Policy Instruments and Institutional Arrangements into GLOBIOM

The Brazilian Case

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REDD pac

Policy Considerations for LUCC Models

- One of the main applications of LUCC models is for policy impact assessment – in Europe, it is mandatory to have an assessment for every new policy proposal

- To achieve sounding results in GLOBIOM, we need to rigorously account for policy instruments and institutional arrangements issues

- For GLOBIOM specifically, the model solves an optimization problem so as production necessities are met with the minimum cost, satisfying a set of constraints

- Economic mechanisms for production decisions are built into GLOBIOM, considering

  - Productivity parameters
  - Cost parameters
  - Land use constraints
  - Elasticities
  - Technical coefficients

- From the policy maker perspective, it is important to have the proper instruments so as the agents respond accordingly to the policy goals

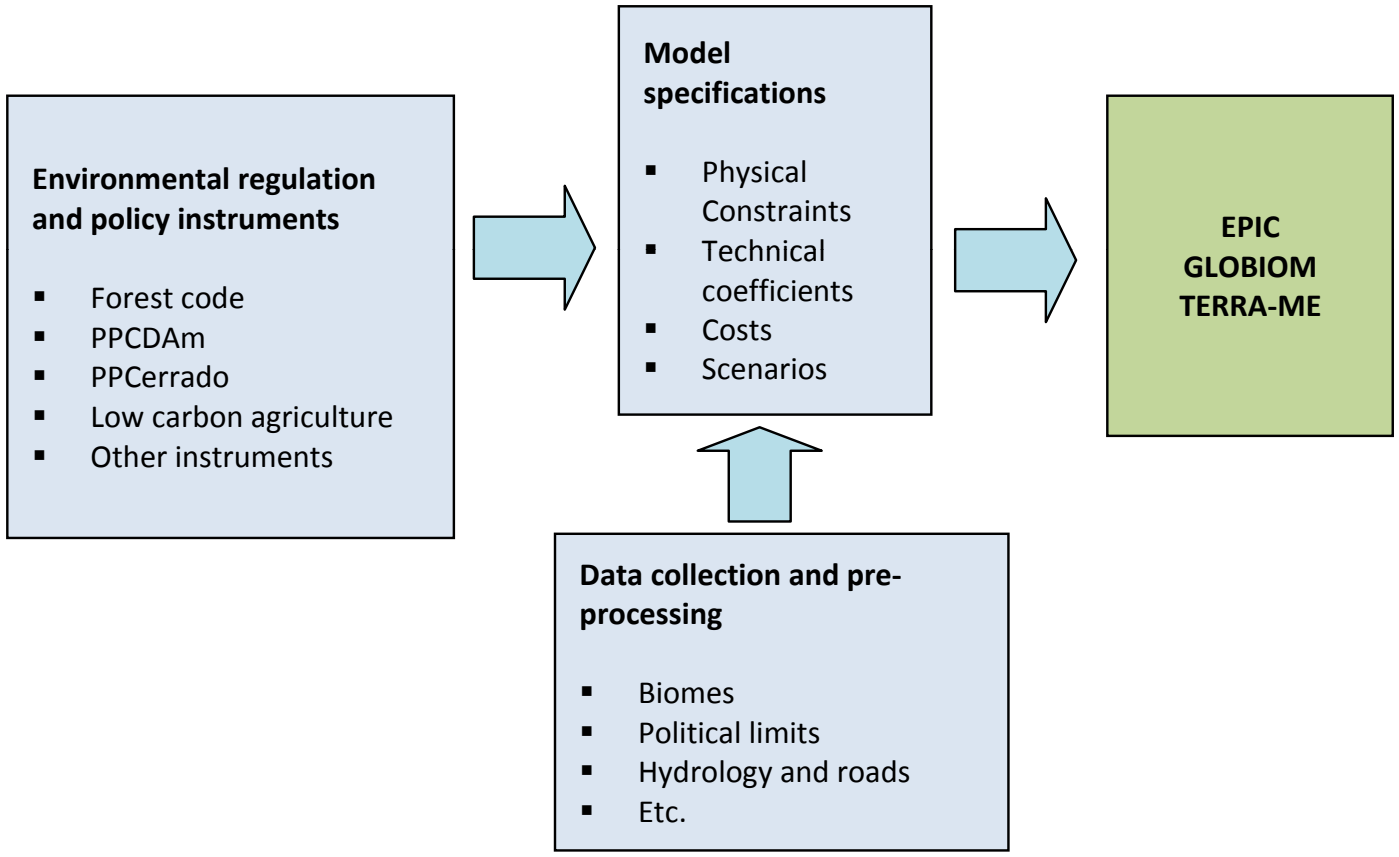
Policy Considerations for LUCC Models

- In Brazil, there is a set of various policies and arrangements to be addressed when running LUCC models

