

# Grassland Intensification Effects Cascade to Alter Multifunctionality of Wetlands within Metaecosystems

## Background/Objective

- Sustainable agricultural intensification aims to boost productivity while improving ecosystem services and ecosystem multifunctionality.
- This work sheds light on the effects of land-use intensification on multiple ecosystem services in spatially connected grasslands and wetlands where management practices were directly applied to grasslands but not to wetlands.

## Approach

Drawing from long-term datasets for 53 physical, chemical, and biological indicators collected in grassland and wetland ecosystems at Buck Island Ranch, FL, researchers quantified ecosystem service multifunctionality using multifunctionality indices (MFs). They subsequently tested the effects of land use intensification on each ecosystem service indicator and analyzed effects of land-use intensification on MFs in spatially coupled grasslands and wetlands.

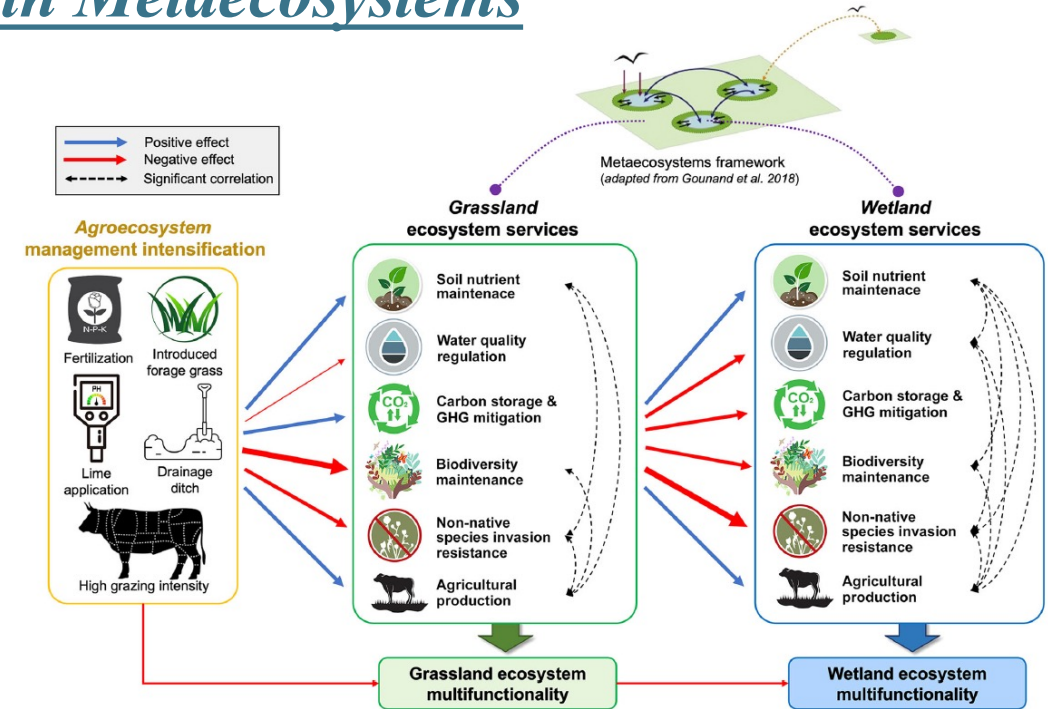
## Results

Intensification promotes high-quality forage and livestock production in both grasslands and wetlands, but at the expense of water quality regulation, methane mitigation, non-native species invasion resistance, and biodiversity. Land-use intensification weakens relationships among ecosystem services. MFs were 15.5% lower in intensified grasslands and wetlands compared to their semi-native counterparts.

## Significance/Impacts

This work demonstrates that intensified and semi-natural landscapes provide complementary outcomes in the supply of multiple ecosystem services and highlights the importance of considering spatial flows of resources and organisms when studying land-use intensification effects on metaecosystems or designing grassland and wetland management practices to improve landscape functionality.

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**Conceptual diagram illustrating how multiple ecosystem services from grassland-wetland metaecosystems were affected by upland land-use intensification.**