

# International Seminar Business Opportunities for a Sustainable Rural Economy: the contribution from forests and agriculture



## REPORT

14 – 15 May 2019



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International Policy Centre for Inclusive Growth

United Nations Development Programme and the United Nations Children's Fund

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**REPORT**

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**International Seminar Business Opportunities  
for a Sustainable Rural Economy:  
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Brasília, 14 –15 May 2019

## LIST OF ACRONYMS

<b>Abiove</b>	Brazilian Association of Vegetable Oil Industries
<b>ADI</b>	Direct Action of Unconstitutionality
<b>Anec</b>	National Association of Cereal Exporters
<b>APP</b>	Area of Permanent Preservation
<b>BNDES</b>	National Social and Economic Development Bank (Brazil)
<b>CAR</b>	Rural Environmental Registry
<b>Cepea</b>	Centre for Advanced Studies in Applied Economics
<b>CPI</b>	Climate Policy Initiative
<b>Conab</b>	National Supply Company
<b>Conama</b>	National Council for the Environment
<b>Corsia</b>	Carbon Offsetting and Reduction Scheme for International Aviation
<b>CRA</b>	Environmental Reserve Quota
<b>Deter</b>	System for the Real-Time Detection of Deforestation
<b>ECLAC</b>	Economic Commission for Latin America and the Caribbean
<b>EMBRAPA</b>	Brazilian Agricultural Research Corporation
<b>ETS</b>	Emissions Trading Systems
<b>Fase</b>	Federation of Organisations for Social and Educational Assistance
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FIP</b>	Forest Investment Programme
<b>FIP CAR</b>	Project for the Environmental Regularisation of Rural Properties in the Cerrado
<b>FREL</b>	Forest Reference Emission Level
<b>Funbio</b>	Brazilian Fund for Biodiversity
<b>GHG</b>	Greenhouse gas
<b>GIZ</b>	German Cooperation Agency ( <i>Gesellschaft für Internationale Zusammenarbeit</i> )
<b>IBAMA</b>	Brazilian Institute of the Environment and Renewable Natural Resources
<b>IBGE</b>	Brazilian Institute of Geography and Statistics
<b>ICAO</b>	International Civil Aviation Organization
<b>IFN</b>	National Forest Inventory
<b>IIASA</b>	International Institute for Applied Systems Analysis
<b>iLPF</b>	Agriculture–Livestock–Forestry Integration

<b>INCRA</b>	National Institute of Colonization and Agrarian Reform
<b>INPE</b>	National Institute for Space Research
<b>IPAM</b>	Amazon Environmental Research Institute
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>LCA</b>	Agribusiness Credit Letter
<b>MAPA</b>	Ministry of Agriculture, Livestock and Supply
<b>MCTIC</b>	Ministry of Science, Technology, Innovation and Communications
<b>MMA</b>	Ministry of the Environment
<b>NDCs</b>	Nationally-Determined Contributions
<b>NGO</b>	Non-governmental organisation
<b>OECD</b>	Organization for Cooperation and Economic Development
<b>PAP</b>	Agriculture and Livestock Plan
<b>PRA</b>	Environmental Regularisation Programme
<b>PSA</b>	Payment for Environmental Services
<b>PCI</b>	Preserve, Conserve, Include strategy
<b>PLANAVEG</b>	National Plan for the Recovery of Native Vegetation
<b>PNA</b>	National Adaptation Plan
<b>PPCDAm</b>	Plan for the Prevention and Control over Deforestation in the Legal Amazon
<b>Prodes</b>	Project for the Satellite Monitoring of the Amazon Forest
<b>Pronaf</b>	National Programme for the Strengthening of Family Farming
<b>REM</b>	REDD Early Movers project
<b>SEEG</b>	System for Estimating Gas Emissions
<b>SEMA</b>	Secretariat of the Environment
<b>Senar</b>	National Rural Learning Service
<b>SFB</b>	Brazilian Forest System
<b>SICAR</b>	National Environmental Rural Registration System
<b>SINAFLOR</b>	National Source Control System for Forest Products
<b>TAC</b>	Terms of Adjustment of Conduct
<b>TNC</b>	The Nature Conservancy
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>ZARC</b>	Agricultural Zoning for Climate Risk
<b>WWF</b>	World Wide Fund for Nature

## 1 INTRODUCTION

The pressing demands of climate change, biodiversity loss and environmental degradation, combined with the rising global demand for food, fuel and fibres, create significant opportunities and economic challenges for the rural sector. Brazil, the steward of the largest tropical forest in the world and one of the main agricultural producers, has achieved relative success in reducing emissions of greenhouse gases (GHGs) through its policies to reduce deforestation in the Amazon.

In this context, international experts and representatives from the Brazilian government, the private sector, civil society and academia gathered to study new opportunities for sustainable businesses for the Brazilian rural sector, and to identify strategies and challenges to develop them, at the international Seminar “Business Opportunities for a Sustainable Rural Economy: Contributions from Forests and Agriculture”, held on 14-15 May 2019, at the headquarters of the Institute for Applied Economic Research (Ipea), in Brasília, Brazil.

