EDGG event

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Report on the International Symposium on Grassland Ecology and Conservation in Hohhot, Inner Mongolia, China

An International Symposium on Grassland Ecology and Conservation took place in Hohhot, at the Inner Mongolia University (IMU), on August 21–23, 2019. It was jointly organised by the School of Ecology and Environment of the IMU and by regional branches of the China Association for Science and Technology, under the auspices of the Chinese Grassland Society, the Ecological Society of China and the Inner Mongolia Grassland Association.

The main topic of the Symposium was modelling, monitoring, sustainable use, conservation and management of grasslands (with special regard to natural steppes) through transdisciplinary and transnational cooperation. The Symposium included two keynote lectures and 40 talks and it was attended by 228 participants from seven countries, plus a number of students from the IMU (Figs. 1–2).

The talks included interesting studies on plot-based compositional data sampled from wet meadows within the Three-Rivers Headwater Region (Xilai Li, Quinghai University), from alpine grasslands of the Tibetan Plateau (Shikui Dong, Beijing Normal University; Wang Shiping, Institute of Tibetan Plateau of the Chinese Academy of Science) and from the steppes of Inner Mongolia (Frank Yonghong Li, IMU), Mongolia (Tuvshintogtokh Indree, Mongolian Academy of Science), Lake Baikal (Luliia Venteeva, Siberian branch of the Russian Academy of Science).

Riccardo Guarino, as EDGG representative, was invited to present "The EDGG activities on Palearctic grasslands: research, networking and passion for biodiversity", a talk aimed at summarizing the main outputs of the research activities promoted by the EDGG. Many of the participants expressed an interest in the GrassPlot database and in the EDGG activities. It was agreed that invitations to join the EDGG will be sent out in order to support data sharing and to encourage new researchers from the West and Central Asian steppe regions to join the network.

In the afternoon of the second day symposium participants had the opportunity to visit two leading companies in their respective sectors: the Mengniu Dairy Company Ltd. and the Mengcao Eco-environment Company Ltd.

The first is one of the leading dairy product manufacturers in China, with an annual production capacity of 10.27 million tons (as of June 2019, http://www.mengniuir.com/html/about_profile.php); the second specializes in "grass, grassland and grass technology", coordinating many grassland and landscape restoration projects throughout China (Figs. 3-4, https://www.mengcao.com/#page1/1).

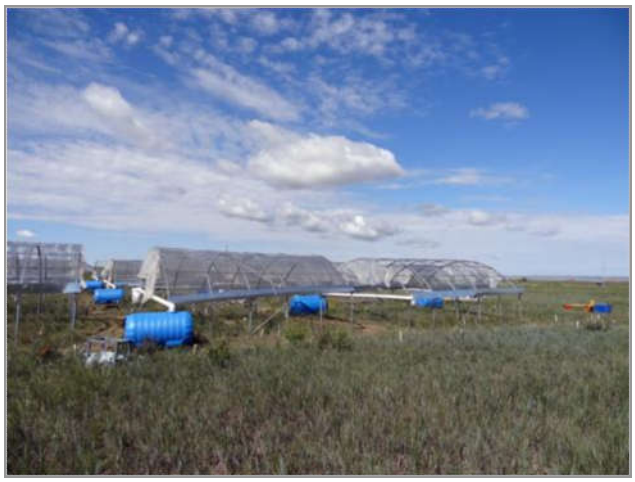
At the end of the Symposium, a delegation of international guests, guided by Prof. Frank Yonghong Li, visited three outstanding sites in the surroundings of Xilinhot, a town about 600 km NE of Hohhot:

- **Xilin Gol Biosphere Reserve.** Established in 1987 as China's first grassland biosphere reserve, to protect the biodiversity of steppe ecosystems and to develop models for the sustainable use of grassland resources. The area measures 5,800 km^2 and is extensively grazed by wild herbivores and domestic livestock (mainly horses, sheep and goats), managed by local herders. The main landmark of the area is a complex of flat-topped hills, formed by a lower layer of dark

Figs. 1-2. The International Symposium on Grassland Ecology and Conservation (Hohhot, August 21-23, 2019) was attended by 228 people from seven countries. Photos: F. Yonghong Li.

Figs. 3-4. Working with grasslands: the Grassland Museum at the Mengcao Eco-environment Company Ltd. Photos: R. Guarino.

