Leibniz Centre for **Agricultural Landscape Research** (ZALF)

Research Area 2 "Land Use and Governance"

The Role of Protected Areas in Conserving Lowland Grassland and Savannah Ecosystems in Latin America

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Introduction

• Grasslands and savannahs are among the most biodiverse ecosystems on Earth, supporting both human livelihoods and unique wildlife across continents. In Latin America, regions such as the Pampas, Llanos, and Cerrado hold exceptional ecological and cultural value, yet face increasing pressure from agricultural expansion, overgrazing, and land-use change. Advances in monitoring tools, including vegetation spectral indices and databases for species distribution models, now offer new opportunities to assess their health and guide conservation strategies within protected private lands.

Objective

• To compare productivity trends and biodiversity records between protected areas (including private natural reserves) and unprotected areas, focusing on natural grassland and savannah conservation in Argentina and Colombia.

Methodology

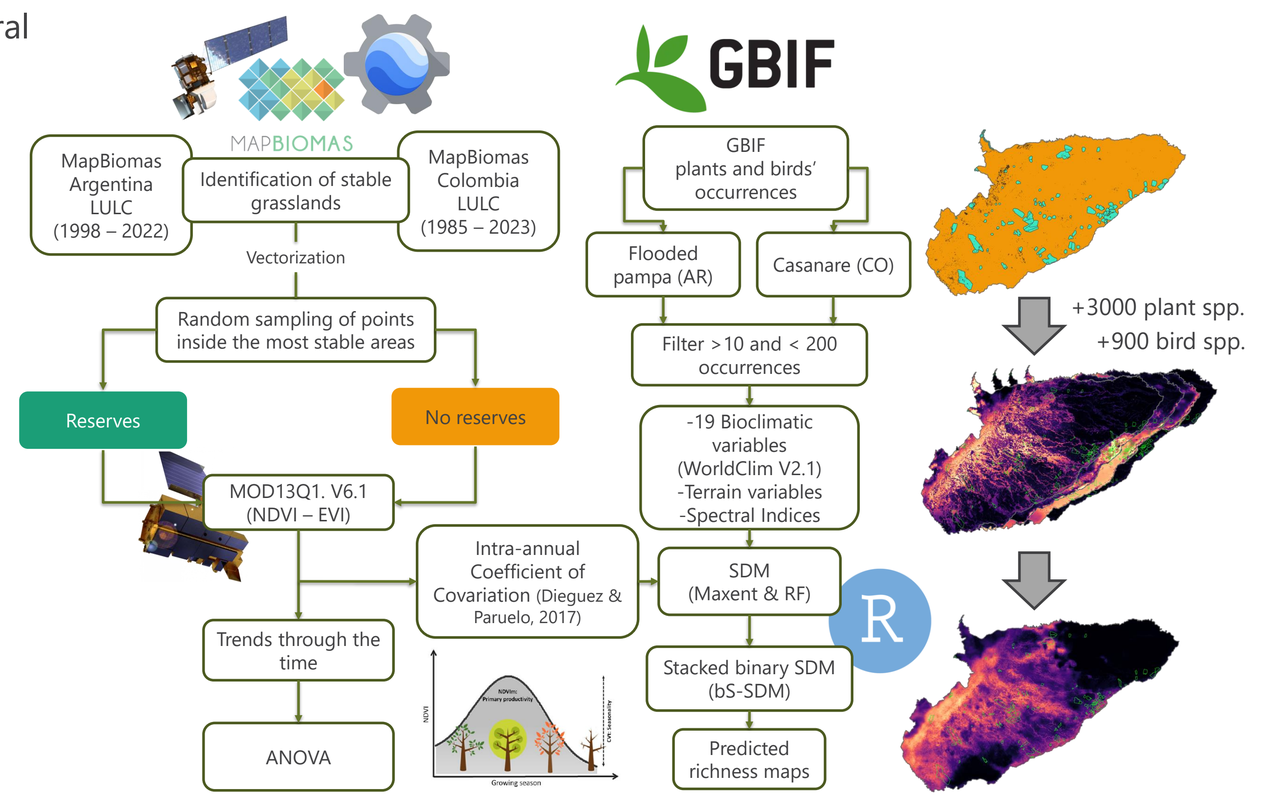

Fig 1. Workflow integrating remote sensing, GBIF occurrences, and species distribution modelling to compare biodiversity monitoring and sustainable management in Argentinian and Colombian grasslands reserves.

