The Economics of Ecosystems and Biodiversity

TEEB for Agriculture & Food

Global Symposium, February 2019

Applying the TEEBAgriFood Framework to Beef Cattle and Soybeans in the Brazilian Amazon

26 February 2019, Nairobi

Supported by:

Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

based on a decision of the German Bundestag

European Commission

GLOBAL ALLIANCE FOR THE FUTURE OF FOOD

The Economics of Ecosystems & Biodiversity

Image credit: Anup Deodar

Objectives of TEEBAgriFood Framework Test

1) Farming typology comparison

- Evaluation of externalities arising from operations at different scales and enterprise mixes from smallholder cattle raising to large-scale ranching in the Brazilian Amazon

2) Alternative policy scenario evaluation

- Evaluation of the impact of “Business-as-Usual” (BAU) practices in large-scale soybean/maize and the range of scales in cattle ranching on natural and human capital and associated flows;
- Simulation of response by actors in value chain to adjustment in financing to reward restoration of degraded landscapes coupled with livestock intensification and integrated crop-livestock-forest systems

Scope of Framework Test

QUESTIONS

1. What factors motivate a conversion from ‘conventional’ to ‘good practices’?
2. What externalities are currently internalized by at least some actors in value chains and which remain “invisible”?
3. What change in rural credit terms might incentivize an increased adoption of ‘good practices’?

METHODS

✓Literature search (~200 references) sorted by stock, flow, value chain stage

✓Questionnaire design and interviews with key informants in each sector

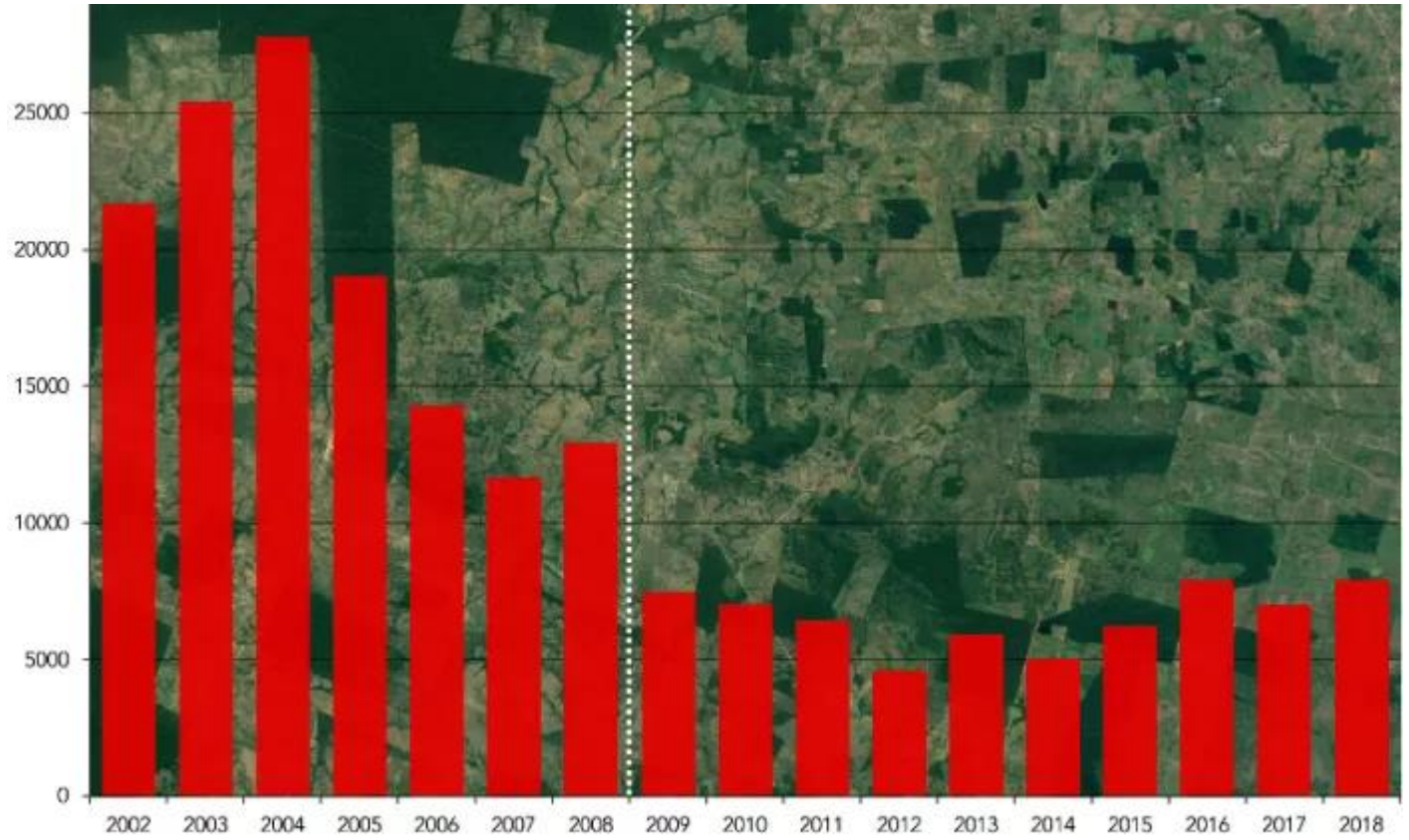
✓Fieldwork in Mato Grosso and interviews with producers, processors, traders, bankers and certifiers