Under the scope of the Paris Accord on climate change and the pressing need for the acknowledgment of public and private concerns about environmental sustainability, renowned experts discussed three main aspects related to the development of a sustainable economy:

1. Multilateral investments are being channelled into Brazil and other countries as a way of recognising efforts related to the mitigation of climate change effects through reductions in deforestation. Experts investigated how best to increase investments in forest conservation efforts.
2. The main international governments and corporations are increasingly keen to distance their activities from deforestation, for example in their supply chains and in the supply of agricultural commodities, timber products and biofuels. The Seminar included discussions of how Brazil could position itself as a country with sustainable and preferential supply.
3. As emissions trading systems become more mature in many countries and in global economy, and as international cooperation for the mitigation of climate change expands under the Paris Accord, the Seminar sought to reflect if—and how—Brazil can potentially engage these systems.

The first day of the Seminar was focused on discussing Brazil’s potential business opportunities to be developed from emergent carbon markets and their limitations, sustainable supply chains and new multilateral investments linked to environmental results.

In the second day, experts explored ways for the country to enjoy these new business opportunities by using and improving existing public policies. Panels addressed opportunities in the Brazilian Forest Code and in Nationally-Determined Contributions (NDCs) under the Paris Accord. They also investigated how rural credit can simultaneously foster agricultural production and environmental protection, discussing some of the biophysical aspects of forest conservation in agriculture.

Challenges include the improvement of command and control regulations and the creation of appropriate incentives, institutions and legislation.

## 2 OBJECTIVE

The purpose of the Seminar was to gather renowned Brazilian and international experts, as well as representatives from the private sector and the government, to debate new sustainable business opportunities for the Brazilian rural sector, as well as strategies to seize them and related challenges.

Attending the event were representatives from the Brazilian governments and institutions such as: the Ministry of Economy; the Ministry of Foreign Relations; the Ministry of Agriculture, Livestock and Supply; Agroicone; the Brazilian Association of Vegetable Oil Industries (Abiove); the Brazilian Central Bank (BACEN); the National Bank for Social and Economic Development (BNDES); the Centre for Studies on Sustainability of the Getúlio Vargas Foundation (FGVces); the International Policy Centre for Inclusive Growth (IPC-IG); the Climate Policy Initiative; *Coalizão Brasil Clima, Florestas e Agricultura*; the Economic Commission for Latin America and the Caribbean (ECLAC); the Environmental Defense Fund (EDF), the Brazilian Agricultural Research Corporation (EMBRAPA); the Produce, Conserve Include (PCI) initiative for the State of Mato Grosso; the Federation of Organisations for Social and Educational Assistance (FASE); KfW; the World Bank; BVRio, the Institute for Advanced Studies of the University of São Paulo (IEA-USP); the International Institute for the Analysis of Applied Systems (IIASA); the National Institute for Space Research (INPE); the Amazon Environmental Research Institute (IPAM); the Institute for Applied Economic

Research (Ipea); the Pontifical Catholic University of Rio de Janeiro (PUC-RIO); the Office of the Attorney General of the Federal Prosecution Service (PGR/MPF); the Brazilian Forest Service (SFB); the Federal University of Minas Gerais (UFMG); and Tufts University.

### 3 ORGANISERS

The International Seminar Business Opportunities for a Sustainable Rural Economy: the contribution from forests and agriculture was jointly organised by:

- [Institute for Applied Economic Research \(Ipea\)](#)
- [Environmental Defense Fund \(EDF\)](#)
- [International Policy Centre for Inclusive Growth \(IPC-IG\)](#)

### 4 TARGET AUDIENCE

The target audience for the Seminar and this report includes researchers, civil servants, policymakers, representatives from embassies, international organisations, rural producers and producers’ associations, journalists and civil society in general, who are interested in the themes of sustainable rural development, agriculture, forestry, the environment climate change, and other related issues.

### 5 AGENDA

#### Day 1 – What are the new business opportunities for a sustainable rural economy?

##### Opening

9:00 – 9:15	Opening session: Seminar goals and expected outcomes	Ipea, EDF and IPC-IG	<ul style="list-style-type: none"> <li>• Aristides Monteiro Neto, Director of the Directory of Studies and Regional, Urban and Environmental Policies/Ipea;</li> <li>• Ruben Lubowski, Chief Natural Resources Economist /EDF, Diana Sawyer, Senior Research Coordinator/IPC-IG</li> </ul>
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##### Panel 1 – How should the rural economy be in the future?

**Moderator:** Dr. Regina Sambuichi, DIRUR researcher, Ipea

9:15 – 9:30	<b>Towards efficient land use in Brazil</b>	PUC-Rio and CPI	Juliano Assunção
9:30 – 9:45	<b>Vision 2030-2050: The future of forests and agriculture in Brazil</b>	Coalizão Brasil and IPAM	André Guimarães
9:45 – 10:00	<b>Amazon 4.0</b>	Institute of Advanced Studies of the University of São Paulo (IEA-USP)	Carlos Nobre
10:00 – 10:30	<b>Panel conclusions and Q&amp;A session</b>	Ipea	Regina Sambuichi



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## Panel 2 — How can Brazil benefit from emerging climate markets? The role of forest and carbon assets

**Moderator:** Dr. Rogério Boueri, Undersecretary for Agricultural Policy and the Environment, Bureau of Economic Policy, Ministry of Economy (ME)

10:45 – 11:00	<b>International markets for the reduction of carbon emissions: opportunities and challenges</b>	EDF	Ruben Lubowski
11:00 – 11:15	<b>Considerations about carbon stocks and biomass: mitigation through biofuels, reforestation and soil carbon <i>vis-à-vis</i> the reduction of fossil fuel emissions</b>	Ipea	Gustavo Luedemann
11:15 – 11:30	<b>CONSERV: Conservation in private areas</b>	IPAM	Marcelo Stabile
11:30 – 11:45	<b>Capacities of INPE monitoring systems for public policies related to forestry and agriculture</b>	INPE	Cláudio Almeida
11:45 – 12:15	Panel conclusions and Q&A session	Ministry of Economy	Rogério Boueri

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## Panel 3 — How can Brazil and companies in the country build large-scale, mutually beneficial and sustainable production chains?

