BUILDING AN INTEGRATED LAND-USE MODEL FOR ASSESSING REDD+ POLICIES
THE BRAZILIAN CASE

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Berlin, March 19, 2014
Brazil is the world’s current largest experiment on land change and its effects: will it also happen elsewhere? Today’s questions about Brazil could be tomorrow’s questions for other countries.
Partner Institutions: IIASA, INPE/IPEA, UNEP-WCMC, COMIFAC

Duration: 4 years (Nov 2011-Nov 2015)

Funding: German Ministry for the Environment (BMU), International Climate Initiative (ICI)
Outline

- Recent Land Use Dynamics in Brazil
- Fighting Deforestation
- Looking Ahead with Land Use Models
BRAZIL

RECENT DYNAMICS
Global Demand to Local Response
Crop Production

% Growth in Brazilian Crop Area Compared to 1994

Spatial impact:

Darker colors indicate higher growth rate on planted and harvested crop area, from 1994 to 2010

Higher rates in the Amazon and the Cerrado biomes

Global Demand to Local Response
Cattle Production

Number of Bovines in Brazil

Source: PPM - IBGE
Global Demand to Local Response
Cattle Production

Number of Bovines in Brazil

- Amazon and Cerrado biomes

Source: PPM - IBGE
Local Impacts on Deforestation

Yearly deforestation rate for 2003-2004: 27,100 km²
How are we using the forest?

[Bar chart showing the distribution of land use categories: Degraded Land, Second Veg, Degrad Pasture, Pasture, Small Farms, Grains.]
REDUCING
DEFORESTATION
PUBLIC POLICY AND SCIENCE
“By 2020, Brazil will reduce deforestation by 80% relative to 2005.” (pres. Lula in Copenhagen COP-15)
Command and control operations
“Deforestation in Brazilian Amazonia is down by a whopping 78% from its recent high in 2004. If Brazil can maintain that progress — and Norway has put a US$1-billion reward on the table as encouragement — it would be the biggest environmental success in decades” (Nature, Rio + 20 editorial)
GLOBIOM

DEMAND

Exogenous drivers
Population, GDP

Wood products
Food
Bioenergy

PROCESS

Primary wood products
Crops

SUPPLY

SPATIALLY EXPLICIT INPUT DATA

Biophysical models
EPIC
G4M
RUMINANT

Climate
Soil and topography
Management
Land cover

Aggregation in larger units (max 200*200 km)

Between 10*10 km and 50*50 km

28 regions

Altitude class, Slope class, Soil Class

Altitude class (m): 0 – 300, 300 – 600, 600 – 1200, 1200 – 2500 and > 2500;

Slope class (deg): 0 – 3, 3 – 6, 6 – 10, 10 – 15, 15 – 30, 30 – 50 and > 50;

Soil texture class: coarse, medium, fine, stony and peat;

HRU = Altitude & Slope & Soil
Spatially explicit input data

- Initial land cover: GLC 2000
Land Use Models for Policy Evaluation

The Brazilian Case:

- The new forest code
- Low carbon agriculture program (ABC program)
- Loans to technology adoption and intensification
- PPCerrado (plan to reduce deforestation in the Cerrado Biome)
- Plans for other biomes
- Forest plantation policies
- Infrastructure improvements
- World demand for food, fuels and wood products
- Etc.

Land use models may help understand the potential joint impact
The New Forest Code

Legal Reserve - LR

- corresponds to a percentage of the rural property which has to be preserved

- The shares of legal reserve obey the following values:
  
  - For the Legal Amazon: 80% for properties located in forest areas; 35% for properties located in the Cerrado biome; 20% for properties located in general fields
  
  - Other regions in Brazil: 20%

- Recovery may happen in up to 20 years

- Compensation with the denoted *environmental reserve shares* (CRA)
The New Forest Code

Permanent Preservation Areas - APP

- River margins – the preserved areas depend on the river width
  
  For width of 10 meters, the preserved areas correspond to 30 meters from the river margin;  
  For width from 10 to 50 meters: 50 m;  
  For width larger than 600 meters: 500 m

- Areas with inclination above 45%, on the side of mountains or hills

- Areas around water springs, up to 50 meters from the margin

- Hill and mountain tops

- Any area 1.8 thousand meters above sea level

- Etc.
Improvements on Brazilian Model

- Transportation costs
- Forest recovery
- Land cover and land use
- Productivity
- Total Production
- Domestic demand
- Scenarios for per capita GDP, population growth, biofuels consumption
- Calibration and fine tuning for model parameters
Land Use Models for Policy Evaluation

• Policy planning has been scientific evidence based

• Land use is too complex to be addressed by a monosectorial approach

• GLOBIOM integrates a large set of geo-maps, biophysical and biodiversity information, and economic theory and helps us provide assessment over time
THANK YOU!