Human-Puma Conflicts in Social-Ecological Land Systems of Argentina

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Introduction

In Argentina, pumas get involved in **two primary conflict types** with humans:

🐂 **Livestock depredation conflicts:** driven by livestock losses, often lead to retaliatory killings[1,2]
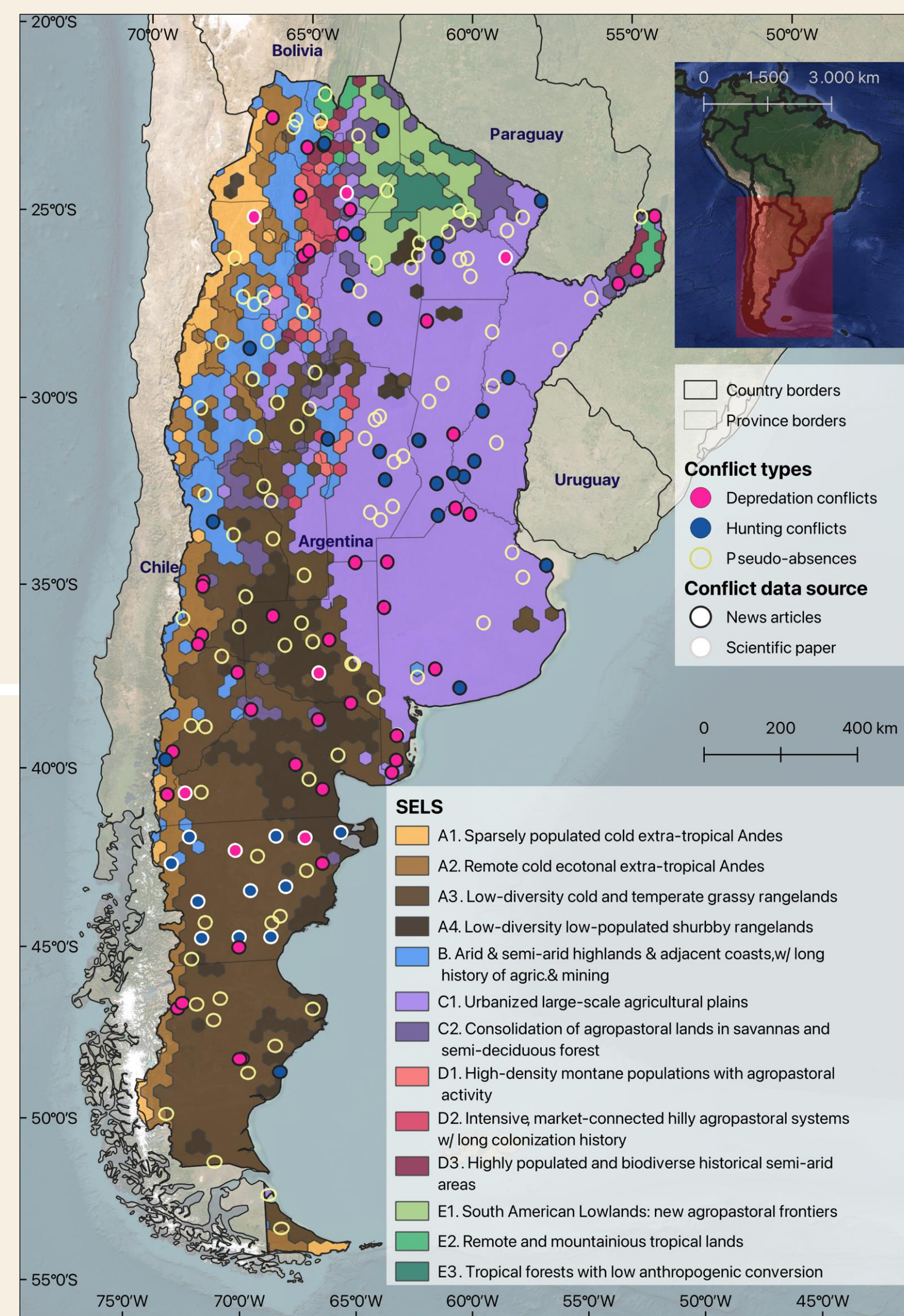
🎯 **Hunting conflicts:** motivated by sport or leisure, threating puma populations

