www.limnology.org

SIL news

Volume 63 - December 2013

In This Issue

Material for the June 2014 issue should be sent to the Editor by:

1 APRIL 2014

Dr. Ramesh D. Gulati
N100/Department of Aquatic Ecology
Post Box 50
6700 AB Wageningen
The Netherlands
Tel: +31.317.473.542
Fax:+31.317.473.675
E-mail: r.gulati@nioo.knaw.nl

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

Budapest and beyond by Yves Prairie

(**Editor's note**: *this article by our new SIL President Dr. Yves Prairie can be considered also as his Introduction to our newsletter63. See also the* **Editor's Foreword** *on next page*)

The 32nd SIL congress held in Budapest this past August was all around a very successful meeting. Truly outstanding plenaries, excellent talks and posters reporting on recent advances from all over the world, social activities and a beautiful city to discover. These are the traditions of SIL meetings and like all great traditions, they have to be preserved and nurtured. Somewhat ironically, maintaining traditions also requires that we must keep up with the times! A little behind the scenes, several significant changes occurred in Budapest in the ways the Society will operate over the coming years and my objective, in this first missive as President, is to explain what some of these changes are and the purpose behind them.

Inland Waters, a first ISI impact factor and moving towards Open Access

SIL's new journal ***Inland Waters*** started publishing only a little over 2 years ago and is already proving to be a viable and noteworthy publishing outlet. It started modestly by publishing less than 200 pages in its first year (2011). As this newsletter goes to press, the last issue of this year's volume has just been completed with a volume total of nearly 500 pages in 2013. Earlier this summer, *Inland Waters* also received a very respectable first "impact factor" ranking from ISI (1.533) and this puts it in the middle of the 20 journals of the limnology category, all of which have a much longer publishing history. These are rather good starts. In keeping with SIL tradition, *Inland Waters* is a journal committed to publishing limnological science from every corner of the world and making it easily accessible and affordable. But the publishing world is changing at an incredible pace and *Inland Waters* must embrace this evolution. To this end, we have now put the structures in place to facilitate a smooth transition between a subscription-based society journal towards a fully Open Access model, all the while keeping it affordable for authors from every country to publish in it. In doing so, *Inland Waters* is poised to become perhaps the first fully Open Access limnological journal. I can only encourage all of you to partake in these exciting times and send your latest manuscript to your journal, *Inland Waters*.

SIL congresses: more often, more diverse and more collaborative

SIL congresses occupy a very particular niche amongst the plethora of scientific meetings of interest to limnologists. For example, I think of it as the conference *par excellence* to hear about new regional or international research initiatives and it is certainly the natural home to report and discuss how global problems manifest themselves differently in various regions of the planet. It is also one of the rare conferences where cutting-edge science is confronted with very down-to-earth problems, i.e. where the applied and fundamental sides of limnology

Reports

13th Symposium on Aquatic Microbial Ecology (SAME 13), on the path to SIL 2016 in Torino, Italy

The road to the SIL Congress 2016 in Torino (Italy) is long and made up of many steps. Both national and international conferences preceding the SIL Congress in 2016 offer opportunities for publicizing the main event and are a testing ground for its organizational structure.

The SAME 13 conference is an example of one such preceding meeting, which was held from 8 to 13 September 2013 in Stresa (Italy), on Lake Maggiore, a few km from the Institute of Ecosystem Study (CNR ISE) that will host this conference. The SAME 13 has been a great success both from the scientific and organizational points of view. In fact, the number of participants has doubled compared with the previous SAME. There were in total 460 participants from 58 countries. In the course of a week, a complex and accurate picture of the state of global research on the microbial ecology of our planet's waters was presented.