- Preliminary list to consider:

  - The new forest code
  - Low Carbon Agriculture
  - Action Plan for Prevention and Control of Deforestation in the Amazon – PPCDAm
  - Action Plan for Prevention and Control of Deforestation and Forest Fires in the Cerrado – PPCerrado
  - Infrastructure
  - Biodiversity priorities
  - Poverty alleviation
  - Protected areas
  - Incentives for deforestation reduction
  - Soy moratorium
  - Beef moratorium

Policy Considerations for LUCC Models



Policy Considerations for LUCC Models

Objectives:

- To present a discussion on the main policy instruments and institutional arrangements to be taken into consideration when setting up the simulations in LUCC models
- Only the main topics directly related to LUCC models implementation will be covered
- This presentation will help us raise other possibly important issues to be considered in LUCC models in Brazil
- To initiate a discussion on scenarios to be simulated in GLOBIOM
- Finally, for some of the policy instruments discussed here, specific information will be needed; we hope we can also discuss possible sources of data

Obs. the discussion benefited from conversations with specialists in Brazil and from the Policy workshop held in São José dos Campos, in October 2012

Policy Considerations for LUCC Models

Outline:

- New Forest Code
- Action Plan for Prevention and Control of Deforestation in the Amazon – PPCDAm
- Action Plan for Prevention and Control of Deforestation and Fires in the Cerrado - PPCerrado
- Low Carbon Agriculture (ABC)
- Scenarios for REDD in Brazil
- Other important aspects
- Topics for Discussion

The New Forest Code

The New Forest Code into GLOBIOM

- The new Brazilian forest code was published as the Law, number 12.651, in May 25, 2012, by the Brazilian President, after several revisions and approval by the Chamber of Deputies and the Senate House

- President Dilma Rousseff vetoed 12 articles from the final version of the code. For these 12 articles, the President House released a provisory measure (valid from its publication for 120 days). The PM was changed, and recently President Dilma vetoed some of its points

- Two important points for land use models:

  (a) permanent preservation areas (APP)

  River margins; 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; wetlands and sandbanks

  (b) legal reserves (RL)

  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

The New Forest Code into GLOBIOM

The new forest code will impose a set of restrictions in the model

Legal reserve limits

- Initially, we can consider a 20% deforestation limit per state, municipality or microregion

$$\sum_{i=1}^{n_k}\left[A_{crop\ s,i} + A_{pasture\ ,i}\right] \leq \sum_{i=1}^{n_k}\left[0.2 \times A_{total\ ,i}\right]$$

- We will assume that the producers can use environmental reserve shares (CRA) to exchange deforestation rights inside each state, municipality or microregion -> sensitivity analysis can be performed

- A parameter of enforcement efficiency can be used in the model: for example, we can assume that there will be a 5% or 10% extra deforestation -> percentages to be based on existing literature

- Areas within the legal reserves can be used for economic activities related to commercial forestry, for example. The restrictions on this exploration are still no clear

- The 80% limit can be reduced to 50%, whenever the municipality has ½ of its land for conservation units. The state governor can also reduce the restriction to 50%, when the state has 65% of its land for conservation units

The New Forest Code into GLOBIOM

Permanent preservation areas -> explicit restrictions for land use change

- Difficult to account at first, but we have to gradually build maps of APP's
- GIS work is required, based on information for: hydrology maps, inclination maps, hill and mountain tops, areas more than 1.8 thousand meters above sea level, wetlands and sandbanks
- Areas with restricted use -> we have to address how relevant it is going to be in terms of overall results
- For both APP's and areas with restricted use, we can also incorporate a parameter of enforcement efficiency
- Some economic activities are allowed inside the APP's, specially for small properties. Commercial forestry is also allowed, in some of parts of the APP
- For areas of restricted use (Pantanal and areas with inclination between 25º e 45º) can be used for ecologically sustainable activities, if authorized by designated authorities

The New Forest Code into GLOBIOM

Treatment of small properties

- The new forest code brings various topics in which special treatment is directed to small properties
- Complications arise, for example, on the definition of small properties; they are based on the use of the fiscal module, whose area varies according to the municipality - a fiscal module can vary from 5 to 110 hectares
- The amount of forest recovery for both permanent protected areas and legal reserves will depend on the size of the property, in multiples of a fiscal module
- In a first stage, we can disregard the special treatment for small properties, and be conservative
- In a further stage, we can map the percentage of area for small properties in each municipality and use this information to refine our simulations