✓“Mystery client” at banks in Northern Mato Grosso to identify access to low carbon credit facility

Geographical Focus: Brazilian Amazon and transitional Cerrado in Mato Grosso

- The Amazon biome constitutes the world's largest contiguous tropical forest
- Benefits of BES for people remain largely unmeasured and undervalued

A consequence of agribusiness expansion



- Deforestation, brought under command and control policies from 2008-2012 is on the rise again as market forces reign and regulation is relaxed (source: Mongabay)

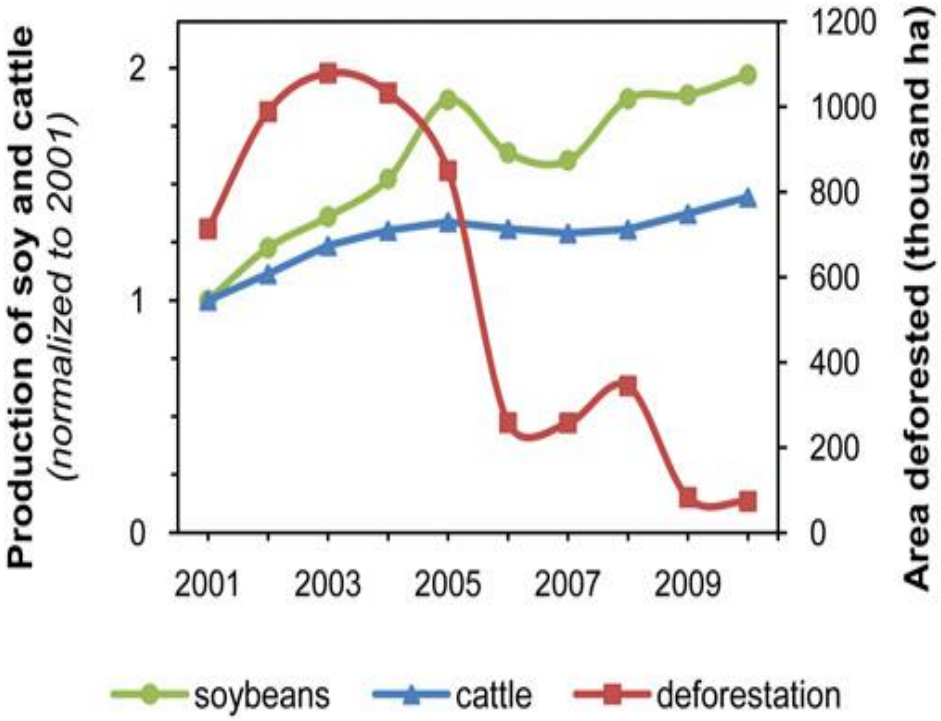
Decoupling: wishful thinking or land sharing?