**Moderator:** Dr. Camila Gramkow, Officer for Economic Affairs, ECLAC Brazil Office

14:00 – 14:15	<b>The Produce, Conserve, Include (PCI) programme in Mato Grosso</b>	PCI Strategy	Fernando Sampaio
14:15 – 14:30	<b>Sustainability in the Brazilian soybean production chain</b>	ABIOVE	Bernardo Pires
14:30 – 14:45	<b>The beef production chain</b>	MAPA	Mariane Crespolini
14:45 – 15:00	<b>Sustainability indicators</b>	Ipea	Regina Sambuichi
15:00 – 15:15	<b>Economic and environmental challenges of beef and soybean production chains</b>	Consultant FASE	Sérgio Schlesinger
15:15 – 15:45	Panel conclusions and Q&A session	ECLAC	Camila Gramkow

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## Panel 4 — How can Brazil expand existing opportunities for multilateral investments?

**Moderator:** Renato Lombardi, Adviser of the Department of the Environment of the Ministry of External Relations (MRE)

16:00 – 16:15	<b>The Amazon Fund</b>	BNDES	Daniela Baccas
16:15 – 16:30	<b>KfW—REM (REDD Early Movers)</b>	KfW	Miguel Lanna
16:30 – 16:45	<b>The Forest Investment Programme (FIP)</b>	SFB	Jaine Ariély Cubas Davet
16:45 – 17:15	Panel conclusions and Q&A session	MRE	Renato Leonardi
17:15 – 17:45	Key outputs from the first day of the Seminar	PUC-Rio and CPI, Coalizão Brasil and IPAM	Juliano Assunção and André Guimarães

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## Day 2 – How can Brazil seize new business opportunities using existing public policies?

### Panel 5 – What opportunities are offered by the Forest Code?

**Moderator:** Dr. Flavia Witkowski Frangetto, Ipea

9:00 – 9:15	<b>The 2012 Forest Code: Institutional and legal frameworks</b>	CPI and PUC-Rio	Joana Chiavari
9:15 – 9:30	<b>Deciphering the Brazilian Forest Code</b>	UFMG	Raoni Guerra Lucas Rajão
9:30 – 9:45	<b>The Environmental Reserve Quota market (CRAs)</b>	BVRio	Beto Mesquita
9:45 – 10:15	Panel conclusions and Q&A session	Ipea	Dr. Flavia Witkowski Frangetto

### Panel 6 – What are the opportunities afforded by Nationally-Determined Contributions (NDCs)?

**Moderator:** João Francisco Adrien Fernandes, Chief Adviser for Socioenvironmental Issues, Ministry of Agriculture, Livestock and Supply (MAPA)

10:30 – 10:45	<b>The Paris Accord and the NDCs: Insights from the GLOBIOM—Brazil model</b>	IIASA	Aline Soterroni
10:45 – 11:00	<b>The cost of forest restoration in Brazil and compliance with the Forest Code</b>	IPAM	Felipe Lenti
11:00 – 11:15	<b>Restoration of damaged pastures and integrated agriculture-livestock-forest systems (iLPP)</b>	EMBRAPA	Luiz Adriano Maia Cordeiro
11:15 – 11:45	Panel conclusions and Q&A session	MAPA	João Francisco e Adrien Fernandes

### Panel 7 – What are the existing financing mechanisms in Brazil?

**Moderator:** João Ferrari Neto, Sub-unit chief, Derop/Diore, Regulation, Inspection and Control Department of Rural Credit and Proagro, Central Bank of Brazil

13:45 – 14:00	<b>Rural Credit and insurance</b>	CPI and PUC-Rio	Priscila Souza
14:00 – 14:15	<b>ABC Programme—low-carbon agriculture</b>	Agroicone	Leila Harfuch
14:15 – 14:30	<b>Challenges of the banking sector</b>	FGVces	Camila Yamahaki
14:30 – 14:45	<b>Rural Credit in Brazil</b>	Ministry of Economy	Francisco Erismá
14:45 – 15:15	Panel conclusions and Q&A session	Central Bank	João Ferrari Neto

### Presentation by Dr. Sandra Verônica Cureau, Associate Federal Prosecutor General (PGR), Federal Prosecution Service (MPF)

**Moderator:** Dr. Flavia Witkowski Frangetto, Ipea

15:30 – 15:50	<b>Rights and safeguards at the heart of Brazil's Forest Code and Constitution</b>	Associate Federal Prosecutor General/MPF	Dra. Sandra Verônica Cureau
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### Panel 8 – What are the biophysical impacts of forest protection on agriculture?