What emerged was the great dynamism of researches in aquatic microbial ecology despite an overall scarcity of funding and adequate infrastructure, afflicting especially the less wealthy and economically afflicted countries. Thus, it became clear that large and expensive trans-oceanic cruises and great polar expeditions are certainly not the only frame in which aquatic microbial ecology can or will have to develop. An increasingly wide space is left to less expensive "in house" research which, thanks to the latest cutting-edge technologies, promises to allow us to take a fundamental leap forward in our understanding, and therefore management, of the "water-world" in the next 5-10 years. In addition, the proliferation of subfields in life sciences from the 1980s that led scientists to become increasingly specialized in narrower disciplines and their techniques seemed a bit outdated. The present day request is for a research approach that combines the same team skills in genetics, microbiology, ecology, evolution biology, chemistry and physics. In other words, there is a renewed appreciation of interdisciplinary approaches that prefigure significant changes in scientific research on environmental issues in the coming years. This call for interdisciplinary research is received well in limnological research, which has always been characterized – it is hardly necessary to recall it – by cross-disciplinarity since its early days. Also for this reason, the SIL Congress in Torino in 2016 promises to produce insights into the intersection of sciences involved in limnology, following from the themes that the SAME 13 has opened up.

A plenary lecture during SAME 13 at Congress Palace in Stresa (Italy)

Roberto Bertoni
r.bertoni@ise.cnr.it

Lake Balkhash, Kazakhstan: Can we predict its future from our knowledge of the past and present developments?

Aladin N.[1], Gulati R.D.[2], Isbekov K.[3], Plotnikov I.[1], Shivareva S.[4]
[1] *Zoological Institute RAS, Russia*
[2] *Netherlands Institute of Ecology*
[3] *KazNIIRH, Kazakhstan*
[4] *KazGidromet, Kazakhstan*

Lake Balkhash (Fig. 1) is a terminal lake in eastern Kazakhstan, located in a desert. Its area varies with its water level and is 17000-22000 km^2. The lake extends from east to west by ca 588-614 km, and is from 9-19 km wide in its eastern section and 74 km wide in its western section. In the 1960s, maximum depth was 26.5-27.0 m, and the volume was 122 km^3. Lake Balkhash is divided into two relatively independent sections: a wide and shallow western section and a deep (to 27 m) and narrow eastern section. These sections are connected by the narrow (3.8-4.2 km) and shallow (2.8-3.3 m) strait of Uzun-Aral. Climate in the region is arid, sharply continental. Annual evaporation over the lake is 950-1200 mm and annual precipitation is 150 mm. The Balkhash catchment has an area of 500000 km^2. The largest river in the basin is River Ili entering the lake's western part and contributing ca 80% of total annual inflow averaging 15.6 km^3. Other large rivers are Karatal, Lepsy, Aksu and Ayaguz entering the eastern part and contributing 6.4 km^3 per year (Fig. 2). Because of division into two sections of unequal size, with most inflow into the western section, salinity in West Balkhash is low (1.1 g/l), whereas in East Balkhash, salinity is higher (4.3 g/l) (Aladin, Plotnikov, 1993). Almost fresh water of the western lake part is used for drinking and industrial supplies. Ionic composition Balkhash water is distinctive. The proportion of chloride is 2-3 times lower than the proportion of chloride in the sea. However, the proportions of potassium, calcium, magnesium, sulphate and carbonate/bicarbonate ions are significantly higher. In eastern Balkhash, the proportion of potassium ions is very high in comparison with other waters. The lower proportion of calcium ions, especially in comparison with the Aral and Caspian seas, also is notable (Anon., 1984). Of special note, ionic composition of Balkhash water (high concentrations of potassium and magnesium; compared to other large saline continental water bodies) is considered to be unfavorable for the biota (Karpevich, 1975).

The western part of Balkhash has a freshwater salinity zone. Eastern Balkhash refers to transitional brackishwater-freshwater salinity zone (Fig. 2). They are divided by δ-horohalinicum. In the western part of the lake freshwater and euryhaline aquatic hydrobionts are predominating, but in the eastern part freshwater organisms are disappearing (Aladin, Plotnikov, 2013).

Figure 1. Lake Balkhash, satellite image (10-20-2013 MODIS).

