



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes  
with planetary health”

## Spatial overlap between waterbird hot spots and permanent basic farmlands reveals policy conflicts in croplands adjacent to national nature reserves in Poyang lake basin

WANYUE PENG<sup>1</sup>, STEFAN SIEBER<sup>2</sup>

<sup>1</sup>*Humboldt University of Berlin, Department of Agricultural Economics, Germany*

<sup>2</sup>*Leibniz Centre for Agric. Landscape Res. (ZALF), Sustainable Land Use in Developing Countries (Sus-LAND), Germany*

### Abstract

Croplands adjacent to protected areas are increasingly used by waterbirds, intensifying potential conflicts between biodiversity conservation and agricultural production. However, the spatial dynamics and conservation implications of such overlaps remain poorly understood. Using the MaxEnt model and Optimal Hot Spot Analysis, we identified habitat suitability and hot spot trends of four key waterbird families (Gruidae, Anatidae, Ciconiidae, and Ardeidae) in croplands adjacent to National Nature Reserves in the Poyang Lake Basin from 2013 to 2023, and quantified spatial overlaps between persistent hot spots and designated national permanent basic farmland to reveal zones of potential human–wildlife conflict. The total waterbird hot spot area for the integrated waterbird analysis increased by 211 % over the decade, with Gruidae showing the greatest expansion (+222 %). Notably, 43 % of persistent hot spots overlapped with permanent basic farmland, particularly in counties prioritised under both ecological conservation and agricultural intensification policies. This overlap reveals a spatial mismatch between conservation priorities and rigid farmland protection policies that are difficult to reconcile. Waterbird species exhibited distinct responses to environmental drivers, reflecting differences in habitat specialisation and sensitivity to anthropogenic disturbance across groups. Our findings emphasise the urgent need for adaptive conservation strategies that integrate species-specific ecological requirements with agricultural land-use planning. Reconciliation of biodiversity and food security goals will require more flexible zoning, multifunctional landscapes, and equitable compensation mechanisms tailored to local contexts. This case offers scalable insights for managing human–waterbird conflict in agricultural wetlands globally, especially in regions where static land-use policies intersect with dynamic and evolving ecological processes.

**Keywords:** Conflicts, GIS, permanent basic farmland, policy, waterbirds conservation