**Moderator:** Breno Pietracci, Economist, EDF

15:50 – 16:05	<b>Valuing local benefits provided by native vegetation to the agricultural sector in Brazil</b>	Tufts University	Avery Cohn
16:05 – 16:20	<b>Mapping the value of the Brazilian Amazon Rainforest</b>	World Bank	Jon Strand
16:20 – 16:35	<b>Adaptation to climate change in agriculture</b>	EMBRAPA	Giampaolo Queiroz Pellegrino



16:35 – 16:50	<b>The magic of the Amazon: a river that flows invisibly around us</b>	INPE	Antonio Donato Nobre
16:50 – 17:20	Panel conclusions and Q&A session	EDF	Breno Pietracci
17:20 – 17:40	Key outputs from the second day of the Seminar	EDF, Ipea	Ruben Lubowski and Breno Pietracci, EDF, Gustavo Luedemann, Ipea
17:40 – 18:00	Final remarks, conclusions and next steps	EDF, Ipea	Ruben Lubowski and Breno Pietracci, EDF, Gustavo Luedemann, Ipea

## 6 SPEAKER BIOS

### Aline Soterroni

Aline Soterroni joined the Ecosystem Services and Management Programme (ESM) of the International Institute for the Analysis of Applied Systems (IIASA) as a research fellow in June 2016. Dr. Soterroni holds a Master's and a PhD in Applied Computing from the National Institute for Space Research (INPE). Her academic background is in applied mathematics and computing, with a special focus on optimisation techniques. Since 2012, she has contributed to the development of the regional version of the GLOBIOM-Brazil model under the umbrella of the REDD-PAC project, which was carried out in partnership between the IIASA and INPE. Dr. Soterroni worked on the standardisation of data relative to land-use changes in the model, the adaptation of model variables to capture Brazil's specificities and the planning of future land-use policy scenarios for the country, especially the new Forest Code. In the ESM group, she will contribute towards the continuous development of GLOBIOM-Brazil and other regional studies.

### André Guimarães

André Guimarães holds a Bachelor's degree in Agronomy from the University of Brasília (UnB) and a Master's in agricultural economy from Cornell University. He started his career at the Institute of the Man and Environment of the Amazon (Imazon), where he worked as a senior researcher (1992-1993) and Executive Director (1994-1995) and currently acts as the president of its Deliberative Council. As a Project Manager at the World Bank (1997-2000), he worked on the pilot programme for the Protection of Brazil's Tropical Forests (PPG7) and was an executive at the Prototype Carbon Fund (PCF). Between 2000 and 2002, he was the Director at A2R Fundos Ambientais, a company acting in the financial market, where he developed the Clean Tech Risk Capital Fund (CTF). From 2002 to 2009, he structured and directed the BioAtlântica Institute (IBio), an NGO resulting from a partnership between Brazilian corporations (Petrobras, Aracruz, Furnas, Veracel, Dupont, among others) and international environmental NGOs (CI and TnC). From 2009 to 2011, he was the CEO of Brazil Forests, a company focused on forest conservation and restoration. Between 2012 and 2015, he worked at Conservation International, initially as Vice-President for Brazil (2012-2014) and then as Vice-President of Development for the Americas Division (2014-2015). Today, he is the Executive Director of the Amazon Institute for Environmental Research (IPAM). He also acts as facilitator of the Brazilian Coalition on Climate, Forests and Agriculture, a network of over 200 entities from various sectors, which develops proposals for sustainable land use in Brazil. André has various publications, from books and scientific articles to opinion pieces in broad media, and actively participates in several forums and national and international conferences on the environment, sustainable development and related themes.

### Antonio Donato Nobre

Antonio Donato Nobre is active in the dissemination and popularisation of science on themes such as the biotic pump of atmospheric moisture and its importance for the valuation of large forests, and the flying rivers, which transfer moisture from the Amazon basin to productive regions in Brazil. He also works on the scientific and technological innovation agenda, leading the development of the new HAND model, applied to terrain mapping, subterranean hydrology and flooding risk

prediction. He was the rapporteur of studies on the Forest Code developed by the SPBC and the Brazilian Academy of Sciences. He holds a Bachelor's degree in Agronomy from the University of São Paulo (1982), a Master's degree in Tropical Biology (Ecology) from the Amazon National Research Institute (1989) and a PhD in Earth System Sciences (Biogeochemistry) from the University of New Hampshire (1994). He was the principal researcher at the Amazon National Research Institute for 33 years, and he is currently principal researcher at the Earth System Science Centre at the National Institute for Space Research, where he previously worked as research fellow for 15 years and leads the terrain modelling working group. He has experience in the fields of Ecology and Geosciences, with a focus on Biogeochemistry, acting mainly on the following themes: evolution of life on earth, forest ecology, carbon cycle, greenhouse gas effect, atmosphere-biosphere relations, hydrology, climate and global changes, remote sensing, mathematical landscape modelling and land-use planning employing digital terrain models, aerial river climatology in Lagrangian cycles. He was a member of the Scientific Committee of the Global Carbon Project (IGBP-GCP) and of the Global Canopy Programme Committee (GCP-WFO); he was a member of the scientific committee for the Large-Scale Experiment of the Biosphere-Atmosphere in the Amazon (LBA) and participated in the Terrestrial Carbon Observations Panel (GTOS-TCO). He is active in various topics in the Amazon sustainable development agenda.

### **Aristides Monteiro Neto**

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Aristides Monteiro Neto has been a Ipea researcher since 1997. He holds a Master's degree in Economics from the Federal University of Pernambuco (UFPE) and a PhD from Unicamp. He is a professor at Ipea's Postgraduate Course in Public Policies and Development and a specialist in regional development and federalism. Aristides is the Coordinator for Regional and Federative studies at DIRUR/Ipea and was chief adviser at Ipea's Advisory for Planning and Institutional Articulation (2012-2013). He was also the Secretary for Science, Technology and the Environment of the government of Pernambuco (2007-2009). He has published various specialised papers on regional policies. He is currently the Director of Regional, Urban and Environmental Studies (DIRUR) at Ipea.