Prevailing technological fix: intensify land use by pasture renewal/enrichment and integration with crops and trees

→ 11.5 million ha in iLP(F) in 2017

→Net rents grow within environmental constraints on private properties (Forest Code)

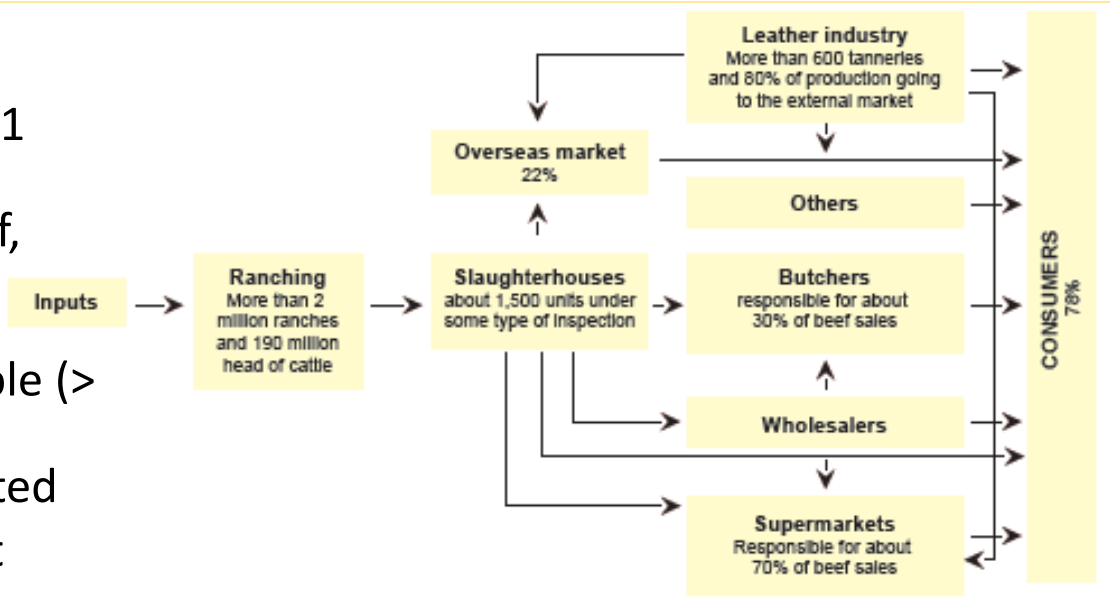
→Forest sparing in protected areas and indigenous/extractive reserves

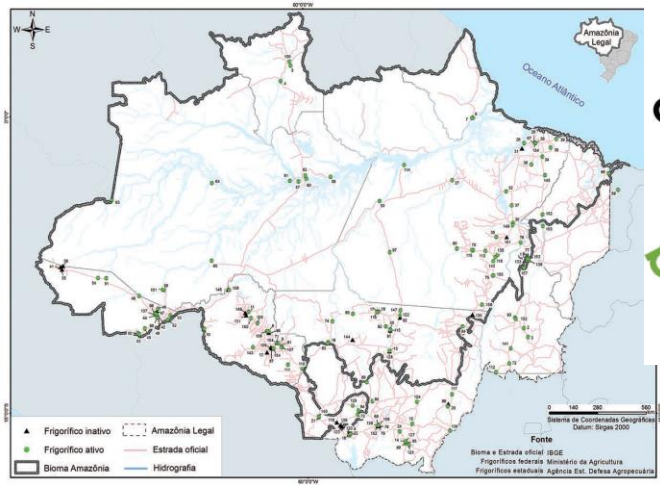


Decoupling of soybean and cattle from deforestation in Mato Grosso: 2001-2010. *Source: Macedo et al. (2012)*

Structure of beef value chain

- Extensive pasture grazing at 1.1 AU/ha, largely degraded
- Complex disorganized cow/calf, semi-confined, feedlot (15%) supply
- Small scale sourcing untraceable (> 150,000 producers in Amazon
- Foot & mouth disease eradicated
- Meatpackers and supermarket chains dominate value added
- Blame for deforestation embargoed unlicensed sources
- Labelling of sustainably sourced beef as yet ineffective despite NGO campaigns
- 78% consumed domestically
- Exports primarily China, Russia and Near East (on the hoof)