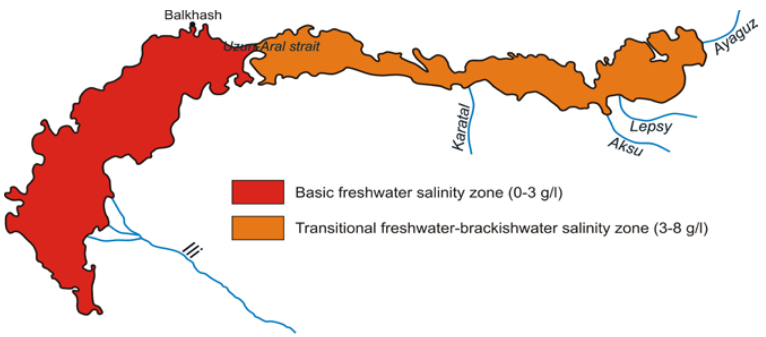

Figure 2. Salinity zones in Lake Balkhash.

Figure 3. Balkhash Mining and Metallurgical Combine.

The level of Lake Balkhash is characterized by significant cyclical fluctuations and depends mainly on the flow of the rivers flowing into it. Changes in the level under current conditions depend not only on natural factors that determine the amount of runoff, but also on the mode of Kapchagay hydroelectric and irrevocable water consumption at the top of Ili River basin in China and in the basins of rivers Karatal, Lepsy and Aksu (Malkovskiy, 2008).

There are 206 species of algae recorded in Balkhash. Half of them are diatoms. Most algae are freshwater forms or euryhaline forms. Zooplankton consists of 54 species: 5 protozoans; 28 rotifers, 11-18 cladocerans, and 8-11 copepods. A regular change in zooplankton species composition occurs from west to east. In the western part, freshwater and euryhaline forms predominate, but freshwater forms disappear eastwards and are replaced by more tolerant to salinity. The recent zoobenthic fauna of Balkhash basically consists of introduced species. In the 1950s and 1960s, some species of polychaete worms, mysids, amphipods and mollusks were introduced. The composition of the zoobenthos is different in the eastern and western parts of the lake. In the western part the main species are oligochaetes, mollusks, mysids and amphipod. In eastern L.Balkhash there are no polychaetes, amphipods, mysids. The dominant components here are chironomids, oligochaetes, and mollusks. There is fishery in Lake Balkhash, with 21 species of fish present. The original fish fauna, however, consisted of only 4 species. Other fish inhabited the deltas of the rivers. In 1930-1960s a series of introductions was made. Of these, several species have become the principal of the fishery (Karpevich, 1975; Anon., 1984).

In 1967 an extension of irrigated areas began and in 1970 the Kapchagay Reservoir on River Ili began to fill. As a result, water withdrawal from the river basin has increased, and from about 1974 a new regressive period began which caused decrease in the lake level and intensified earlier anthropogenic pressures on the lake ecosystem. The basin's water resources have also decreased due to natural climate aridity. This resulted in the flow of the River Ili decreasing. Water losses have also increased. Relative increases in the amounts of water during the period 1979-1981 did not reverse the trend and by the beginning of 1983 the level of the lake was at 341.0 m a.s.l. An increase in lake salinity has also been observed, resulting not only from changes in the hydrological balance, but also from a rise in the salinity of the River Ili (from 0.25-0.37 to 0.42 g/l) after the regulation of its flow. By 1978, the salinity of Balkhash had increased from 1.12-4.31 to 1.42-5.14 g/l. (Samakova, 2003; Malkovskiy, 2008). From 1998 until 2005 there was a sharp increase in the level of Lake Balkhash. This was due to increased water inflow in the lake due to increase of humidity in this area, increasing the air temperature, as well as receipt of additional water in Ili River due the melting of mountain glaciers. Since 2006, the lake level began to drop again, but in 2010 situation has changed, the lake level rose by 20 cm.