### **Avery Cohn**

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Avery Cohn is an Assistant Professor at the Department of Agriculture, Food and Environment and the Friedman School of Nutrition Science and Politics of Tufts University. He also teaches at the Fletcher School of Law and Diplomacy at Tufts University. He researches interactions between man and environment, especially challenges posed by global environmental change. A significant portion of Avery's work has focused on strategies for land systems to continue playing a crucial role in meeting human needs and maintaining the Earth's vital functions. He has worked extensively in Brazil and has developed additional research at the global level, focused on nations and regions in the developing world. His current research explores the ecosystem conservation as a strategy to avoid environmental risks, the role of agricultural and food systems in meeting climate goals, the perspectives of limiting climate risks according to rural and urban livelihoods in less-developed countries and the environmental and social consequences of changing food habits.

### **Beto Mesquita**

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Beto Mesquita is a forestry engineer, with a PhD in Environmental and Forest Sciences. He is the Director of Policies and Institutional Relations at BVRio. He has acted in the third sector for 25 years, being responsible for the implementation of projects on protected areas, forest restoration, public policies, intersectoral dialogues and initiatives by numerous actors, with various publications on these themes. He has held relevant positions in national and international organisations, and is a member of the Strategic Group of the Brazilian Coalition on Climate, Forests and Agriculture, of the Board for the Coordination of Forest Dialogue, of the Deliberative Council of the Brazil Conservation Fund and of the Editorial Board of the O Eco website.

### **Bernardo Pires**

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Bernardo Pires has been the Sustainability Manager of the Brazilian Association of Vegetable Oil Industries (ABIOVE) since 2009. He has acted as Coordinator of the National Recycling Programme for packaging and cooking oil, Coordinator of the Verde de Grãos Protocol, National Coordinator for the Soja Plus Programme, Technical Coordinator for the Cerrado Working Group and Technical Coordinator of Soy Moratorium. His professional experience includes a position as Environmental Coordinator

at Veracel Celulose (2007–2009), Environmental specialist at the Ministry of the Environment (2001–2007) and Environmental Analyst at the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA, 2001). Bernardo holds a Master's degree in Forest Sciences (2000) and a Bachelor's degree in Forestry Engineering (1997) from the Federal University of Viçosa.

## **Breno Pietracchi**

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Breno Pietracchi is an economist with the Environmental Defense Fund, where he carries out research on environment economics and economic development. He holds a PhD in Economics from the Università Ca'Foscari di Venezia, and a post doctorate degree from the Department of Economics of PUC-Rio, in the Climate Policy Initiative. He also holds a Master's in Administration from PUC-Rio, a postgraduate degree in Economics and Finance from Venice International University and a Bachelor's degree in Economic Sciences from the Federal University of Rio de Janeiro.

## **Camila Gramkow**

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Camila Gramkow holds a Bachelor's degree in Economics from the University of São Paulo (USP), with a Master's in Economics from the Federal University of Rio de Janeiro (UFRJ) and a PhD in the Economics of Climate Change from East Anglia University. She has worked with sustainable development for over a decade, having acted in the third sector, academia and international cooperation. She worked on over 20 technical cooperation projects and has published over a dozen articles in the field. She is currently an Officer for Economic Affairs at the Brazil Office of the United Nations' Economic Commission for Latin America and the Caribbean (ECLAC).

## **Camila Yamahaki**

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Camila Yamahaki is a Senior Researcher of the Sustainable Finances Programme of the Centre for Studies on Sustainability of the Business Administration School of the Getúlio Vargas Foundation (FGV-EAESP). She holds a Bachelor's degree in Public Administration from FGV-EAESP, a Master's in Corporate Social Responsibility from the University of Nottingham, a Master's in Research Methods and a PhD in Administration from Middlesex University. In her doctoral thesis, she explored the theme of investor engagement in emergent markets. Camila has a vast experience in sustainability and responsible investment, having acted in organisations such as Trench, Rossi & Watanabe, SESI, AccountAbility, UK Sustainable Investment and Finance (UKSIF) and Principles for Responsible Investment (PRI). She has participated in research projects on themes related to sustainability, private social investment and responsible investment. Camila has had her articles published in the *Corporate Governance: an International Review* and *Business Ethics: an European Review* journals, in addition to book chapters in *The Routledge Handbook of Responsible Investment* and *The World Guide to CSR*.

## **Carlos Nobre**

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Carlos Nobre is a Brazilian climatologist. He holds a Bachelor's degree in Electronic Engineering from the Technical Institute of Aeronautics (ITA) and a PhD in Meteorology from the Massachusetts Institute of Technology (MIT). He has dedicated his scientific career to the Amazon and to climate research at the Amazon National Research Institute (INPA) and the National Institute for Space Research (INPE). Almost 30 years ago, he debuted the hypothesis of 'savannization' of the Amazon, in response to deforestation. He has been studying risks to the Amazon resulting from deforestation and climate change, as well as from the increase in forest fires. In 2016, he came up with the 'Third Amazon Way' concept as an alternative for sustainable development in the region. He was the National Secretary for Research and Development of the Ministry of Science and Technology and President of CAPES. He is a member of the National Academy of Sciences, of the Brazilian Academy of Sciences and of the World Academy of Sciences. He received the Volvo Environment Prize in 2016, the Von Humboldt Medal in 2010 and was one of the authors of the Intergovernmental Panel on Climate Change—Fourth Assessment Report (AR4), awarded with the Nobel Peace Prize in 2007. He is currently a senior researcher at the Advanced Studies Institute at USP, the Scientific Coordinator of the Climate Studies of the Federal University of Espírito Santo (UFES) and President of the Brazilian Panel for Climate Change.