The New Forest Code into GLOBIOM

Payment for environmental services

- Activities for maintaining legal reserves and permanent preservation areas are eligible for payments or incentives due to environmental services

- Certificates for GHG emission reduction in both national and international markets can be used

- Several proposals have been made for the development of a system of incentives, such as payment for environmental services, which enables landowners to benefit from the services that are provided if they manage ecosystems well

- Another possibility is for incentives to be provided through tax breaks

- 'Bolsa Verde' (forest grant), which provides grants to communities that are closely associated with or depend on forests, but does not require specific actions or results in return

The New Forest Code into GLOBIOM

Bolsa Verde Program

- created in in June 2, 2011. It corresponds to payments for environmental services, paid basically for biodiversity preservation functions
- focus are families in extreme poverty (per capita income of less than US$ 35 per month), living in areas considered important for preservation of Brazilian biomes, operating mainly in the following areas within the Legal Amazon
- pays quarterly amounts of US$ 150 per family
- until March 2012, according to information from the Ministry of Environment, the total amount paid summed up to US$ 6.2 million; more than 23 thousand families benefited from the program
- proposals to foster families to sell their deforestation rights

PPCDAm e PPCerrado

PPCDAm

- The main existing initiative of the Brazilian REDD policy is the Action Plan for Prevention and Control of Deforestation in the Amazon (PPCDAm)

- Established in early 2004, this program integrates forest cover monitoring, land use planning and land titling, inspection and enforcement, and promotion of sustainable use of natural resources

- The PPCDAm is also the operational program, which puts into concrete operations the goals stated in the Sustainable Amazon Plan (PAS)

- So far, PPCDAm has worked mainly for deforestation reduction, and it has been quite successful in doing so

- The main results observed since its creation include:

  - Creation of more than 25 million ha of conservation units, located mainly nearby conflict zones.

PPCDAm

- The main results observed since its creation include (continuation):
  - Consolidation of more than 10 million ha of indigenous land
  - Inhibition of more than 60 thousand illegal rural property titles
  - Intensive law enforcement by IBAMA (Brazilian environmental police), with planed operations in critical areas, together with the Brazilian Army, the Federal Police and the Federal Highway Police, resulting into expressive apprehension of illegal wood and equipment, and resulting into many issued fines
  - Combat to corruptions, with more than 600 public employees arrested
  - New law for public forest management (Law number 11.284/2006), giving more transparence to identification of public forest and expediting the process of forest concession
  - First public forest concession (Flona Jamari, state of Roraima)

PPCerrado

- The Brazilian Cerrado is the second largest biome in Brazil, with approximately 2 million km^2
- It corresponds to 24% of the total Brazilian territory (Amazon biome corresponds to 49%) and is considered the most biodiverse savanna in the world
- Many of the nation's large hydrographic basins are formed in the Cerrado, so as this biome plays a very import role in guaranteeing water supply to many large cities
- By 2008, more than 48% of the original vegetation had been cleared (for the Amazon biome, the percentage of remaining original vegetation was 82% at that same year)
- The Cerrado area contains 30% of Brazilian cattle herd (54 million hectares of pastures and 72 million head of cattle)
- Contains 21 million hectares of croplands, producing 60% of Brazilian soy, 60% of Brazilian coffee, 44% of Brazilian corn and 84% of Brazilian cotton

PPCerrado

PPCerrado

- In 2010, the government launched the PPCerrado, the Action Plan for Prevention and Control of Deforestation and Forest Fires in the Cerrado

- Main goal: reduce greenhouse gas emissions from deforestation in the biome in 40% by 2020

- Inspired by PPCDAm, the PPCerrado encompasses 151 actions, divided in three main axes:

  - Monitoring and control;
  - Protected areas and land use planning;
  - Fostering sustainable activities.

- The PPCerrado raised an initial list of priority areas to direct it is actions for deforestation control, according to:

  - Recent deforestation pressure;
  - High priority for biodiversity;
  - High relevance for hydrological resources.