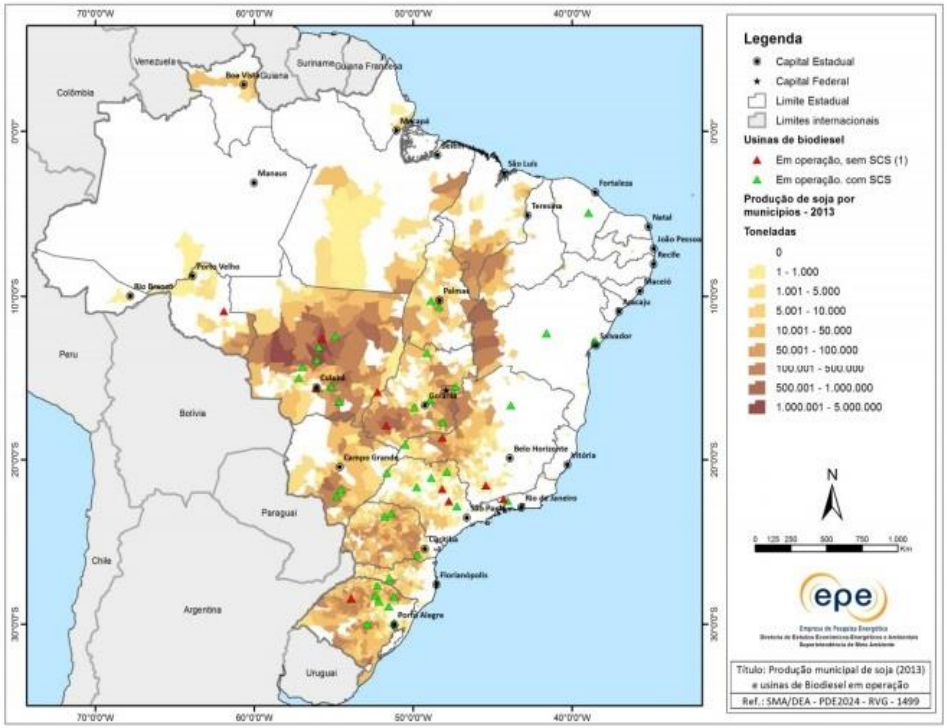


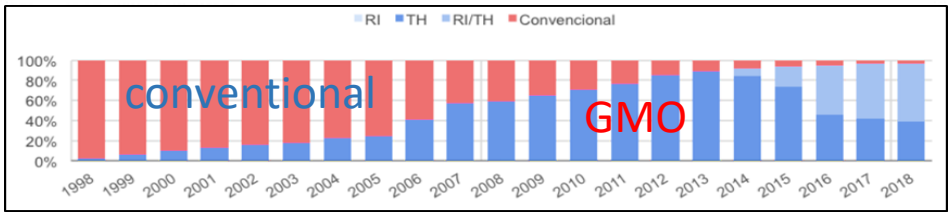
carbon neutral brazilian beef

teebweb.org

Structure of soybean value chain

- Soybeans expanded from southern Brazil to the Cerrado and then Amazonia from 1970s
- No-till cultivation nearly universalized
- Maize second crop (*safrinha*)
- Concentrated due to bulky equipment requirements, significant economies of scale
- GMO (RR) dominates, but glyphosate resistance is rising (weeds, society)
- Return to conventional varieties fluctuating with market demand (0 to 15%; premium $0 - 3/60 kg)
- Global market for animal feed (Europe, China), domestic uses for cooking oil and biodiesel
- Market for inputs, finance, products dominated by global multinationals (ADM, Bunge, Cargill etc.)





Application of the TEEBAgriFood Framework

Table 3. Summary of externalities in the TEEBAgriFood Framework		Soybean-Maize and Beef Cattle Value chains			
		Agricultural production	*Manufacturing & processing*	*Distribution & marketing*	*Household consumption*
STOCKS					
Natural capital	**Water**	Sedimentation of waterways affects potable supplies and hydroelectric facilities	Pollution of waterways from slaughterhouse and tanning waste (controlled with settling ponds in larger operations)		
	Soil	Net soil nutrient stock losses from conventional soybean tillage valued at R$ 4.46/ha/yr (Rodrigues: Goiás)			
	Air	Atmospheric GHG and particulate matter concentrations increased due to forest fires and pasture burning	Ambient air quality and atmospheric GHG concentrations increased by power use in slaughterhouses and fuelwood for crop drying	Ambient air quality and atmospheric GHG concentrations increased by agricultural product transport, primarily trucking (diesel)	
	Vegetation cover and habitat	Carbon stock loss due to deforestation: losses valued at up to US$100 ± 20/ha/yr (Strand *et al.*)	Legal conditions (TACs) on slaughterhouses to ensure suppliers obey forest code provisions on forest cover.		
	Biodiversity	Irreplaceable loss of endemic diversity and reduced species richness due to deforestation (Strand *et al.*); Threats of GMO and pesticide dependence to agrobiological diversity.		Rudimentary transport corridors without adequate land use governance threaten remaining Amazon biodiversity.	
	Other natural capital				
	Buildings				
Material cap	**Machinery and equipment**	Economies of scale in grain production imply greater investment capacity			

