Exploring policy options to curb future deforestation in the Argentine Chaco

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Background

Introduction

- The South American Chaco has the highest rates of dry forest loss in the world due to soybean and cattle ranching expansion
- The forest loss lead to substantial forest fragmentation and decreasing connectivity
- Argentina implemented a national *Forest Law* in 2007 to reduce forest loss

Research question

- How do past deforestation and the implementation of the Forest Law affect forest extent and connectivity in the Chaco?

Objective

- We studied changes in (a) extent, (b) fragmentation and, (c) connectivity of forest in the Chaco for the past and the future under different implementation scenarios of the *Forest Law*

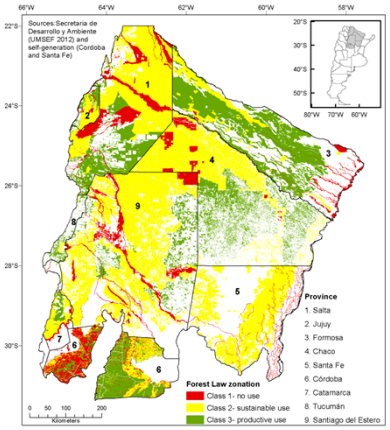
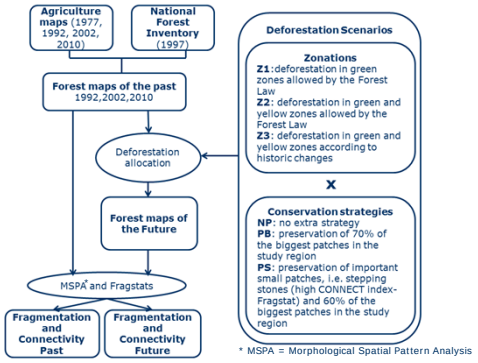


Fig. 1: *Forest Law* zonation in the Argentine Chaco

Methods



* MSPA = Morphological Spatial Pattern Analysis

- This resulted in a TOTAL of 9 scenarios (i.e., Scenario Z1 X PB where deforestation is allowed in green zones and big patches are preserved)

Forest conversion and fragmentation

Results

- Provincial borders of the zonation map of the *Forest Law* often show strong inconsistencies in zoning (e.g. Salta-green/Chaco-yellow, Fig.1)
- Past deforestation and forest fragmentation
  - Past agricultural expansion translated into a loss of 22.5% of the Argentine Chaco's forests (highest in 2000-2010 with approx. 4,700km^2/year deforested, Fig.2)
  - Forest fragmentation and connectivity loss were highest in 1977-1992 due to road construction
- Future deforestation and forest fragmentation
  - The full implementation of the Forest Law (scenario Z2 x NP) could decrease forest area to 45% of forest cover in 1977
  - The east of the Chaco will experience the highest forest fragmentation (Fig. 3)

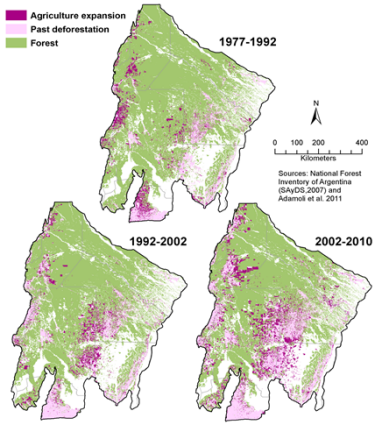


Fig. 2 : Past agricultural expansion in the Argentine Chaco

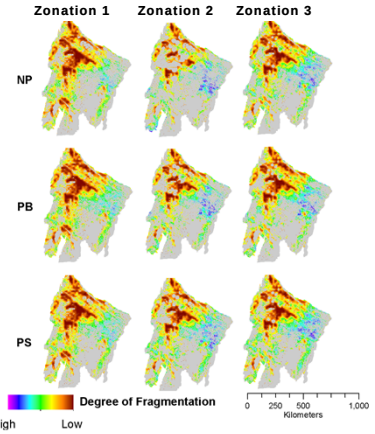


Fig. 3: Scenarios of future conversion under conservation options and potential degree of forest fragmentation

Connectivity and conservation options

Deforestation compatible with connectivity

- The conversion of forest in green zones with the protection of stepping stones (▲ scenario Z1 x PS, Fig.5) would minimize fragmentation and maintain highest landscape connectivity even at higher deforestation amounts than scenario Z1 x PB ● (Fig. 3 and 5)

Total implementation of the Forest Law

- If the Forest Law will be implemented as planned (■ scenario Z2 x NP, Fig.5), forest area and connectivity will decline dramatically and fragmentation will be highest (Fig.3 and 5)
- However, the protection of stepping stones (▲ scenario Z2 x PS, Fig.5) would result in a connectivity increase, despite substantial amounts of deforestation.

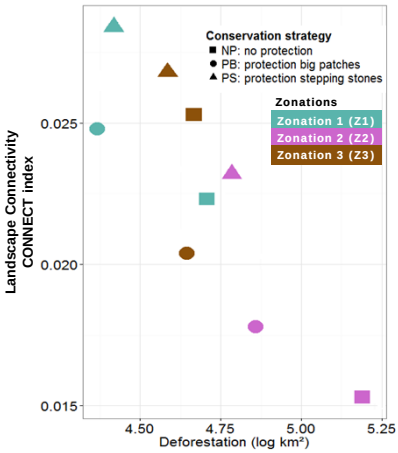


Fig. 5: Relationship among landscape connectivity (y axis), conservation options and deforestation

Stepping stones increase connectivity

- Fragmentation will be lowest and connectivity highest for all scenarios under the protection of stepping stones (Fig. 5) even if deforestation remains high (▲ ■ ● scenarios Z3, Fig.5)

Conclusions

- Decentralized land-use and conservation planning (e.g., Forest Law planned at the province level) can have unintended results at the eco-regional scale
- Land-use planning that is designed to protect stepping stones could substantially mitigate eco-regional connectivity loss due to deforestation in the Argentine Chaco

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