





You are kindly invited to attend the public PhD defense of Jiudan Zhang

Spatiotemporal Refinement and Ecological Quality Assessment of Xinjiang Wetlands Based on Deep Learning

Date: Wednesday, 21 May 2025 at 10:00 AM (Brussels time) Location: Sterre gebouw S8, grote vergaderzaal vakgroep geografie Alternatively, you can follow the livestream here: https://tinyurl.com/hepswm6c

About the Author

Jiudan Zhang (1995, China) is a joint PhD candidate at the Department of Geography at Ghent University and the University of Chinese Academy of Sciences. In 2017, she graduated from Shihezi University with a Bachelor's degree in Human Geography and Urban and Rural Planning. In 2021, she graduated from the Xinjiang Institute of Ecology and Geography, University of the Chinese Academy of Sciences (XIEG, UCAS) and obtained her Master diploma in Surveying and Mapping Engineering. And subsequently she continued her doctoral study at UCAS and pursued her doctorate at Ghent University. During her PhD studies, her research focused on the wetland structure information extraction and mapping in arid areas, the wetland ecosystem evolution and ecological restoration assessment.

Examination Committee

Prof. Dr. Alain De Wulf (Chair) (Ghent University) Prof. Dr. Peter Goethals (Ghent University)

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- Prof. Dr. Wenqiang Xu (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences)
- Prof. Dr. Yue Huang (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences)

Supervisors

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Prof. Dr. Amaury Frankl (Ghent University)
Prof. Dr. Philippe De Maeyer (Ghent University)
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Summary

Accurately identifying the fine structure and dynamic changes of wetlands is crucial for their management, conservation, and restoration. This study presents a D-UNet+ deep learning model tailored for complex scenarios in arid regions. Using Sentinel-2 satellite imagery, it achieves high-precision structural mapping of Xinjiang wetlands at a spatial resolution of 10 meters. The overall mapping accuracy reached 88.3%, with a MIoU of 87.3%. Additionally, a wetland ecological quality evaluation system was developed based on the wetland Structure-Function-Stability (SFS) framework, which quantifies the ecological condition and change characteristics of typical lake and alpine wetlands. In Xinjiang, the implementation of ecological water diversion and grazing ban measures has led to significant improvements in the ecological quality of both lake and alpine wetlands. The primary drivers of wetland ecosystem recovery are the expansion of water surface area and an increase in the number of water bodies. In water-scarce arid regions, increasing the number of small water bodies plays a more important role in promoting wetland vegetation recovery than maintaining large water bodies in lakes. Furthermore, climate change positively impacts the ecological restoration of alpine wetlands.