PPCerrado

- The total federal conservation units are expected to be increased in 2.5 million hectares
- It is possible that conservation units at the state level are also expanded or created
- For indigenous land, the National Indian Foundation will homologate 300 thousand hectares of indigenous land and specify 5.5 million additional hectares
- Finally, as the program also has as one of its axes fostering sustainable activities. For example, credit lines for:
  - recovery of more than 8 million hectares of areas
  - large commercial reforestation projects
  - production based on agroextractivism and on biodiversity
- Important research question: how is the PPCerrado affect deforestation in other biomes?

PPCDAm and PPCerrado into GLOBIOM

Conservation units and indigenous land

- The model would consider a hard constraint, so as they can only contain native forest
- For the PPCerrado, new areas are planned to be transformed into conservation units and into indigenous land -> GIS information on these areas is needed
- We wonder whether it will be allowed to have other activities to have economic activities (and what kind) inside the indigenous land and conservation units (e.g., extractive activities)
- For these areas, we can also consider an enforcement efficiency parameter
  - The enforcement efficiency parameter can be 90%, for example, meaning there will be 10% non-compliance with legal restrictions

PPCDAm and PPCerrado into GLOBIOM

Priority areas for action

- In both PPCDAm and PPCerrado, specific areas are selected to be the focus of more intense surveillance and deforestation control
- There are 48 municipalities nowadays, in the special list for the Amazon biome
- For the Cerrado biome, priority areas are specified, according to the PPCerrado, based on relevance for hydrological resources, relevance for biodiversity and recent deforestation pressure
- For these priority areas, the model can consider that new clear cutting of original vegetation is not allowed
- The model may also consider trajectories for enforcement restriction parameters: some areas are not prioritized initially, but may receive more attention in the next decades

Low Carbon Agriculture

Low Carbon Agriculture

- In the last COP 15, on climate change, held in Copenhagen, Brazil has committed voluntarily to reduce its GHG emission between 36.1% and 38.9% considering the total emission projected till year 2020 (considering trend scenarios, based on recent historic growth for emissions)

- This commitment was formally assumed with the Law number 12.187, sanctioned in December 2009, which launched the National Policy on Climate Change (PNMC)

- Considering a baseline trend scenario, with no policy for emission reduction, by 2020, Brazil would emit around 2.7 billion of tons of CO2

- According the country's commitment, the reduction would be somewhere between 975 and 1,052 million tons of CO2

- The PNMC establishes important economic instruments to be used by the policy implementation institutions:

  (i) fiscal and tax incentives;

  (ii) special credit and financing products for public and private agents;

  (iii) development of a domestic market for emission reduction, using carbon credits as financial assets negotiable on the stock market

Low Carbon Agriculture

Main goals:

- Recovery of 15 million hectares of degraded pasture, with proper techniques and green manure, allowing for a reduction of 101 million tons of GHG, or carbon equivalent

- Adoption of an integrated system of pasture-crop-forest in 4 million hectares, resulting in the reduction of 20 million tons of GHG, or carbon equivalent

- Increasing the use of direct planting system in 8 million hectares, going from 25 million hectares nowadays to 33 million, resulting in a possible reduction of 16 to 20 million tons of GHG, or carbon equivalent

- Incentives to the biological nitrogen fixation in the soy production, going from 11 million hectares to 16.5 million (an additional of 5.5 million), allowing for a reduction between 16 to 20 million tons of GHG, or carbon equivalent

- Increasing the plantation of economic forests in 3 million hectares, resulting in a sequestration of 10 million tons of GHG, or carbon equivalent

- Treatment of animal waste, in a total of 4.4 million m3

Low Carbon Agriculture

Methods and technologies covered by the ABC Program:

- Direct planting system (DPS) as a practice that retains more carbon in the soil, increases the amount of water and organic matter (nutrients) in the soil and decreases erosion
- Crop-livestock-forestry integration systems
- Recovery of degraded areas and pasture
- Forest plantation, based for example on the production of pines, eucalyptus and black wattle, which are fast growing species
- Biological Nitrogen Fixation (BNF), by using micro-organism and bacteria
- Treatment of animal waste, producing energy and organic material

Low Carbon Agriculture

Program characteristics

- The Brazilian government directed a total amount of R$ 2 billion, in 2011, for the ABC program, to be passed as loans to the agriculture sector
- These loans have a limit of R$ 1 million, per producer, per year, independent on other credit the individual or the cooperative have received
- The annual interest rate is 5.5%, with up to an eight-year grace period, and a total payment period of up to fifteen years
- The borrower has to provide guarantees for the loans. The main type of item to be used as collateral is the rural property itself
  - Property rights is an important issue in Brazil, specially in the Amazon biome => it causes difficulties for the ABC program implementation as well as REDD instruments
  - As found in Börner et al. (2010), around 67% of endangered forest areas in Brazilian Amazon contain rural establishments with ill-defined or non-clarified tenure