Results

NDVI – EVI through the time

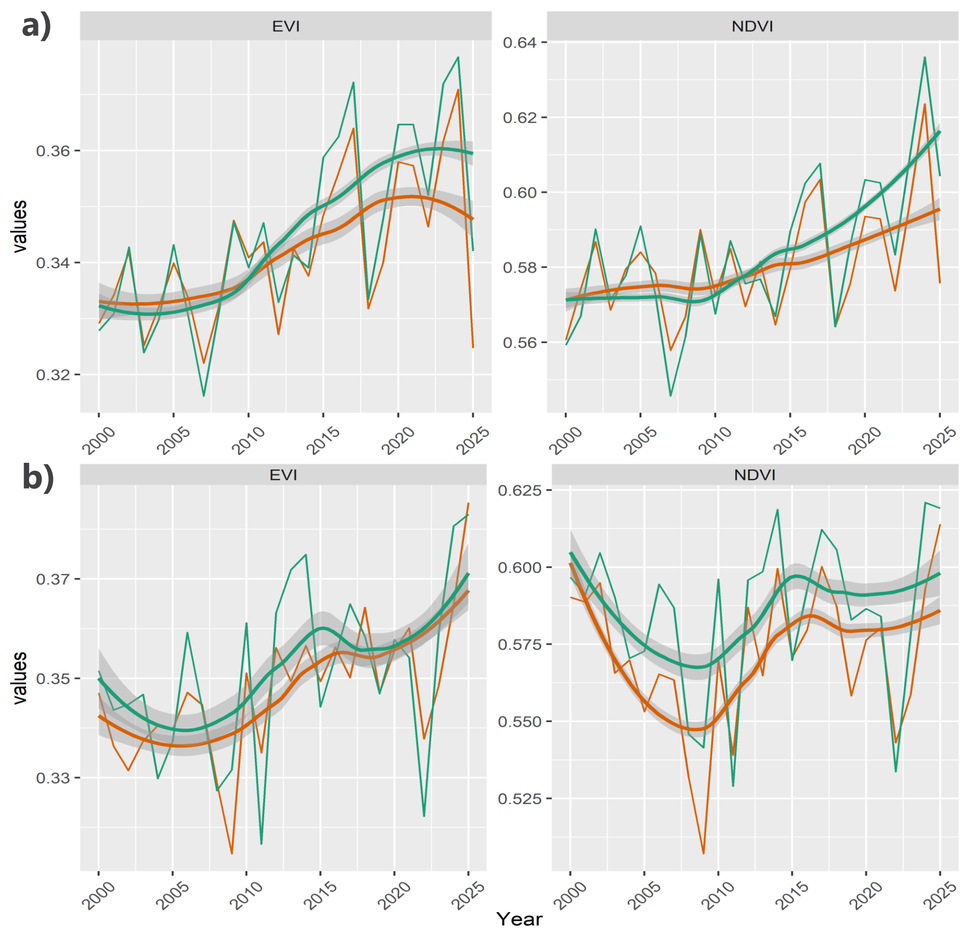

Fig 2. Temporal trends in EVI and NDVI inside (green) and outside (orange) reserves: a) Casanare, Colombia, b) Flooded pampa, Argentina. Lines represent yearly averages with 95% confidence intervals.