It would be unwise to assume that the threat has gone. Increase in river pollution and salinization continue, and the concentration of certain toxic substances such as nitrates, pesticides, heavy metals (copper, zinc and cadmium) and carcinogenic substances are also increasing. Relatively favorable state of water resources of the river Ili in recent years does not remove from the agenda the question of maintaining Lake Balkhash as a single water body keeping its level not less than 341.0 m a.s.l. The situation can change for the worse, similar to that observed in the 1970s, when it was low-water period and lake level dropped significantly and there was threat of salinity increasing above the permissible limit. It is very likely that relentless water consumption in river Ili basin will increase further, especially in China. Another factor is the ongoing anthropogenic climate change. Only if natural water resources will increase due to increase of precipitation in mountains in winter, and if water consumption will not increase further, will the water level of Balkhash Lake not decrease to less than 341 m a.s.l. Existing prognoses are not optimistic. According most of them the level of Balkhash after 10 years will drop below 341 m. Reduction of water inflow to the western L. Balkhash will lead to a drop in the lake level below the critical level of 341 meters and to significant increase in the salinity that would complicate the use of water for the water supply of the city of Balkhash, Balkhash Mining and Metallurgical Combine (Fig. 3) and other industries requiring the use of fresh water.

There is a project to maintain the hydrological regime in western L. Balkhash by separating it from eastern L. Balkhash by a dam and sluice in the Uzun-Aral Strait. Thus, the water supply to eastern Balkhash will be limited (Anon., 1984; Malkovskiy, 2008). In other words, it is proposed to sacrifice the Eastern part of this unique water body which will become a shallow hypersaline lake (Aladin, Plotnikov, 1993).

References

Aladin N.V., Plotnikov I.S., 1993. Large saline lakes of former USSR: a summary review. Hydrobiologia. Vol. 267. P. 1-12.

Aladin N.V., Plotnikov I.S., 2013. The concept of relativity and plurality of barrier salinity zones and forms of existence of the hydrosphere. Proceedings of Zoological Institute RAS. Supplement 3, c. 7–21. (Russian)

Anon., 1984. Prirodnie Resursy Bolshikh Ozer SSSR i Veroyatnie ikh Izmenemya. Leningrad, 'Nauka' 228: pp. (Russian)

Karpevich, A. F., 1975. Teoriya i praktika akklimitaztsn vodnykh organizmov. Moscow, 'Pischevaya Promyshlennost' 432 pp. (Russian)

Malkovskiy I.M., 2008. Geograficheskie osnovy vodoobespecheniya pripodno-hozyaystvennyh sistem Kazakhstana. Alamaty, 204 p. (Russian)

Samakova A.B. (ed.), 2003. Problemy gidroekologicheskoy ustoychivosti v basseine ozera Balkhash. Almaty. "Kaganat", 584 p. (Russian)

Contact: **Dr. Nick Aladin**, aral@zin.ru

SIL Working Group on Ecohydrology, Symposium Report

International Symposium: Ecohydrology, Biotechnology & Engineering: Towards Harmony between the Biogeosphere and Society on the basis of Long-Term Ecosystem Research. 17-19 September 2013, Łódź, Poland

The **International Society of Limnology** promotes and communicates new and emerging knowledge among limnologists to advance the understanding of inland aquatic ecosystems and their management. One of its 17 **Working Groups is focused on Ecohydrology**, defined as a sub-discipline of hydrology focused on biological aspects of the hydrological cycle (Zalewski et al., 1997). Ecohydrology provides not only scientific understanding of the hydrology/biota interplay, but also a systemic framework on how to use ecosystem processes as a tool for Integrated Water Resources Management, complementary to existing hydrotechnical solutions (Zalewski, 2010). Ecohydrology has also been in the focus of the **UNESCO International Hydrological Programme (UNESCO IHP)**, which in 1997 has adopted **ecohydrology** as one of the fundamental concepts reflected in its strategic development plans, and in the coming VII phase of the project (2014-2021), as one of its five key Themes.

Integration of scientists and practitioners working around the water sector, shifted ecohydrology towards transdisciplinary science, which focuses on sustainability and reaching common social goals. Its progress towards the ability to build system solutions (e.g., Zalewski, 2000; Wagner et al., 2009, Wagner and Breil, 2013) can now develop a dialogue on the integration of efforts with technologists (engineers) and social and economic scientists to contribute to ecologically sound solutions for harmony between the biogeosphere and humanity. Strengthening this dialogue was one of the goals of the **International Symposium on Ecohydrology....**, held in Łódź, Poland, on the **17th-19th September 2013**. The conference was attended by 210 participants from 31 countries: there were, 95 oral presentations and 50 posters dealing with interdisciplinary topics.