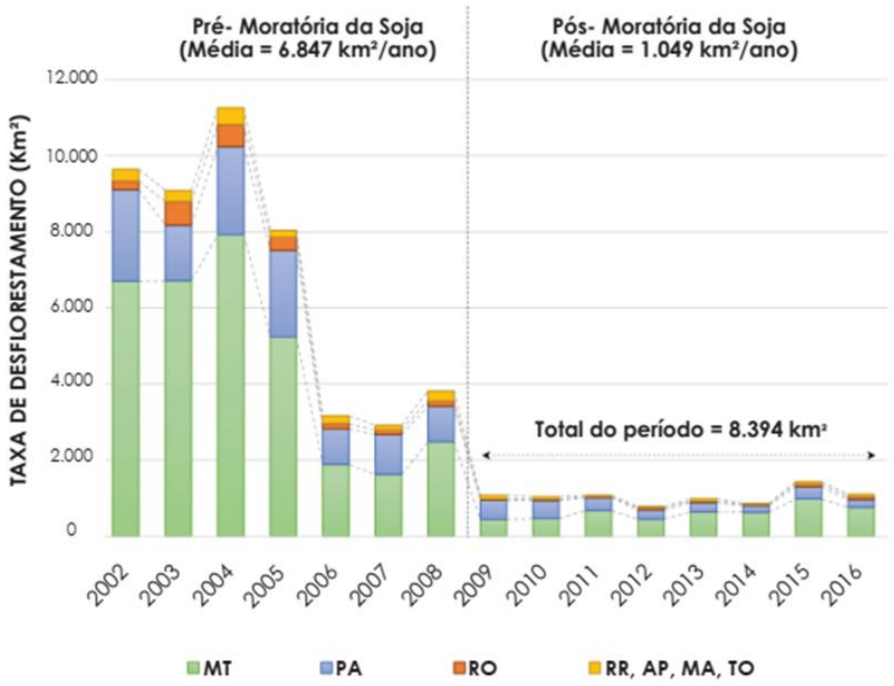
Application of the TEEBAgriFood Framework

Table 3. Summary of externalities in the TEEBAgriFood Framework		Soybean-Maize and Beef Cattle Value chains			
		Agricultural production	*Manufacturing & processing*	*Distribution & marketing*	*Household consumption*
	Infrastructure	Sedimentation of waterways and deforestation-induced climate change reduces useful life and power potential of hydroelectric facilities		Rudimentary transport corridors on dirt roadways increase costs and facilitate access to remote areas to open agropastoral frontiers, increasing deforestation.	
	Research and development				
	Finance	Banking system unsupportive of low-carbon production options in Amazonia. Purchase price premiums for conventional (non-GMO) soybeans and quality beef.			
	Other produced capital				
Human capital	**Education / skills**				
	Health / Age				
	Working conditions (decent work)	Informal labor markets predominate in North region, reducing average wages			
Social capital	**Land access/tenure (private, public and communal)**	Extensive cattle land use results in loss of land access by smallholders and reconcentration in land reform areas.			
	Food security (access, distribution)	Growing use of non-GMO soybeans responds to price premium of US$ 3/60 kg sack, approx. 15% of market	Prosecution of slaughterhouses that do not ensure sustainable sourcing	Inspectors' failure to condemn tainted beef from major meat packers led to export embargoes, reputation loss.	Concentration in beef market affects price competitiveness and consumer costs
	Opportunities for empowerment (gender and minority)				
	Social cooperation and networks/unions	Cooperation in multistakeholder roundtables			