Main goals:

- Conflict characterization within the **social-ecological land systems (SELS)** by Zarbá et al. 2022[3], a spatial classification framework of South America

- Identification of social and environmental drivers of both conflict types on a **regional scale**

Photo by Nanni

Methods

1. *Data collection:* **peer reviewed scientific articles and online news articles** between 2017 and 2022

2. *Data preparation:* conflict type classification, geolocation, **conflict area** calculation (20 km buffer), SELS type assignation, calculation of **spatial social-ecological attributes** (such as *roads, protected areas, land cover types,...*) for each conflict area

3. *Modeling:* one **generalized linear model (GLM)** per conflict type → to detect the social-ecological attributes influencing each conflict type

🐂 *Depredation conflict occurrence = cattle density + agricultural landscape + population density*

🎯 *Hunting conflict occurrence = small-livestock density + settlement number*

Photo by Himmelsbach

Conflict types
- Depredation conflicts
- Hunting conflicts
- Pseudo-absences

Conflict data source
- News articles
- Scientific paper

SELS
- A1. Sparsely populated cold extra-tropical Andes
- A2. Remote cold ecotonal extra-tropical Andes
- A3. Low-diversity cold and temperate grassy rangelands
- A4. Low-diversity low-populated shurbby rangelands
- B. Arid & semi-arid highlands & adjacent coasts,w/ long history of agric.& mining
- C1. Urbanized large-scale agricultural plains
- C2. Consolidation of agropastoral lands in savannas and semi-deciduous forest
- D1. High-density montane populations with agropastoral activity
- D2. Intensive market-connected hilly agropastoral systems w/ long colonization history
- D3. Highly populated and biodiverse historical semi-arid areas
- E1. South American Lowlands: new agropastoral frontiers
- E2. Remote and mountainious tropical lands
- E3. Tropical forests with low anthropogenic conversion

Results

- **90 conflict areas:** 51 depredation conflicts, 39 hunting conflicts

- Most conflicts in **SELS type C1 and A3**, with **hunting conflicts** predominating in **C1** and **depredation conflicts** in **A3**

- Depredation conflicts tend to be present in more heterogeneous SELS areas (≥ 2 SELS types within conflict area), while hunting conflicts in more homogeneous areas (one SELS type)

Model findings:

🐂 More **livestock depredation conflicts** with more *agricultural landscape* (including pasture, agriculture, forest/shrub plantation), *population density and less cattle density* → AUC 0.7, McFadden pseudo R^2 0.09

🎯 More **hunting conflicts** with higher *number of settlements* and more *small-livestock* (goats & sheep) *density* → AUC 0.78, McFadden pseudo R^2 0.16