Low Carbon Agriculture

Program characteristics

- According to data from Banco do Brasil, from June 2011 to July 2012, there were 3,552 contracts in the ABC Program credit line, totalizing R$ 1.2 billion
- Most of the contracts were directed to rural establishments in the South and the Southeast regions (66% of all contracts)
- Less than half of the total available amount in the program was actually taken as loans
- A more thorough evaluation of the program is necessary so as to understand who is receiving credits for the ABC program and how they employing it
- Who is adopting the new technologies in the ABC program is related to a broader line of research: technology adoption

Low Carbon Agriculture

Technology adoption for the agriculture sector

- Documented factors:
  - property size
  - risk and uncertainty
  - human capital
  - property contract (lease, partnership, and property rights)
  - credit availability
  - labor force
  - market proximity
  - proper technical assistance
  - soil characteristics
  - infrastructure
  - cultural factors

- Technology adoption is extremely important to understand how establishments will incorporate new techniques not only for sustainable agriculture, but also for productivity gains

Low Carbon Agriculture

Some of the challenges

- Proper training and technical assistance for the adoption of the new technologies
- Proper training for the financial agents and the rural technicians, so they can analyze appropriately the ABC projects to be financed
- Even though the annual interest rate of 5.5% may sound attractive (for Brazilian standards), there are other incentive programs for rural producers, also with low interest rates and good credit conditions (e.g., PRONAF)
- We may also evaluate alternative policy instruments to reduce risk and/or increase profitability, so as to improve general attractiveness for the new projects
  - Implementation of policies of payment for environmental services generated from the adoption of these new technologies
  - Implementation of tax and fiscal incentives for the produces adopting the new technologies

Low Carbon Agriculture into GLOBIOM

- ABC plan will be considered into GLOBIOM by specifying:
  - Technical coefficients for low carbon production methods versus traditional methods
  - Possibility of tax breaks to increase program attractiveness
  - Effects of credit availability
- Topics to be addressed:
  - Which methods in the ABC plan are more likely to work?
  - Which methods are more likely not to be adopted?
  - Possible sources of data?

Scenarios for REDD in Brazil

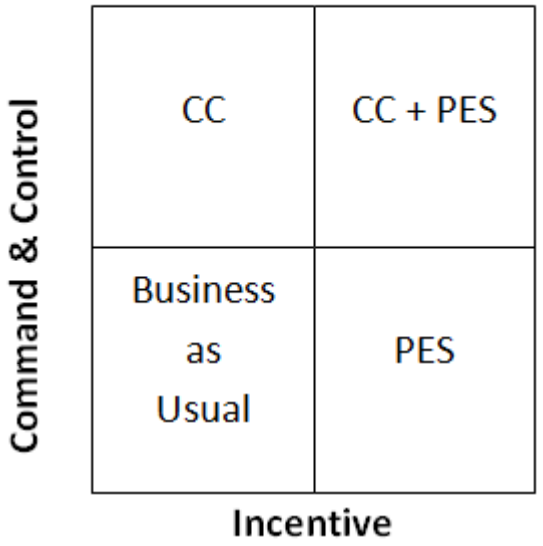
Scenarios for REDD in Brazil

- Based on preliminary conversations with specialists, it appears that REDD implementation in Brazil is likely to
  - build on the country's previous success in limiting deforestation through improved monitoring and enforcement
  - develop at least some component of transmitting financial benefit to landowners, through some form of payment for environmental services (PES)
- There have been discussions on the opening of a national market for carbon credits in Brazil, which would similarly provide an incentive-based mechanism for REDD+ implementation
- Nowadays, Foreign Office does not accept market-based policies, only voluntary agreements
- REDD at national and subnational levels => funds transference from Federal government to states and municipalities
- There is still room for further improvements on the REDD model Brazil will adopt

Scenarios for REDD in Brazil

Initially, two axes for REDD implementation: command and control versus incentives:

- BAU - include both the existing policies and some representation of their effectiveness (not necessarily 100%)
- CC - degree of enforcement effectiveness greater than the current levels
- PES - can presumably be represented as a price per ton of carbon stock (as emissions avoided)