Application of the TEEBAgriFood Framework

Table 3. Summary of externalities in the TEEBAgriFood Framework		Soybean-Maize and Beef Cattle Value chains			
		Agricultural production	*Manufacturing & processing*	*Distribution & marketing*	*Household consumption*
	Institutional strength	Rural lobby victorious in reducing environmental restrictions (Forest Code)			
	Laws and regulation (e.g. child labor)	Monitoring and legal safeguards against child labor and slavery conditions			
	Other social capital aspects				
FLOWS					
Outputs	**Agricultural and food production**	Soybean productivity mean 3.35 t/ha; Maize productivity mean 5.5 t/ha (Mato Grosso, 2017) Cattle 1.1 head/ha in pasture (Mato Grosso, 2017); Feedlot finishing increases productivity	Agricultural by-product markets (ethanol, biodiesel, hides, etc.) generate additional revenues	Complex and outmoded logistics for raw material supply; inadequate storage facilities	
	Income / operating surplus	.		Net returns to producers in beef chain are constrained by monopsony	
Purchased inputs to production	**Labour**	Housing, training and health care provided to farm workers			
	Intermediate inputs (fuel, fertilizer, etc)	Increased costs of weed control in soybeans due to herbicide resistance (R$ 120 to R$ 386/ha)		Increased logistics costs (25%) and CO_2 emissions due to road modal for 2/3 of grain transport	
Ecosystem services	**Provisioning (e.g. biomass growth, water)**	Compliance with legal reserve and permanent protection areas ensure water resource provision for on-farm needs			
	Regulating (e.g. pollination)	Pollination deficit in soybeans is responsible for losses of ~30% in productivity due to excessive pesticide use and deforestation			
Residual flows	**Food waste**	In-field crop losses are low due to harvest efficiency; animal health problematic in feedlots			Mean 128 kg / household/yr of food waste, primarily rice and beans
	Pollution and emissions (excess N & P, GHG emissions, etc.)	- Water supply costs due to sedimentation by soybean-maize erosion valued at R$ 2.13/ha/yr (Rodrigues – Goiás). Feedlot finishing reduces GHG emissions by 20% and land use change by 37% but increases water pollution discharges (Baltussen *et al*. 2016). - Respiratory health costs due to smoke inhalation from forest fires	Respiratory health costs due to smoke inhalation from crop drying	Air pollutants and CO_2 emissions due to use of diesel trucking for most grain and animal transport	

Soybean moratorium (a model for cattle?)



- European boycott of soybean fed hamburgers at McDonalds in 2006
- Brazilian soybean crushers and traders partnered with NGOs and producer associations to monitor land use change from soybeans
- Restrict purchases to areas free of deforestation since 2008
- Effective in 7-fold reduction of new soybean in former forests of the 89 municipalities which grow 97% of soybeans in Amazonia
- Coincided with other C&C policies (credit: Marcio Selva)
- But soybean area in Amazon increased by 4.5 million ha in previously cleared areas (decoupling?)
- Road, rail and waterway expansion

Outcomes for credit policy and certification

- Support for transition is driven by the financial sector, responsive by the soybean and large-scale cattle enterprises in the Cerrado
- Low-carbon agricultural credit lines exist for environmental restoration but there are few takers: most prefer pasture renovation
- Intensification funding is feasible and attractive compared to conventional borrowing when it is made available at lower interest rates (57% increase in ABC membership since the rate fell to 5.5% aa)
- Self-financing or corporate advances against harvest are primary sources of finance (85%); small scale ranchers risk averse and loath to take on credit on any terms: they prefer to invest net rents in cattle
- Difficult to find players in financial institutions in the Amazon that have an interest in lending for the purposes of the low-carbon program, or borrowers among ranchers who are resistant to spending their own or borrowed resources.
- Meatpackers and supermarkets have a fundamental role of communication with consumers, but the sustainable sourcing initiatives tested have not improved price signals or access to preferential markets for producers.
- Knowledge of impact values can be useful in formulating interventions, but the productivity and proven profitability of systems after transformation is far more convincing to producers than the estimation of true costs.

Next steps

- Peer review by selected internal/external reviewers
- Stakeholder engagement to discuss findings and intervention space
- Revision and translation for publication in English and Portuguese
- Develop communication tools
- Presentation to roundtables, coalitions, government agencies
- Interface with SEEA, EU-PI, NCC projects
- Your ideas?

Thanks for your interest!

- Peter H. May, resource economist, UFRRJ/TEEB – peterhmay@gmail.com
- Fabio Ramos, animal scientist, director - Agrosuisse
- Antonio Horta Barbosa, agronomist, grower/rancher, Mato Grosso
- Fabiano Costa, economist, Central Bank of Brazil
- Juliana Speranza, social scientist, UFRRJ
- Tomaz Lanza, agronomist, UNESP/Agrosuisse
- Eduardo Azeredo, agronomist, Agrosuisse