Are rates of land use change in Río de la Plata grasslands slowing down?

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Rio de la Plata Basin is a very dynamic region...
DRIVERS
(BROAD SCALE FACTORS)

International Price Technology
...

OWNER-PRODUCER STRATEGY

LAND USE CHANGE

NEIGHBORHOOD
(SMALL SCALE FACTORS)

Personal preferences
Soil characteristics
Financial capabilities
...

Probabilistic, rather than a deterministic approach

Grassland ➞ Forest Stands ?
Grassland ? ➞ Grassland
Crops ? ➞ Grassland ?

Land Use Change
I) If trends continue
¿How will the land use cover change?

Spatially Explicit Cellular Automata Model

II) If relative importances of Driver and Neighborhood change
¿How would the land cover proportions vary?
The system...

I. Three countries: Argentina, Brasil, Uruguay

II. Three land uses: CROPS, GRASSLANDS, FOREST (Natural and commercial stands)

III. Eight Vegetation Types

IV. Eight LANDSAT-TM scenes

V. Each scene is a 8 km × 8 km grid (N total= 2900 cells)

VI. Land Use Covers in 1985-1990 (t=0)

VI. Land Use Covers in 1995-2000 (t=1)
Model scheme...

Estimation of transition rates through direct LandSat Image analysis

Entries of $A$ can be modified by:

**Drivers**
Increment of 10, 20 and 40% in $a_{ij}$

**Land Use Change**

Relative abundance of each cover type in the Neighborhood of a focus cell. Increments of 10, 20 And 40% in $a_{ij}$

$p_{11} = aX / X$
$p_{21} = bX / X$
$p_{31} = cX / X$

$t(0)$  $t(1)$

For forests: $aX$
For grasslands: $cX$
For crops: $bX$
Model analysis

\[ \Delta = \frac{S_{t(2)} - S_{t(1)}}{S_{t(1)}} \times 100 \]

Land Cover Change (%)

Steady State Proportions of Land Use Cover

\[ \mathbf{A} \times \mathbf{w} = \lambda \times \mathbf{w} \]

Influence of Drivers and Neighborhoods on Steady states
PRELIMINARY RESULTS
Trends by country:

Cover change (%):

\[
\Delta = \frac{A(2000) - A(1990)}{A(1990)} \times 100
\]

\[
\Delta = \frac{A(expect) - A(2000)}{A(2000)} \times 100
\]
Argentina, for example…

Cover Change (%)

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Cover trends:

Argentina
- forests and crops: increase
- grasslands: decrease

Brasil
- forests and crops: decrease
- grasslands: increase

Uruguay
- Forest: increase
- Grassland: decrease

Different land use policies in the three countries.

Cobertures observed in 2000 in Argentina and Uruguay are similar to those predicted by models.

Is steady state almost reached?

This may suggest that therefore land use change will continue, but relative proportions of land cover will not.
Thanks!