

# Policy Instruments and Institutional Arrangements into GLOBIOM

## The Brazilian Case

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REDD<sup>+</sup> pac

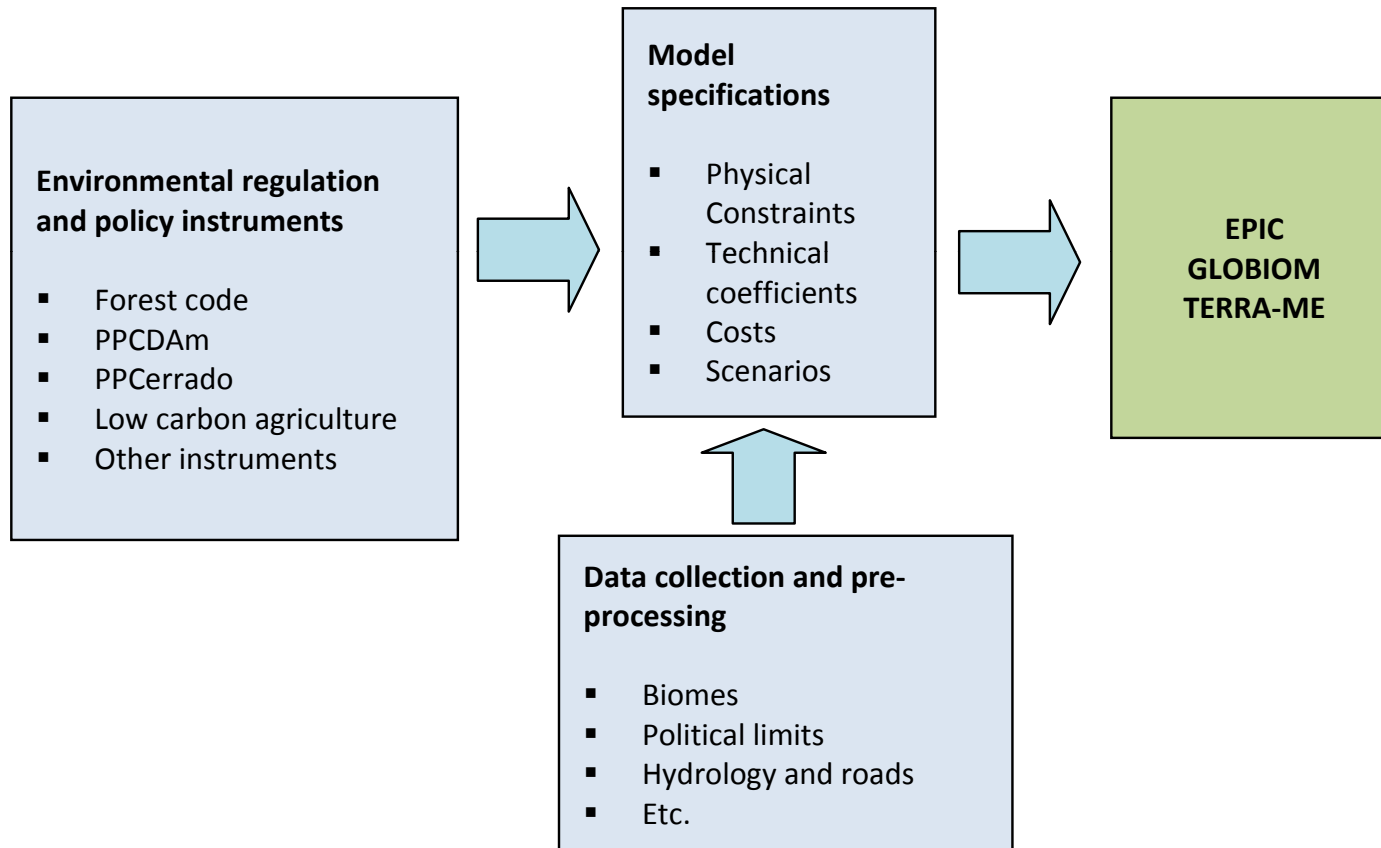
# Policy Considerations for LUCC Models

- 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

# 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

# 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
- 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)
- 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

- (a) 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

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

- 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
- One question we had is whether areas within the legal reserves can be used for economic activities related to commercial forestry?