## Cláudio Almeida

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Cláudio Almeida holds a Bachelor's in Agronomy from the Rural Federal University of Rio de Janeiro (1992), a Master's in Remote Sensing by INPA (2008) and a PhD in Geomatics by Université de Montpellier (2016). He is a senior technologist at INPA and one of the creators of the TerraClass project. He implemented the position and was the chief of the Amazon Regional Centre at INPE between 2008 and 2012. He is currently the Coordinator of the Programme for the Monitoring of the Amazon and other Biomes.

## Daniela Baccas

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Daniela Baccas works at Brazil's National Economic and Social Development Bank (BNDES). She has worked in projects and initiatives related to the environment since 2009, such as the Amazon Fund, Green Finances, Forest Restoration, Climate Change and Corporate Socioenvironmental Responsibility. She holds a Bachelor's degree in Law from USP and is a specialist in Environmental Rights (PUC-RIO) and is Chief of the Department for the Environment and Management of the Amazon Fund at BNDES.

## Diana Sawyer

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Diana holds a Doctor of Science degree in Population Sciences from Harvard University, USA (1980). She has been working as a Senior Researcher and Research Coordinator at the IPC-IG since 2009, after she left her position as Director of the Department of Evaluation and Monitoring of the Ministry of Social Development and Fight against Hunger (SAGI-MDS). Some highlights of her academic career include: Adjunct Professor at the Center for Latin American Studies, University of Florida, Gainesville (1981); Visiting Researcher at the Yale University School of Medicine (1990–1991) and at the Office of Population Studies, Princeton University, USA (1995–1996). She spent most of her academic career at the Federal University of Minas Gerais (UFMG), Brazil, from where she holds the title of Professor Emeritus. Her areas of expertise are: demographic analysis, population and public policies, design and implementation of integrated M&E systems for social programmes, as well as methodologies for quantitative impact evaluation and poverty and vulnerability studies.

## Fernando Sampaio

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Fernando Sampaio holds a Bachelor's degree in agricultural engineering from the Luiz de Queiroz Higher School of Agriculture of the University of São Paulo (ESALQ/USP), with a specialisation in beef and dairy markets from the École Supérieure d'Agriculture d'Angers. He worked in the international beef market in France, at the Société des Viandes Bretagne Anjou–Soviba, in 2000–2001, and in Meat Import Zandbergen Brothers BV from 2001 to 2008. In 2009, he took over the sustainability coordination of the Brazilian Association of Meat-Exporting Industries (ABIEC) and was its Acting Director from 2011 to 2016, acting in the institutional representation of the sector, in international negotiations and in commercial promotion, while giving continuity to the sustainability agenda. He participated in the construction of the Working Group for Sustainable Livestock Ranching (GTPS), a multi-stakeholder initiative, of which he was President in 2015–2016. He also participated in the Council of the Global Roundtable for Sustainable Beef (GRSB) and the Sustainability Committee of the International Meat Secretariat (SMS). In October 2016, he took over the position of Executive Director of the Produce, Conserve, Include Strategy (PCI) a legal sustainability initiative in the State of Mato Grosso. Since then, he has worked towards the implementation of the Strategy, which entered a new stage with the creation of the PCI Institute in early 2019.

## Felipe Eduardo Brandão Lenti

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Felipe Lenti is a Biologist (2011) with a Master's degree in Ecology (2014) and is a PhD student in the Ecology programme at UnB. He worked at Ipea in the project "Costs and Opportunities of Ecological Restoration in Brazil". In partnership with the Nature Conservancy, the German Cooperation Agency (GIZ), the World Resources Institute, the Ministry of the Environment and ESALQ/USP, he characterised the main restoration techniques used in Brazilian biomes and the costs associated with commodities and labour. He is currently a researcher at IPAM, acting in the [MapBiomas](#) project and in the [SEEG](#) initiative, where he contributes towards the production of geospatial information about the history of land coverage and land use, with a focus on analyses of gain and loss of native vegetation and associated greenhouse gas emissions/removals



## Flavia Witkowski Frangetto

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Flavia Frangetto is a lawyer, with a Master's degree and a PhD in social rights law: diffuse and collective rights (environmental law) from the Pontifical Catholic University of São Paulo (PUC-SP) and a specialist in environmental law by the Université Jean Moulin Lyon III. She is the author of "Judicial viabilisation of the Mechanism for Clean Development (MDL) in Brazil: the Kyoto Protocol and international cooperation) and of "Environmental mediation". She was a visiting research fellow of the Oxford Institute for Energy Studies (OIES) and a policy fellow of the Smith School of Enterprise and the Environment (SSEE) of the University of Oxford. She was a scientific correspondent of the United Nations Convention to Combat Desertification (UNCCD). From 2007 to 2019, she consulted for international cooperation agencies, such as the United Nations Foundation, the United Nations Development Programme, the United Nations Environment Programme and the German Cooperation Agency (GIZ). She is currently a visiting researcher at Ipea. Since April 2019, she has acted as legal consultant in the Commission for the Environment at the Brazilian Federal Senate.