The symposium was **organized** by the European Regional Centre for Ecohydrology u/a UNESCO of the Polish Academy of Sciences, University of Lodz, Project Life + EnvEurope (LIFE08 ENV/IT/000399) and Marshal's Office of the Lodz Region (Poland), in cooperation with: Institute for Water Resources of the U.S. Army Corps of Engineers, Rivers & Coastal Group of the Chartered Institution of Water and Environmental Management (U.K.), International Society of Limnology (SIL), International Centre for Coastal Ecohydrology u/a UNESCO (Portugal), Municipal Company of Water Supply and Sewage System in Lodz (Poland), Collective Wastewater Treatment Plant in Lodz (Poland) and Infrastructure Company in Lodz (Poland), LTER-Europe Network and the projects listed below the text. The **Chairman of the Symposium Steering Committee** was Prof. Maciej Zalewski and the **Convenor of the Symposium** was Dr. Iwona Wagner, both representing ERCE UNESCO PAS and the Department of Applied Ecology, University of Lodz, Poland.

On the first day of the Symposium, prominent key-note speakers, gave talks on various aspects of sustainability in the context of water resources and its management. The general remarks were provided by **Mr Alemayehu Tegenu, Minister of Water and Energy of the Federal Democratic Republic of Ethiopia**, and by Prof. **Alessandra Pugnetti**, the Coordinator of the EnvEurope Project, from National Research Council in Italy. The opening speeches, giving the European and global perspectives for the need of integration of ecohydrology with other disciplines, were given by Prof. **Giovanni Bidoglio**, Head of the Water Resources Unit of the Institute for Environment and Sustainability, Joint Research Centre (EC), Dr. **Enrique Playán**, Coordinator of the Water Joint Programming Initiative – MINECO (Spain) and the representatives of UNESCO IHP and Prof.**Johannes Cullmann** (Chair of the Intergovernmental Council of the UNESCO IHP from Germany) and **Mr. Giuseppe Ardunio**.

The global perspective for the Symposium discussions was provided by Prof. **William J. Mitsch** (Florida Gulf Coast University, Professor Emeritus of the Ohio State University) Chair of the 4th International EcoSummit (Ohio, USA, 2012). He delivered a lecture on the opportunities and challenges for transdisciplinary integration of ecological engineering. Presence of Prof. Mitsch has also provided a bridge for the 2012 Ecosummit in Columbus and the next Ecosummit to be organised in 2016 in Montpellier (France), which will continue to focus on the repairing of the planet including an emphasis on fragile ecosystems that are susceptible to climate change. This lecture was followed by a talk by the former President of SIL, Prof. **Brian Moss**, who discussed the future of the human civilisation in the context of the role of freshwater resources and biomes, as the important provision of environmental services, so vivid in the face of the global challenges and changes. Can the natural biomes provide services if stressed, fragmented, overexploited? Can we replace the natural biomes with Anthromes? Where are the limits of human actions and what are the possibilities of compensation or prudent management. These were the questions posed by Prof. Moss in his speech.

Other Key-note speeches on the first day dealt with complementary aspects of water-based cooperation and transdisciplinarity and were given by: representative of hydro-engineers – Prof. **Robert A. Pietrowsky**, Director of the Institute of Water Resources (IWR) of the U.S. Army Corps of Engineers (U.S.A.) and Dr. **Graham Piper**, Chairman of the Chartered Institution of Water and Environmental Management (CIWEM), Rivers & Coastal Group (U.K.) who were also representing the co-organisers of the Symposium. Prof. **Michael Mirtl**, Chair of European Long-Term Ecosystem Research Network, Head of the Department for Ecosystem Research and Monitoring Environment Agency in Austria and Prof. **Patrick S. Bourgeron**, the head of the