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Upcoming SIL 2020 Congress

SIL 2020: A YOUNGER AND GREENER MEETING!

The city of Gwangju (Republic of Korea) welcomes the opportunity to host the 35th Congress of the International Society of Limnology from August 23 to 28, 2020, devoted to the theme of **"Biodiversity and Ecosystem Functions: Healthy Rivers, Lakes, and Humans".**

One of the purposes of the SIL Congress is to promote **open discussions** on new scholarly findings and pioneering research in the field of limnology to **foster knowledge transfer to scientists and researchers worldwide.** It is important for SIL to host its Congress in **East Asia** to highlight and reflect on the scientific challenges for limnologists in the region. Accordingly, SIL facilitates developing a **stronger regional scientific network** to encourage **innovative scientific discussions on regional issues.** SIL2020 is the perfect opportunity for delegates to be a part of SIL's new mission that is concentrated on **promoting excellence in limnology** and solving global issues through the transfer of knowledge and the **fostering of a strong international community.**

SIL2020 will also be holding **short courses** to share the expertise of SIL scientists with society members, including students. Short courses will cover diverse topics from limnological studies. The full-day practical courses will represent a **unique opportunity to foster innovative ideas,** but also to **increase collaboration** among international limnologists. Indeed, these short courses not only provide technical knowledge, but will enable participants to **create networks** with great limnologists.

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Material for the **July issue** should be sent to SILnews Editor, Giovanna Flaim, by 31 March 2020 at **flaim.giovanna@gmail.com**

LIMNOLOGY AROUND THE WORLD: RUSSIAN FEDERATION

How to save the Aral Sea

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The Aral Sea is an endorheic lake, lying amidst the vast deserts of Central Asia and was once the world's fourth largest lake according to its surface (371,000 km^2 in 1960), draining an area of about 1.8 million km^2. The water level and salinity of the Aral Sea are closely dependent on its hydrology, which is strongly influenced not only by climate change, but also by water abstraction for irrigation from the inflowing rivers Syr Darya and Amu Darya. From the 1600s to the 1960s, the hydrology of the Aral Sea followed a natural regime. After 1961, there was a rapid drop in water level and an increase in salinity (Fig. 1) accompanied by the disappearance, and in some cases the extinction, of most invertebrate and fish species.

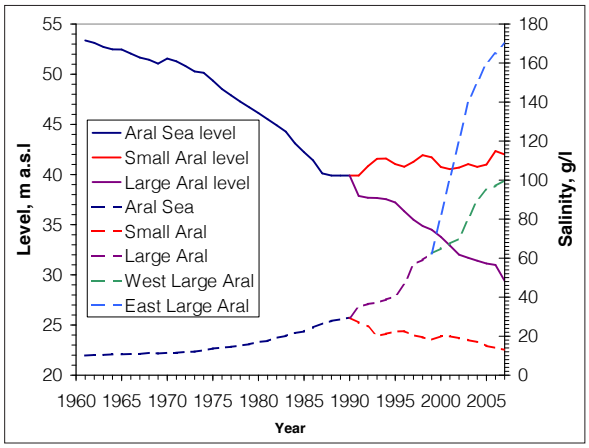

Fig. 1 *Water level and salinity changes in the Aral Sea.*

By the end of 1980s, water level had decreased by about 13 m, reaching about +40 m a.s.l. and salinity had increased from 10 g/l in 1960 up to 30 g/l. Surface area and volume were reduced to 60% and 33% of 1960 values, respectively. The Aral Sea was now divided into two residual water bodies – a northern Small Aral and southern Large Aral, with different hydrological regimes (Micklin et al., 2014). Changes in the hydrological and hydrochemical regimes of these two lakes occurred independently (Fig. 1).

The Small Aral has a positive water balance, its level has stabilized and its water has begun to feed the Large Aral through the Berg Strait. In 1992 the first dam in the strait was built and now been replaced by the new Kokaral Dam completed in 2005 (Fig. 2). Following construction of this dam the Small Aral has seen an increase in water level and a gradual decrease in its salinity (Fig. 1) (Aladin, 2014), making restoration efforts possible. Restoration of its former biodiversity is underway, and the decrease in salinity has fostered the reappearance of many invertebrate species. Commercial freshwater fish species have also returned to the Small Aral from the Syr Darya and lakes in its lower reaches and their populations are stable. Fisheries are recovering and catches are growing (Micklin et al., 2014; Aladin et al., 2012; Ermakhanov et al., 2012; Plotnikov et al., 2016).

