# Trade-offs between agricultural production and conservation in the Dry Chaco of Argentina

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Background

➤ Increasing demand for agricultural products drives major land use changes in dry Chaco
➤ Wild populations are affected mainly through habitat loss & intensification process
➤ Conservation strategies that maximizes a regional production target & wild populations are required

➤ Our aims were to
  i. Describe the main land use intensity (LUI) gradients in the Argentinean dry Chaco
  ii. Describe the community patterns of birds communities along LUI
  iii. Explore which conservation strategies maximizes birds populations for current & future regional levels, considering different proportions of natural habitats (forest & grasslands)
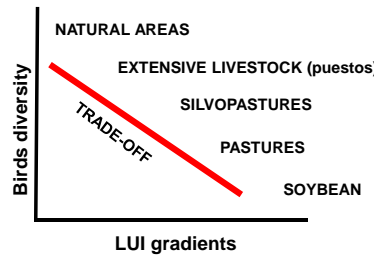

Considered conservation strategies

➤ Land sharing: Promotes the spatial co-existence of non intensive productive systems that generate suitable habitat for biodiversity

➤ Land sparing: Promotes the spatial separation of intensive productive systems & conservation of large natural habitats without human intervention

LUI and patterns

METHODS

➤ Meat production: bibliographic revision of forage biomass production in different livestock systems converted to meat

➤ Soybean collected from governmental data & converted to meat

➤ Birds relative abundance data collected with field surveys 60 plots, 10 plots for each of the following covers: forest, grasslands, puestos, silvopastures, pastures, soybean
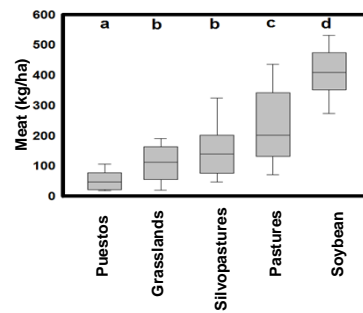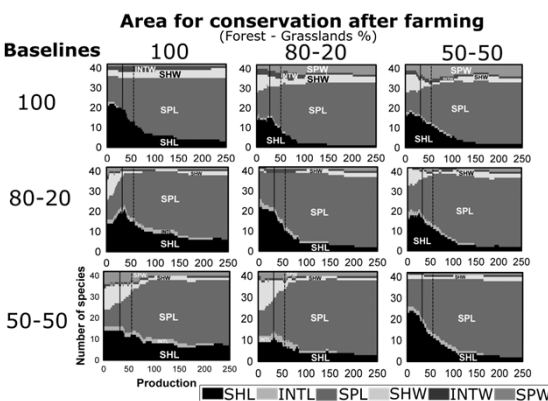

Generalized linear model describing the relation between meat production patterns along LUI
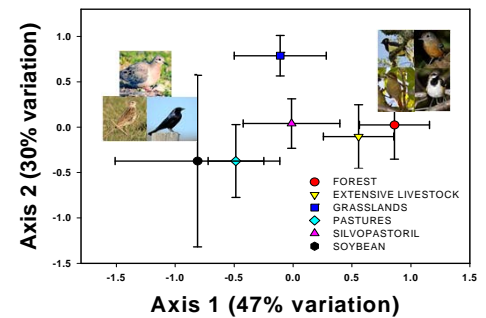
NonMetric Multidimensional Scaling expressing the similarity in birds community composition along LUI

## Optimal strategies for birds populations

Numbers of bird species for which land-sharing or land-sparing or an intermediate strategy gives the highest total population. Production targets (2007 & 2020) in vertical lines. Fills & columns varies in forest–grasslands proportions from 100% forest to 80:20% & 50:50% forest grasslands

Results

➤ The results showed a similar number of birds species populations maximized by a land sparing & sharing strategies for regional production 2010

➤ For future increments in agricultural production land sparing resulted best strategy to maximize the production-biodiversity trade-offs

Going forward

➤ Adding a third component of sustainability (e.g. carbon stocks) to the trade-offs analysis
➤ Implementing multi-criteria optimization analysis to explore "optimal" land allocation for natural and productive systems
➤ Relating yields, biodiversity and carbon to spatial heterogeneity (climate and soils)
➤ Integrating the optimization analysis with the spatial modelling
➤ Generate "optimal landscapes" with combinations of natural and human uses that maximizes production and conservation goals
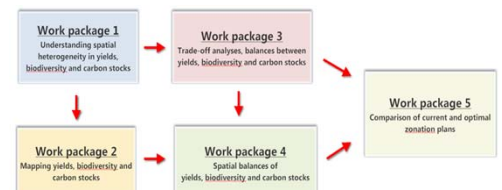
Acknowledgements

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Web www.geographie.hu-berlin.de
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