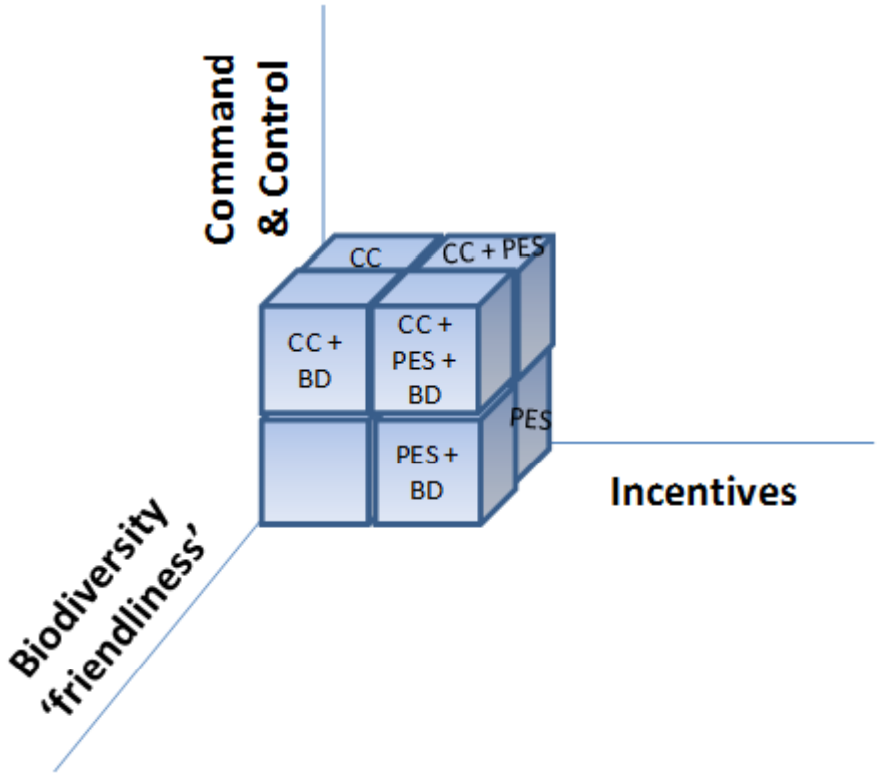
Scenarios for REDD in Brazil – Including Biodiversity

There is as yet little (if any) discussion of considering biodiversity in the implementation of REDD+ in Brazil

There is potential for including biodiversity conservation priorities as one basis for directing REDD+ implementation

Possibility for including biodiversity:

- using a phased approach to REDD+ implementation, focusing first on areas with high priority for biodiversity



Scenarios for REDD in Brazil

Other issues:

- Potential variation PES related to additionality:
  - there is a strong question in Brazil about whether remuneration should relate to stocks or to fluxes of carbon
  - The suggestion in Brazil has been that a hybrid approach would be best in which payments are higher in areas of high pressure or flux, but there is some payment in other areas as well
- Regional variation within Brazil:
  - Role potentially played by forest restoration (of high importance in e.g. Sao Paulo, Mato Grosso)
  - PES schemes are already functioning in the Atlantic Forest region, and some states (Paraná) have developed their own approaches to PES in relation to biodiversity importance
  - One could consider implementation of REDD through different approaches in different locations, as for example suggested by Börner et al. (enforcement vs incentives according to location and circumstances)
- Tenure rights -> how to get PES if you do not own the property?

Other Issues for LUC in Brazil

- **Tenure rights:**
  - around 67% of endangered forest areas in Brazilian Amazon contain rural establishments with ill-defined or non-clarified tenure (Börner et al., 2010)
  - tenure problems may affect negatively the effectiveness of both command and control policies and PES instruments (Börner et al., 2011)
  - Araújo et al. (2008) analyze specifically the impacts of property rights on deforestation
  - as a consequence of the Brazilian legal system, which does not provide a complete bundle of rights to land, property insecurity prevails resulting in violent land conflicts and expropriation procedures
  - title holders face a risk of losing their rights to the land as a result of land reform policies
  - In this risky set up, as part of a risk management strategy, agents convert forests into pasture or agricultural lands

Other Issues for LUC in Brazil

- **Incorporating value of forest used for extractive purposes:**
  - Costa (2011 e 2012) presents evidence on the importance of forest products, other than timber
  - the author studies different technology trajectories, in which he identifies a specific group of rural establishments that obtain income from exploiting the natural forests.
  - the total income from these activities can be up to 20% of gross product value for landowners in the Brazilian Amazon
  - Income from the forest may induce forest conservation incurring also in poverty alleviation
  - in GLOBIOM, at present, these activities are not captured for the natural forest class. Taking account of this value added value will require sub-setting natural forest according to the potential for exploitation (e.g. access, proximity to population & markets)