Fig. 5. The flat-topped hills of the Xilin Gol volcanic landscape merge with the horizon line. Hillsides are covered with scattered fallen stones from the basaltic interbeds. Photo: R. Guarino.



Figs. 6-7. Plants for the experimental manipulation of water and temperature (left) and of nitrogen availability at the Grassland Ecosystem Research Station of Inner Mongolia University. Photos: R. Guarino.

Fig. 8. The Dalinor Lake is a typical saline-alkaline lake, surrounded by a belt of succulent chenopods (*Suaeda glauca*). Photo: R. Guarino.

Fig. 9. The Zenzi hill (anvil-shaped hill) is a volcanic neck whose current morphology results by the weathering and lakewater erosion. Photo: R. Guarino.

sandstone and conglomerate, with interbeds of basalts, and an upper layer of conglomerate and white volcanic ash (Fig. 5).

- The Grassland Ecosystem Research Station of Inner Mongolia University. Extensive areas of gently swaying grasslands under intense blue skies are not just a charming view, but also an ideal living laboratory for grassland ecologists. The Grassland Ecosystem Research Station, located in the typical steppe region on the Mongolian Plateau (44°10' N, 116°28' E, 1100 m a.s.l.), is the field research base of the School of Ecology and Environment (IMU), headed by Prof. Frank Yonghong Li. The facilities at the research station include two lysimeter systems for investigating single species and/or grassland responses under different regimes of temperature, CO_2 concentration, water and nutrient availability, grazing pressure, and seed predation (Figs. 6–7). The semi-arid continental climate of this area is characterized by a mean (1998–2013) precipitation of 253 mm and a mean temperature of 13.8°C during grassland growth season (April to August), coincident with the maximum rainfall.

- Dalinor Nature Reserve. In the Mongolian language, Dalinor means "lake like the sea" and it is one of the four largest lakes of IM (Fig. 8). The maximum depth of the lake is only 13 m, but it covers an area of 228 km^2 and has a water (brackish) volume of 1.6 billion m^3. Its northwest shore features the Dalinor volcanic landscape, which includes a basalt plateau and scattered volcanic necks (Fig. 9), which once were islands in the lake when water levels were higher. The area is part of the Heshingten Global Geopark, located at the junction of Daxing'anlig Mts., Yanshan Mts. and the Hunshandake Sandland. The Geopark covers 1,750 km^2 and is made up of unique geological, glacial, geothermal and volcanic structures, lakes, marshes, grasslands, deserts and sites of cultural heritage. Its grasslands are the most species rich of IM as the Heshingten is at the convergence zone of the northeast Chinese Mongolian floras.

With the assistance of Frank Yonghong Li, Tiejun Bao, Hugjiltu Minggagud, and Jinghui Zhang, a demonstration of the EDGG biodiversity sampling approach was carried out using 10 m^2 nested plots (Fig. 10; Table 1). The EDGG hopes that these three plots are the start of a period of greater engagement with research in Central Asia, an area with the largest expanses of grassland in the Palaearctic region. The EDGG also hopes that the International Symposium on Grassland Ecology and Conservation will mark the start of a fruitful scientific cooperation with colleagues from China and neighbouring countries.

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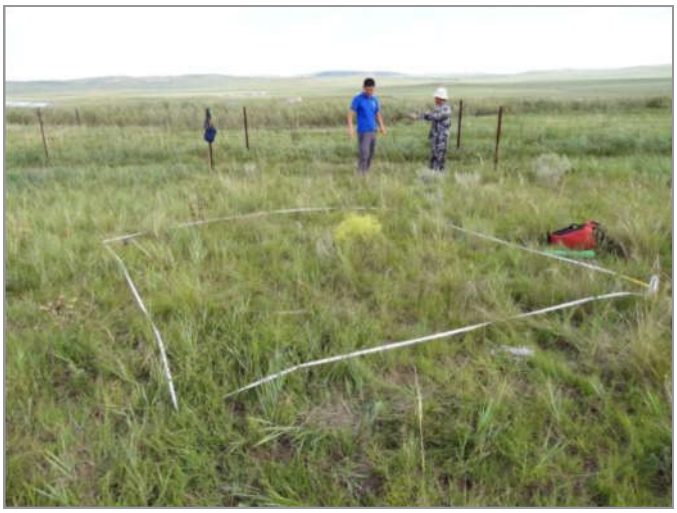

Fig. 10. Sampling a 10 m^2 nested plot in a dry steppe dominated by *Leymus chinensis* and *Cleistogenes squarrosa*. Photo: R. Guarino.