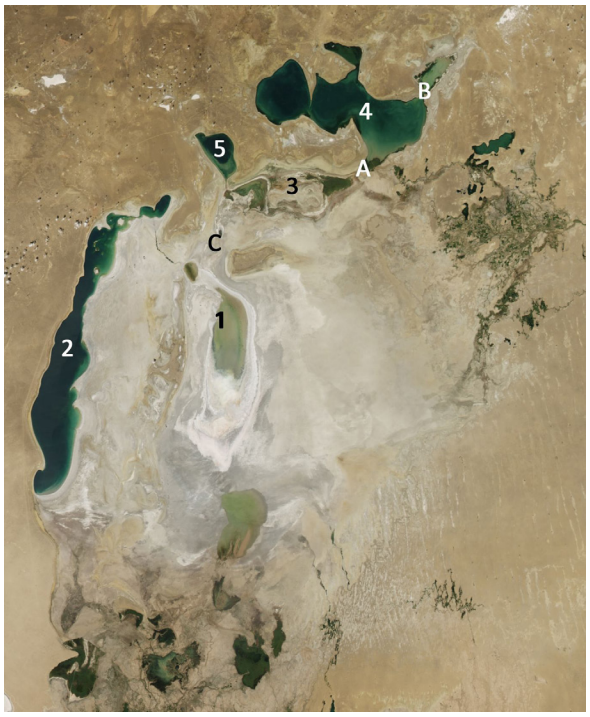

Fig. 2 *The Aral Sea today:*
1 - Dried Eastern Large Aral;
2 - Western Large Aral;
3 - Central Aral;
4 - Small Aral;
5 - Tsche-Bas Bay;
A - Kokaral dam;
B – proposed Northern dam;
C – proposed Southern dam.

Unfortunately, the water balance of the Large Aral remains negative, and is the most ecologically devastated part of the lake. Drying and salinity are continuously increasing (Fig. 1) and since the late 1990s it has become so hypersaline that brine shrimp (Artemia *parthenogenetica*) have naturally colonized the Large Aral. The eggs of this crustacean have become a valuable biological resource and are harvested. Water level decline has divided the Large Aral into three parts (Fig. 2): Western Large Aral, Eastern Large Aral and Tsche-Bas Bay (Micklin et al., 2014). Over the last decade, a fourth basin has also appeared – the Central Aral (Fig. 2), created by the overflow from the Kokaral dam. Its area varies greatly depending on the season of year. When the Central Aral is largest, it connects through a narrow channel with Tsche-Bas Bay and supplies it with some water. This new water body is shallow and, therefore, loses a great deal of water via evaporation and evapo-transpiration from the extensive reeds that grow in it.

Some actions have been taken to save the Aral Sea. Restoration of the Kamyshlybash and Akshatau lake systems in the lower reaches of the Syr Darya has created over 40 thousand hectares of water and wetland systems. This is improving the socio-economic and health conditions of the population.

There is also a project for the further reconstruction of the Small Aral. It involves the creation of a 50 m dam at the entrance to the Bolshoy Sarycheganak Bay (Fig. 2) and the laying of a channel from the Syr Darya to supply part of its flow to this bay. Another dam could be built at the southern end of the Central Aral Sea (Fig. 2). This dam will retain water that is now lost via the spillway of the Kokaral dam rather than allowing it to flow southward into the Eastern Basin of the Large Aral. However, this proposal needs detailed ecologic, engineering, and economic analysis.

Together with water from the Small Sea, a large number of valuable commercial fish (Fig. 3) are transported through the Kokaral Dam to the Central Aral (Fig. 4). The Executive Directorate of IFAS in Kazakhstan signed a contract to implement a large investment project "Preserving the fish of the Northern Aral". The aim of the project is designing a hydro-acoustic fish protection device on the Kokaral dam to prevent the loss of fish during water discharge downstream from the Northern Aral.

Fig. 3 *Fish transported and killed through the Kokaral Dam.*

Fig. 4 *The Kokaral Dam feeding the Central Aral.*

Some suggestions for the conservation of biodiversity and biological resources of the Aral Sea **include the following: (1)** as soon as possible raise the dam in Berg Strait by 2-3 m in the next few years; **(2)** build a dam in the throat of Sarycheganak Bay; **(3)** build a simple dam to the south of the Kulandy peninsula; **(4)** do not maintain the shallow reservoirs existing in the Amu Darya delta; **(5)** redirect the rest of the Amu Darya flow to the Western Large Aral.

In order to reduce the direct impact of salt-dust dispersion from dried sediments, and thereby protect people, settlements, agricultural lands, flora and fauna of the region, we suggest creating a multi-tiered "Green Belt", about 70 km long and 200-1000 meters wide. The belt will serve as a kind of "ecological screen" area where plants could be irrigated by the collector-drainage waters and surplus water of the Aksai and Kuan Darya lakes systems, and by potential discharges from the Syr Darya. This "Green Belt" could be a phyto-remediation effort planted with drought- and salt-tolerant desert trees or shrubs such as black saxaul (*Haloxylon aphyllum*) that grows on different types of soil, has moderate fodder value and is widely used to create protecting sand-holding strips. Kochia (*Kochia prostrata*) is also a drought-resistant and salt-tolerant shrub that grows in saline and sandy steppes and deserts and is a good fodder plant. Other possible plants include the pamirian winterfat (*Kraschenninnikovia ceratoides*), a xerophilous shrub and a good pasture and haymaking plant and amaranth (*Amaranthus* spp.), another forage crop that surpasses traditional crops in terms of yield, drought tolerance, quantity and quality of protein.

Additional water will be sent to the Large Aral Sea to create wetlands and to water the tree plantations of the "Green Belt". A system of polders is being created along the collector, which will contribute to the improvement of water quality. The biodiversity of the region is increasing and conditions are being created for the return of native species of wild ungulates and deltaic vegetation. This 'Green Belt' will act as a special "ecological screen" to protect populated areas, irrigated massifs and pastures from dust and salt removal, and the rate of desertification of the region is decreasing.

However, international intellectual solidarity with the Aral Sea is needed. Only joint efforts of the intellectuals all over the world can stop the Aral Sea catastrophe (Aladin, 2018; Rzymski & Klimaszyk, 2019; UN News, 2018).

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