Species occurrences

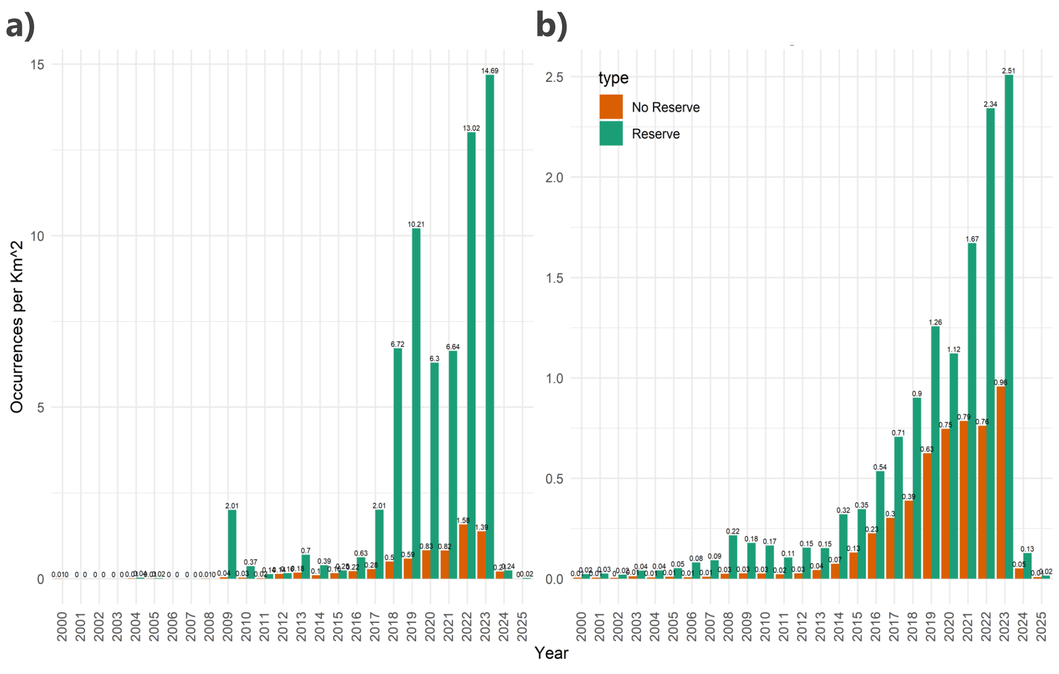

Fig 3. Annual bird occurrence density (records per km^2) inside (green) and outside (orange) reserves: a) Casanare, Colombia, b) Flooded pampa, Argentina.

Predicted richness based on bS-SDM

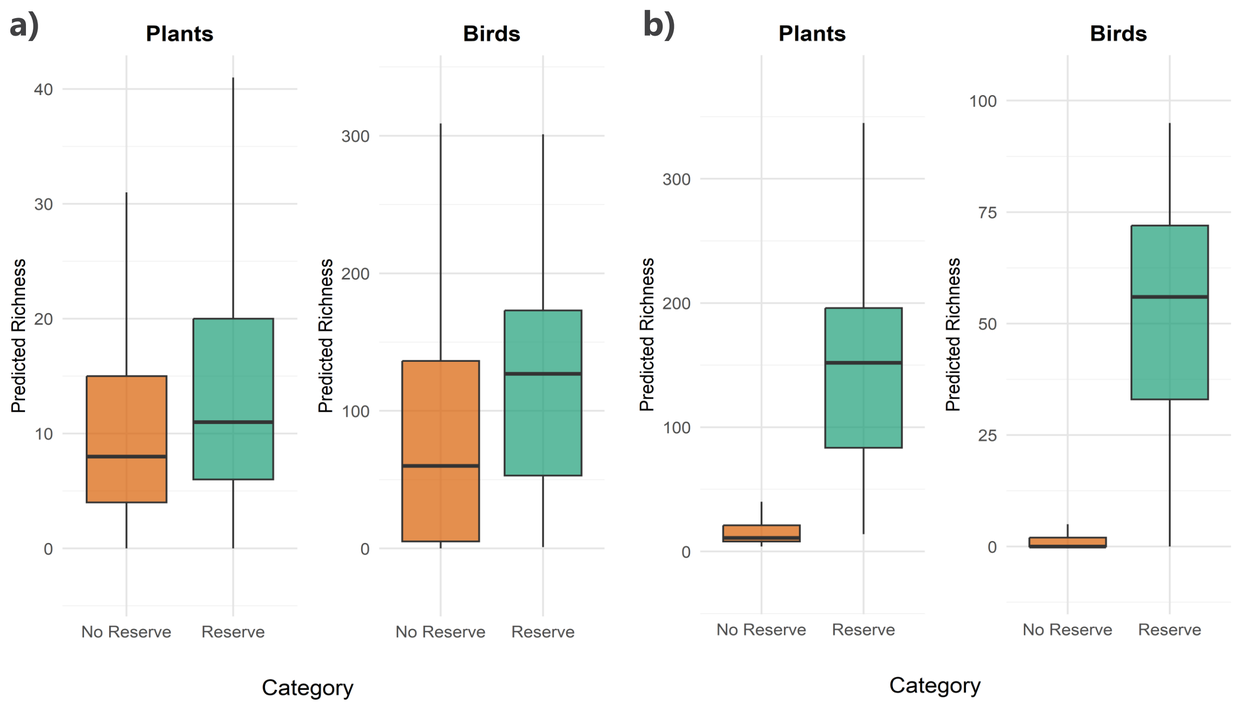

Fig 4. Number of predicted species richness for plants and birds in a) Colombia and b) Argentina.

Conclusions

• Although the clear identification of natural or semi-natural grasslands is challenging, the annual LULC data from MapBiomas helped reveal the most stable grassland zones (Fig 1.).

• bS-SDM can be used to identify areas that show strong biodiversity monitoring activity and demonstrate high species richness within protected reserves (Fig 4.).

• Compared to unprotected areas, reserves maintained or increased plant productivity (Fig 2.) while supporting biodiversity monitoring efforts. This success is evidenced by significantly higher densities of both plant and bird species per square kilometer within protected areas (Fig 3.).

References:

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