Public Relations of SB RAS).

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The International Society of Limnology (formerly International Association of Theoretical and Applied Limnology; Societas Internationalis Limnologiae, SIL) works worldwide to understand lakes, rivers, and wetlands and to use knowledge gained from research to manage and protect these diverse, inland aquatic ecosystems.

SIL Officers

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