## Francisco Erismá

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Francisco Erismá is a member of the Administrative Council of the Brazilian Agricultural Research Corporation (EMBRAPA), a representative councillor at the Ministry of Economy, and a member of the Administrative Council of the National Learning Service for Cooperativism (Sescoop), acting as representative councillor at the Ministry of Finance (2013–2014). He holds a Bachelor's degree in Administration from AEUDF and a Full Licentiate for Teachers of Subjects in the High School Curriculum from UnB, in addition to a specialisation in Public Finance from Ipea's Training Centre for Economic and Social Development (CENDEC).

## Giampaolo Queiroz Pellegrino

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Giampaolo Pellegrino has a Bachelor's degree in Forestry Engineering (1991) and a Master's in agronomy and agricultural environment physics from ESALQ/USP. Between 1988 and 1989, he obtained a specialisation in nuclear energy in agriculture, isotopic hydrology and carbon cycling from USP's Centre for Nuclear Energy in Agriculture (CENA). From 1993 to 2000, he worked as a tenured researcher at the Centre for Meteorological and Climatic Research Applied to Agriculture, of Campinas State University (Cepagri/Unicamp). In 2001, he received a PhD in agricultural engineering, water and soil, also by Unicamp. To obtain experience in the private sector, he resigned from Unicamp in 2001 and started working at Atech Foundation—Citric Technologies, representing the company in its cooperation with University of California and the Lawrence Berkeley Laboratory, where he pursued a postdoctoral degree in hydrological modelling. In 2005–2006, he worked as a consultant in agrometeorology and environmental planning in public and private companies in Campinas and São Paulo, including the Botanical Institute of São Paulo, Atech, Unicamp and the Brazilian Agricultural Research Corporation (EMBRAPA). In late 2006, seeking to integrate his academic/scientific and corporate experiences, he joined EMBRAPA as a researcher in climate changes in agriculture. He acted as coordinator for Nationwide Projects and Action Plans (2009–2015), president of the Management Committee of EMBRAPA's Project Portfolio on Climate Changes in Agriculture (2012–2018) and deputy chief of research and development (2015–2018). He currently conducts research on climate change and agriculture, focusing on agro-environmental modelling, vulnerability analysis, risk monitoring systems and adaptation to climate change, seeking to contribute towards the implementation of priority goals for agriculture in the National Adaptation Plan.

## Gustavo Luedemann

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Gustavo Luedemann is a Planning and Research Technician at Ipea. He has coordinated Ipea's environment division and acted as general coordinator for climate at the Ministry of Science, Technology, Innovation and Communications (MCTIC), having acted in this capacity as executive secretary of the Inter-ministerial Commission on Global Climate Change, representing the MCTIC in the Intergovernmental Panel on Climate Change (IPCC) and National Director for International Cooperation Projects, such as the Third National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) and the GEF-led project Mitigation Options. He has also consulted for international organisations such as the UNDP and the GIZ and was one of the founders of the environmental organisation Pequi—Research and Conservation of the Cerrado and of the GHG Asset company. He advises the initiative for evaluation and learning of Climate Investment Funds (CIF).

## **Jaine Ariély Cubas Davet**

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Jaine Davet holds a Bachelor's degree in Forestry Engineering by Contestado University (SC), with a specialisation in Geoprocessing Applied to Environmental Analysis and Water Resources from Ceará State University (UECE). She is the current Director of Enrolment and Forestry Fostering of the Brazilian Forest Service (FSB) of the Ministry of Agriculture, Livestock and Supply (MAPA).

## **Joana Chiavari**

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Joana Chiavari is responsible for the governance and climate legislation programme of the Brazilian Climate Policy Initiative (CPI) office, where she leads legal and institutional analysis focusing on improving the performance of land-use and sustainable infrastructure policies. Before joining CPI, she worked at the International Energy Agency (IEA), focusing on policy approaches to accelerate the adoption of clean energy technologies and low-carbon innovation. Previously, she worked on climate and energy policy issues at the Institute for European Environmental Policy (IEEP). Before that, she worked as a researcher at the Climate Change Policy and Modelling Unit of the Eni Enrico Mattei Foundation (FEEM). She also collaborated with PUC-Rio's Interdisciplinary Centre for the Environment (NIMA-JUR) in various environmental law projects, having been a Speaker at PUC-RIO's LLM Environmental Law programme since 2005. An environmental lawyer by trade, she holds a PhD in Sustainable Development Analysis and Governance from the Ca'Foscari University in Venice and a Master's in Environmental Management from the Sant'Anna de Pisa University.

## **João Ferrari Neto**

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João Ferrari Neto holds a Master's degree in Soil and Plant Nutrition from Lavras Federal University (UFLA, 1991) and a Bachelor's degree in Agronomical Engineering from Londrina State University (UFL, 1984). An employee of Brazil's Central Bank since 2000, he is currently subunit chief at the Department for Regulation, Oversight and Control of Rural Credit Operations and of Proagro (Derop/Diore). His previous professional experiences include the Cotia Agricultural Cooperative (1985-1987) and Laborsolo—Agronomical Analyses (1993–1997).

## **João Francisco Adrien Fernandes**

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João Adrien Fernandes is a rural producer in the state of São Paulo. He works as a Special Advisor of Socioeconomic Affairs at the Ministry of Agricultura, in the coordination of Ministry's strategic agenda for the sustainability of Brazilian rural production. He holds a Bachelor's degree in Economics from PUC-SP. He was Director for the Brazilian Rural Society (SRB), from 2013 to 2016, and its Executive Director until 2018. During his years heading the institution, he developed an important multisectoral platform to coordinate public policies geared towards agro sustainability.