Table 1. Three nested plots (sampled on August 24, 2019) in dry steppes of IM. Cover values were estimated on the 10 m^2 plot. Cover values ≥ 10% are in bold character. Taxonomic nomenclature according to the Flora of China (http://www.efloras.org/flora_page.aspx?flora_id=2).
Protocol by: Riccardo Guarino. Other authors: Frank Yonghong Li, Tiejun Bao, Hugjiltu Minggagud, Jinghui Zhang.

Plot nr.	1		2		3	
Latitude (precision: 5 m)	44°15'59''		44°15'50''		43°33'20''	
Longitude (precision: 5 m)	116°31'29''		116°31'13''		116°40'13''	
Corner of GPS	NW		NW		NW	
Elevation (m)	1143		1140		1278	
Aspect	178° S		-		328 NW	
Inclination	2°		0°		2°	
Relief position	plain		plain (slightly hollowed)		tophill	
Max. microrelief (cm)	2		5		3	
Vegetation height (cm)	20, 5, 8, 12, 20		20, 13, 13, 15, 10		20, 15, 31, 18, 15	
Vegetation cover (total)	80%; max. height: 60 cm		85%; max. height: 108 cm		85%; max. height: 110 cm	
Litter cover (total)	10%		20%		40%	
	Edge lenght (m)	Cover (%)	Edge lenght (m)	Cover (%)	Edge lenght (m)	Cover (%)
Achnatherum sibiricum					0.01	**50**
Adenophora stenanthina					3.16	1
Agropyron cristatum	3.16	3				
Allium anisopodum	0.10	4		0.5	0.10	0.8
Allium senescens					0.32	3
Allium tenuissimum					1.00	0.2
Artemisia commutata	1.00	1			1.00	0.8
Artemisia frigida			3.16	3		
Artemisia scoparia	3.16	1			3.16	0.8
Artemisia sieversiana			3.16	0.8	3.16	0.8
Astragalus galactites			3.16	0.5	3.16	0.3
Caragana microphylla					3.16	1
Carex duriuscula			3.16	2		
Carex korshinskyi					1.02	2
Carpesium abrotanoides	3.16	0.1				
Chenopodium acuminatum			0.32	0.5		
Chenopodium glaucum	1.00	0.1	0.32	0.5		
Cleistogenes squarrosa	0.01	**45**	0.01	**50**	1.00	5
Dontostemon micranthus					1.03	0.2
Euphorbia esula					0.32	0.3
Festuca dahurica					1.01	3
Heteropappus altaicus			3.16	1		
Klasea centauroides (= *Serratula centauroides*)					3.16	0.3
Koeleria macrantha s.l. (= *K. cristata*)					3.16	0.8
Leymus chinensis	0.01	**35**	0.32	5	0.32	0.2
Oxytropis hirta	3.16	2				
Pholomis umbrosa			3.16	2		
Poa attenuata					1.05	0.5
Potentilla bifurca					0.10	5
Potentilla tanacetifolia	3.16	0.8				
Potentilla verticillaris					3.16	0.5
Rhaponticum chinense			1.00	2		
Salsola collina	0.32	2	0.01	**10**	1.00	0.3
Saposhnikovia divaricata			3.16	4		
Stellera chamaejasme					1.04	0.5
Stipa grandis	1.00	2			0.03	**40**
Stipa sareptana var. *krylovii*			3.16	8		
Thalictrum petaloideum	0.03	3	1.00	1		
Thalictrum squarrosum					3.16	1

NOTES:

Plots 1-2: Location: Maodeng. Parental geological substrate: sand, without any visible stone/rock (soil depth > 90 cm); Land use: Heavily grazed until 2013, now unmanaged.

Plot 3: Location: Gegenshala. Parental geological substrate: sand, without any visible stone/rock (soil depth > 90 cm); Land use: Grazed until 1998, now unmanaged.

Achnatherum sibiricum

Agropyron cristatum

Chloris virgata

Psammochloa villosa

Stipa splendens

Cymbaria daurica

Cynanchum thesioides

Convolvulus ammannii

Allium tenuissimum

Allium condensatum

Orostachys fimbriata

Caryopteris mongolica

Leonurus sibiricus

Dracocephalum moldavica

Limonium bicolor

Heteropappus altaicus

Some grassland plant species of Inner Mongolia. Photos: R. Guarino.