Discussion
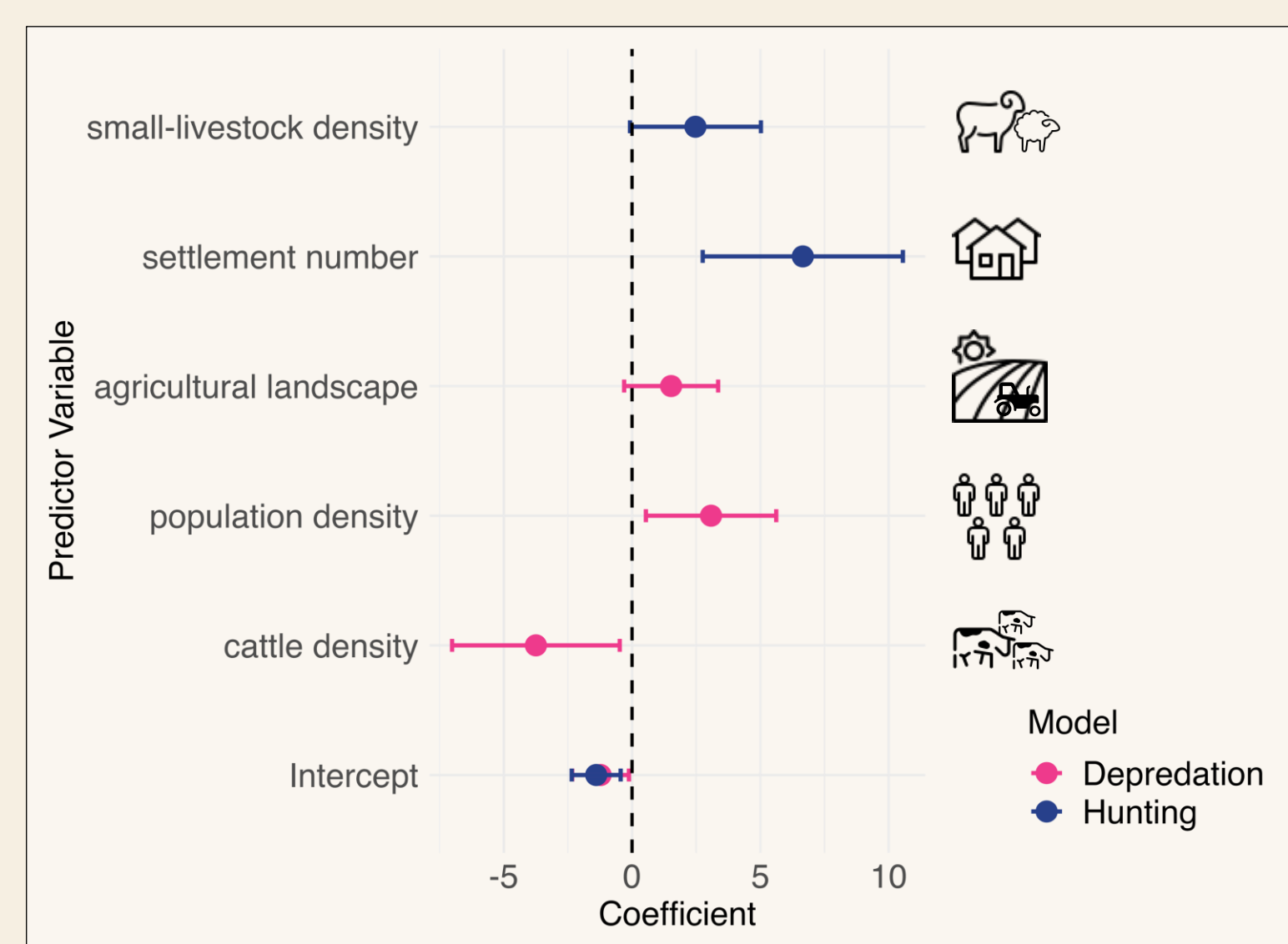
1. There are different social-ecological drivers that characterize conflicts:

🐂 **Livestock depredation conflicts** tend to occur in transformed areas with high human presence and less extensive cattle production, pointing at smallholder farming

🎯 **Hunting conflicts** tend to occur in rural areas with enriched small-livestock production

2. SELS framework suitable for regional characterization of human-puma conflicts,

as SELS characteristics are largely consistent with model results, and human-puma interactions are largely driven by social-ecological attributes

References

[1]Nanni et al. (2021): Predation on livestock and its influence on tolerance toward pumas in agroecosystems of the Argentine Dry Chaco. *Human Dimensions of Wildlife*, 26(5).

[2]Guerisoli et al. (2021): Puma-livestock conflicts in the Americas: A review of the evidence. *Mammal Review*, 51(2).

[3]Zarbá et al. (2022): Mapping and characterizing social-ecological land systems of South America. *Ecology and Society*, 27(2).

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