**Integrating water depth to predict the threshold of collapse and recovery of submerged macrophytes for lakes with large depth gradients**

Yexin Yu a, b 1, Yehao Li a, 1, Haijun Wang a, c, \*, Haojie Su a, \*, Qingyang Rao a, Ying Liu a, Ping Xie a, d

*a Institute for Ecological Research and Pollution Control of Plateau Lakes, School of Ecology and Environmental Science; Yunnan Key Laboratory of Ecological Protection and Resource Utilization of River-lake Networks; Qilu Lake Field Scientific Observation and Research Station for Plateau Shallow Lake in Yunnan Province; Ministry of Education Key Laboratory for Transboundary Ecosecurity of Southwest China, Yunnan University, Kunming 650500, China*

*b Institute of International Rivers and Eco-Security, Yunnan University, Kunming 650500, China*

*c Institute of Yunnan Plateau Indigenous Fish, Kunming 652115, China*

*d Donghu Experimental Station of Lake Ecosystems, State Key Laboratory of Freshwater Ecology and Biotechnology, Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan, 430072, China*

\*Corresponding author

Email: wanghaijun@ynu.edu.cn (Haijun Wang), suhaojie@ ynu.edu.cn (Haojie Su)

1 These authors share the first authorship

Supplementary Material

**Table A1** Main limnological characteristics (mean ± SD) of the sampling sites with and without macrophytes.

|  |  |  |
| --- | --- | --- |
|  | Sampling sites  with macrophytes | Sampling sites  without macrophytes |
| TN | 1.22±1.32a | 1.65±1.16b |
| TP | 0.05±0.06a | 0.05±0.04a |
| Chl *a* | 30.94±37.60a | 35.80±35.02a |
| Turb | 7.80±11.08a | 15.46±18.53b |
| Z | 3.79±3.34a | 13.12±13.03b |
| ZSD | 3.01±3.30a | 1.85±2.25b |
| WT | 18.62±2.02a | 17.30±2.70a |
| DO | 8.24±6.21a | 7.50±1.83a |
| Cond | 202.90±119.77a | 197.64±295.11a |
| pH | 8.49±0.30a | 8.48±0.29a |
| ORP | 179.61±78.87a | 143.51±79.68a |

Note: TN, total nitrogen; TP, total phosphorus; Chl *a*, phytoplankton chlorophyll *a*; Turb, turbidity; Z, water depth; ZSD, transparency; WT, water temperature; DO, dissolved oxygen; Cond, conductivity; ORP, oxidation-reduction potential.

****

Figure S1 Relationships between log10TN (a, c), log10(TN\*Z) (b, d), log10TP (e, g), log10(TP\*Z) (f, h) with log10(BMac+0.1) and log10(SR+0.1) (Blue points indicate the sampling sites with macrophytes, red points indicate the sampling sites without macrophytes).