

**Summer Field School [Online] on  
MOUNTAIN ECOSYSTEMS AND RESOURCE MANAGEMENT  
19-28 September, 2021**

Name of Faculty Member (Facilitator)	<b>Dr. Zhanhuan Shang (Prof. School of Life Sciences, Lanzhou University, China)</b>
Technical Session Group No.	1.1
Technical Session Group Name	Mountain Ecosystems; Freshwater Ecosystems; Forest Ecology; Environmental Issues
Topic	High Altitude Grassland Ecosystems: Function, Problem and Management on Tibetan plateau
Sub-Topics	<ul style="list-style-type: none"> <li>▪ Basic information of alpine grassland ecosystem</li> <li>▪ Carbon and ecological service of alpine grassland ecosystem</li> <li>▪ Livelihood function of alpine grassland ecosystem</li> <li>▪ Problem of alpine grassland ecosystem</li> <li>▪ Restoration and management of degradation grassland</li> <li>▪ Monitoring effect of active restoration of alpine grassland <ul style="list-style-type: none"> <li>--Short term effect</li> <li>--Middle term effect</li> <li>--Long term effect</li> </ul> </li> <li>▪ Key factor for sustainable management of alpine grassland ecosystem</li> <li>▪ Strategy and suggestion</li> </ul>
Synopsis (if any) (max. 100 words)	The current high altitude grassland ecosystem is the one key sentinel for global climate change, especially above 4000 m a.s.l. area, and meanwhile the local people kept the traditional lifestyle as nomadic model. However, the alpine grassland ecosystem had faced unprecedented crisis under global warming, then what happen and how can we do? This report will take these kind of viewpoint and knowledge from Dr. Zhanhuan Shang study group's about 10 years research findings from Tibetan plateau, where has largest, highest alpine grassland ecosystem. From their study, we should think about 1) what is the future road of alpine grassland ecosystem under global climate change? 2) do we can achieve the sustainable management for alpine grassland ecosystem? 3) how hard for the transformation adaptation of alpine grassland ecosystem and nomadic system.
List of Learning Material	<ul style="list-style-type: none"> <li>▪ PPT presentation (pdf file): 1</li> <li>▪ Published papers: 7</li> </ul>

(Files to be availed to us before 31 August 2021)	
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## List of Learning Material for topic “High Altitude Grassland Ecosystems”

By Zhanhuan Shang, Chian

**PPT presentation (pdf file) will be online**

### List publications supporting the presentation:

- (1) Yanfu Bai#, Cancan Guo#, Shanshan Li, Degen A Allan, Anum Ali Ahmad, Wenyin Wang, Tao Zhang, Mei Huang, **Zhanhuan Shang\***. 2021. Instability of decoupling livestock greenhouse gas emissions from economic growth in livestock products in the Tibetan highland. **Journal of Environmental Management**. 287: 112334.
- (2) Xiaopeng Chen, Tao Zhang, Ruiying Guo, Haiyan Li, Rui Zhang, A. Allan Degen, Kewei Huang, Ximing Wang, Yanfu Bai, **Zhanhuan Shang\***. 2021. Fencing enclosure alters nitrogen distribution patterns and tradeoff strategies in an alpine meadow on the Qinghai-Tibetan Plateau. **Catena**. 197:104948.
- (3) Yanfu Bai#, Lina Ma#, Abraham A. Degen, Muhammad K. Rafiq, Yakov Kuzyakov, Jingxue Zhao, Rui Zhang, Tao Zhang, Wenyin Wang, Xiaogang Li, Ruijun Long, **Zhanhuan Shang\***. 2020. Long-term active restoration of extremely degraded alpine grassland accelerated turnover and increased stability of soil carbon. **Global Change Biology**. 26:7217-7228.
- (4) **Zhanhuan Shang**, A. Allan Degen, Muhammad Khalid Rafiq, Victor R. Squires. 2020. Carbon Management for Promoting Local Livelihood in the Hindu Kush Himalayan (HKH) Region. Springer. Switzerland.
- (5) Tao Zhang, Xiaopeng Chen, Ruiying Guo, A. Allan Degen, Michael Kam, Jingxue Zhao, Ximing Wang, Yanfu Bai, Wenyin Wang, Rui Zhang, Yinfeng Li, Yu Liu, Ruijun Long, Zhongkui Xie, **Zhanhuan Shang\***. 2020. Natural primary production mediates the effects of nitrogen and carbon addition on plant functional groups biomass and temporal stability in the Tibetan alpine steppe-meadow. **Agriculture, Ecosystems and Environment**. 302:107080.
- (6) Shikui Dong\*, **Zhanhuan Shang\***, Jixi Gao, Randall B. Boone. 2020. Enhancing sustainability of grassland ecosystems through ecological restoration and grazing management in an era of climate change on Qinghai-Tibetan Plateau. **Agriculture, Ecosystems and Environment**. 287:106684.
- (7) Na Guo, A. Allan Degen, Bin Deng, Fuyu Shi, Yanfu Bai, Tao Zhang, Ruijun Long, **Zhanhuan Shang\***. 2019. Changes in vegetation parameters and soil nutrients along degradation and recovery successions on alpine grasslands of the Tibetan plateau. **Agriculture, Ecosystems and Environment**. 184:106593.
- (8) Rui Zhang, Yanfu Bai, Tao Zhang, Zalmen Henkin, A. Allan Degen, Tianhua Jia, Cancan Guo, Ruijun Long, **Zhanhuan Shang\***. 2019. Driving factors that reduce soil carbon, sugar, and microbial biomass in degraded alpine grassland. **Rangeland Ecology & Management**. 72:396-404.
- (9) **Zhanhuan Shang\***, Andrew White, A. Allan Degen, Ruijun Long. 2016. Role of Tibetan women in carbon balance in the alpine grasslands of the Tibetan plateau-a review. **Nomadic People**. 20(1):108-122.

- (10) **Shang, Z.H.\***, Gibb, M. J., Leiber, F., Ismail, M., Ding, L. M., Guo, X. S., Long, R. J. 2014. The sustainable development of grassland-livestock systems on the Tibetan plateau: problems, strategies and prospects. **The Rangeland Journal**. 36(3): 267-296.
- (11) **Shang, Z.H.**, Gibb, M., Long, R.J.\* 2012. Effect of snow disasters on livestock farming in some rangeland regions of China and mitigation strategies – a review. **The Rangeland Journal**. 34:89-101.
- (12) **Shang, Z.H.**, Ma, Y.S., Long, R.J.\*, Ding, L.M. 2008. Effect of fencing, artificial-seeding and abandonment on vegetation composition and dynamics of ‘black soil land’ in the headwaters of the Yangtze and the Yellow Rivers (HAYYR) of the Qinghai-Tibetan Plateau. **Land degradation & Development**. 19(5):554-563.
- (13) **Zhanhuan Shang**, Ruijun Long\*. 2007. Formation causes and recovery of the ‘Black Soil Type’ degraded alpine grassland in Qinghai-Tibetan Plateau. **Front. Agric. China**. 1(2): 197-202.