Other Issues for LUC in Brazil

- **Minimum Prices Policies:**
  - the minimum price policy is an instrument to guarantee a minimum income to the rural producer, so as to cover production costs, when there is supply excess in the market at the harvest time
  - the agricultural products are bought by the federal government and transfer to stocking areas, avoiding significant price drops in the market
  - yearly, the government does a survey on production costs in different regions, considering both summer and winter products
  - products considered: garlic, coffee, canola, cashew nuts, silk cocoon, oats, barley, wheat, triticale, sunflower, guarana, milk, castor oil, sisal, grapes, cotton, peanuts, rice, natural rubber, Brazil nuts, carnauba wax, beans, cassava, corn, soybeans, sorghum, jute
  - prices for each product are available at the National Supply Company (CONAB) website => good source of production costs for each of the products covered

Other Issues for LUC in Brazil

- **Productivity gains:**
  - between 1975 and 2006, corn and wheat had a productivity gain of more than 150%
  - from 2006 to 2010, productivity for rice, sugarcane, bean, corn and soy has increased in 6.4%, 5.2%, 7.6%, 29.1% and 23.9% respectively

Average Productivity (Kg / hectare) For Selected Products

Census year	Coffee	Sugar cane	Corn	Soy	Wheat	Beans
1975	729	42.979	1.335	1.542	679	410
1980	571	53.618	1.521	1.639	914	397
1985	926	60.525	1.476	1.773	1.519	377
1995	1.034	62.086	2.442	2.334	1.701	507
2006	1.399	68.876	3.606	2.602	1.737	718
Productivity gains from 1975 to 2006	92%	60%	170%	69%	156%	75%

Source: www.sidra.ibge.gov.br.

Other Issues for LUC in Brazil

- **Considering Fiber and Rubber Products:**
  - it may be important also to taking into consideration rubber and fiber (cotton, jute and linen) products
  - according to the 2006 agriculture census, the total harvested area of temporary crops was 49.1 million hectares
  - rubber and fiber products accounted for almost 1 million hectares, accounting for almost 2% of the total harvested area
  - cotton is by far the most important fiber product, accounting for 0.8 million hectares

Other Issues for LUC in Brazil

- **Tax breaks policies:**
  - in order to foster the adoption of new technologies, government can use tax breaks instruments
  - in Brazil, total taxes correspond to 34% of total gross domestic product. For the BRICS: India, 12% of its GDP, Russia, 19%, and China, 23%
  - on the other hand, taxes for the Brazilian rural producers are much lower
  - according to the input-output matrix for Brazil (year base 2005), some of the agriculture sectors have negative total tax incidence (considering all subsidies). Example: rice, corn and cotton
  - for wheat, sugarcane, soy in grains, total taxes correspond to 3% or less of the basic production prices (final price to consumer, excluding transportation and retail costs)
  - for coffee and beef products, total taxes vary between 5% and 9% of the basic production prices
  - the Rural Property Tax (ITR), one of the main taxes, has a high level of evasion (Moreira and Assunção, 2001)

Other Issues for LUC in Brazil

- **Soy moratorium:**
  - it is an environmental pact established among representative entities of Brazilian soy producers, NGO's, and later on was supported by the Brazilian government
  - it was initially anticipated to be valid for two years, beginning in July 2006. After 2008, is has been prorogated yearly
  - participant producers (initially accounting for 94% of the total soy production in Brazil) agreed not to commercialize soy produced in areas deforested for expanding soy plantation in the Amazon biome
  - the moratorium is monitored by satellite image analyses (Landsat/TM and Terra/MODIS)
  - INPE has been playing a major role in this process, being responsible for the satellite monitoring (see Rudorff et al, 2011)

Other Issues for LUC in Brazil

- **Beef moratorium:**
  - the beef moratorium was idealized by the NGO Greenpeace, and was signed by the four major beef Brazilian exporters and by various beef retailers, compromising not to buy beef from animal production in areas illegally deforested
  - the idea was to guarantee an environmental complying origin for the beef exported to international markets
  - rural establishments that deforested illegally after October 5, 2009, will have difficulties selling to main beef retailers and exporters
  - for the sake of implementation of the beef moratorium in GLOBIOM, it may not incur in any additional specification, provided that the model is already accounting for compliance with the new forest code, for example