# 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
- Question: what kind of activities (if any) are allowed inside the APP's or the areas with restricted use?

# 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 floresta' (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

# 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 planned 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 transparency 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<sup>2</sup>
- 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 important 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 its 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.

# 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

# 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

# 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 CO<sub>2</sub>
- According the country's commitment, the reduction would be somewhere between 975 and 1,052 million tons of CO<sub>2</sub>
- 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 m<sup>3</sup>



# 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

# 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
- Questions (to discuss in the afternoon?):
  - 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
- Initially, two axes for REDD implementation: command and control versus incentives

# Scenarios for REDD in Brazil

Two axes:

- 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)

Command & Control	CC	CC + PES
	Business as Usual	PES
	Incentive	

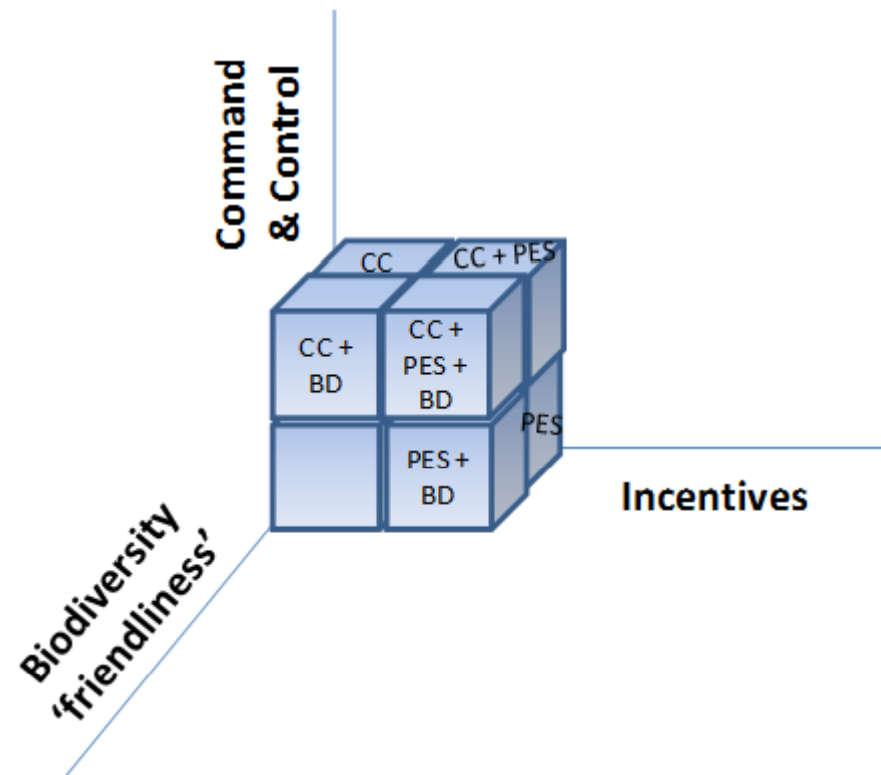
# Scenarios for REDD in Brazil – Including Biodiversity

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

Nonetheless, 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)

# Topics for Discussion

- Which policy instruments and institutional arrangements are the most important for land use change/cover models?
- Which instruments and arrangements are the most likely not to be implemented in practice?
- Other policies to be considered for assessment? Are other arrangements we do not know of?
- Payment for environmental services – how is this going to evolve in Brazil?
- Possible sources of information?
  - GIS data (indigenous land, protected areas etc.)
  - Technical coefficients (productivity, costs, inputs for different crops, livestock, per region, etc.)
  - Tax incidence per class of establishment
- For the ABC plan:
  - Which methods in the ABC plan are more likely to work?
  - Which methods are more likely not to be adopted?
  - Possible sources of data?

## Topics for Discussion

- We want GLOBIOM and other LUCC models do be used for policy impact assessment in Brazil:
  - what other policies are important to be evaluated with analytical instruments?