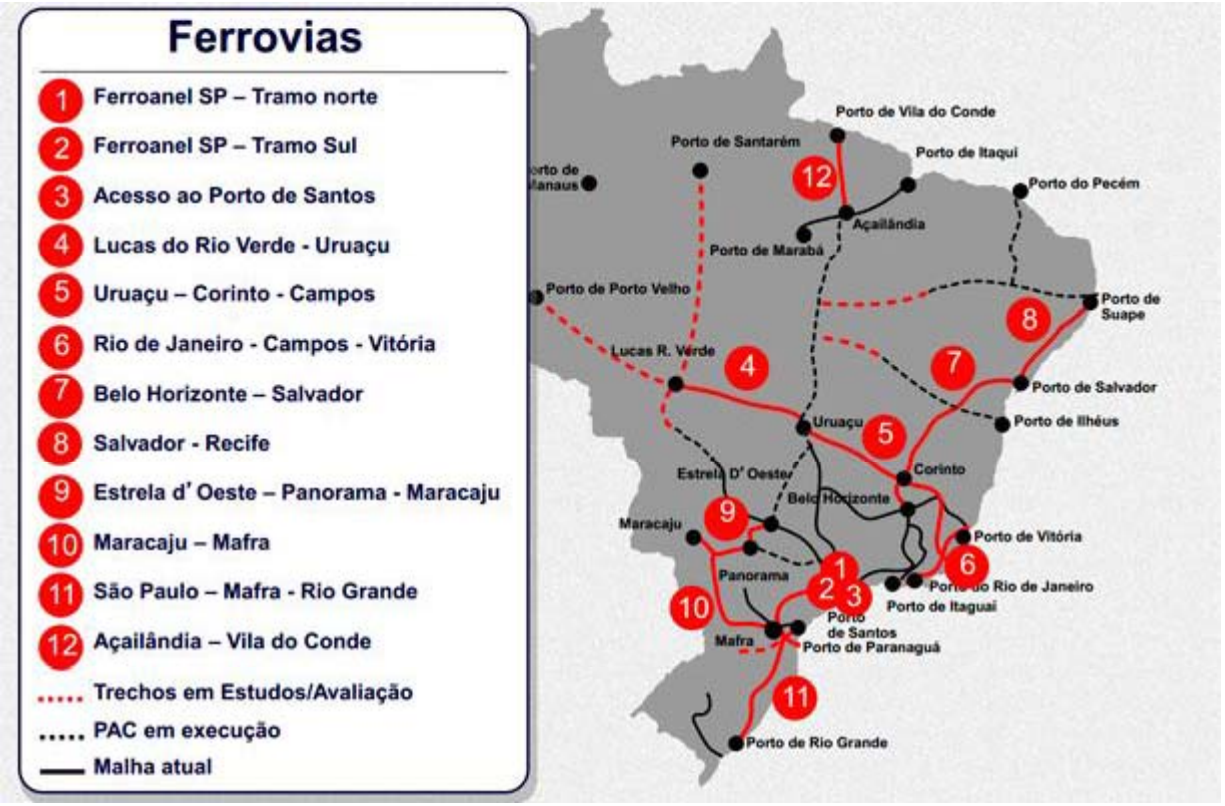
Other Issues for LUC in Brazil

- **Migration movements:**
  - migration movements, due to public policies, construction of new infrastructure, such as new energy plants, or salary differential, among other factors
  - ongoing construction of a new power plant, named Belo Monte => it is possible that Belo Monte will speed up migration to Pará, and eventually surrounding states
  - according to the 2010 IBGE Census, North region has the highest recent incoming migration, possibly because of the expansion of the agriculture and pasture frontier in the region
  - for LUC models, it is important to understand causality between migration and land use change:
    - if migration is caused by exogenous events, the causality is expected to occur from migration affecting land use change
    - if migration is caused by more economic related variables, such as salary differential, causality may occur in both directions

Other Issues for LUC in Brazil

- **Infrastructure expansion:**

  new concession package for roads and railroads -> in the future, new package for ports



Conclusions

- Important to understand policy instruments and institutional arrangements for LUC models in Brazil

  - New Forest Code
  - Action Plan for Prevention and Control of Deforestation in the Amazon – PPCDAm
  - Action Plan for Prevention and Control of Deforestation and Fires in the Cerrado - PPCerrado
  - Low Carbon Agriculture (ABC)
  - REDD in Brazil
  - Land tenure
  - Migration
  - Technology adoption
  - Productivity gains
  - Beef and soy moratoriums
  - PES
  - Forestry sustainable activities
  - Minimum price policies
  - Tax structure

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