## **Jon Strand**

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Jon Strand currently works as a consultant for the World Bank. He has accrued significant experience as a senior economist of the Research Group for Development of the World Bank's Energy and Environment Team, as the principal environmental economist of the International Monetary Fund and as an Economics professor at Oslo University, where he earned his PhD. His research focuses on the analysis of the environment, climate and energy and in the evaluation of natural and environmental resources. He has published various works in these fields. Much of his research is interdisciplinary in nature. Recently, he led an important research project at the World Bank about local and regional valuation of tropical forests in the Amazon, bringing together many natural scientists and economists.

## **Juliano Assunção**

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Juliano Assunção is Executive Director of the Climate Policy Initiative (CPI) office in Rio de Janeiro and is a professor at the Economics Department at PUC-Rio. His research focuses on various aspects of economics and development, including

agricultural economy, institutions and financial intermediation. He is a member of the Consortium on Financial Systems and Poverty of the University of Chicago and works as a consultant for companies, governments and multilateral corporations. Juliano has contributed with the CPI since 2010. In addition to offering strategic orientation about project components, his areas of research include improving policies to increase land-use efficiency; the implementation of the new Forest Code; and the relationship between productivity gains and protection of natural resources.

### **Leila Harfuch**

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Leila Harfuch is managing partner of Agroicone. The technical coordinator of the Brazilian Land-Use Model (BLUM), she has been developing quantitative tools applied to public policies, agrobusiness, family farming, international commerce, climate change and the environment. She is also responsible for analysis on agricultural policy and proposals for their improvement. She was a visiting researcher at University of Illinois Urbana-Champaign, a trainee in finances and investment at IGC Partners and a junior consultant for Banco do Brasil in the federal government's Project for Employment and Income Generation (PROGER). She holds a Bachelor's degree in Economics from Londrina State University (UEL-PR), a post-doctorate degree in Economics from the Getulio Vargas foundation and a PhD in Applied Economics from ESALQ/USP.

### **Luiz Adriano Maia Cordeiro**

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Luiz Maia Cordeiro holds a Bachelor's degree in Agricultural Engineering from Paraná Federal University (UFPR) a Master's in Phytotechnology (Vegetable Production) and a PhD in Phytotechnology (Land Use and Cultures) from the Viçosa Federal University (UFV). He was a university professor in Agronomy for over ten years in Minas Gerais. He is active in the fields of phytotechnology, sustainable production systems, agriculture-livestock integration, agriculture-livestock-forest integration, direct planting system and low-carbon emissions. He is currently a researcher with Embrapa Cerrados, in Planaltina-DF.

### **Marcelo Stabile**

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Marcelo Stabile holds a Bachelor's degree in Agricultural Engineering from ESALQ/USP, with a Master's from Texas A&M University and a PhD in Agriculture from the University of Sidney. Since 2011, he has been a researcher at IPAM, working on the areas of agriculture and livestock rearing, with a focus on public policies. He has worked to increase the sustainability of cattle ranching through productive improvements aligned with environmental concerns. Since 2017, he has worked on creating financial compensation mechanisms for producers with an excess of native vegetation in their properties.

### **Mariane Crespolini**

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Mariane Crespolini holds a Bachelor's degree in Environmental Management from ESALQ/USP, and a Master's and a PhD in Economic Development from Unicamp's Economics Department. Since 2011, she has developed research and consultancies related to the agricultural market, having worked as a researcher at the Centre for Advanced Studies in Applied Economics (Cepea/ESALQ/USP). She is currently the Director of Sustainable Production and Irrigation of the Secretariat of Innovation, Rural Development and Irrigation of the Ministry of Agriculture, Livestock and Supply (MAPA). She is also a cattle rancher in the northern part of Mato Grosso.

### **Miguel Lanna**

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Miguel Lanna is an executive professional in the field of international cooperation for development and fundraising, with significant experience in forestry, biodiversity and climate, as well as in transportation, urban mobility, sanitation, energy efficiency and solid waste. Since 2003, he has consulted for governments as a civil servant, organising in the third sector and in international cooperation agencies. His work includes the creation, management and monitoring of projects, government and international relations, negotiation of contracts for donation and international cooperation loans, sectoral studies and political analysis, elaboration of institutional and sectoral strategies, creation and modelling of environmental funds and other mechanisms for financial sustainability in the environmental field. He is currently Project Manager for the KfW Banking Group.

## Priscila Souza

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Priscila Souza is a researcher for PUC-Rio's CPI. She holds a PhD in Economics from Yale University, a Master's in Economics from the Getulio Vargas Foundation (EPGE/FGV-RJ) and a Bachelor's degree Magna Cum Laude in Economics from the Federal University of Rio de Janeiro (UFRJ). Before joining the CPI, she was an Assistant Professor of Economics at the Toulouse School of Economics, from 2011 to 2014, and Vice-Director of Advanced Research in Quantitative Applied Development Economics (Arqade) from 2012 to 2014. She is a member of the Institute for Advanced Study in Toulouse (2013-2014). She was an Adjunct Professor at University of Columbia from 2015 to 2017. Previously, she worked as an economist at the Planning Area of BNDES. Her main areas of research are development economics and labour economics. At CPI, she is working on projects related to rural credit and security, rural productivity, land use and sustainable development.

## Raoni Guerra Lucas Rajão

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Raoni Rajão is a professor of Environmental Management and Social Studies of Science and Technology at UFMG's Production Engineering Department and participates in the post-graduate programmes in Production Engineering and Environmental Modelling and Analysis at the same institution. He is also co-advisor in the Post-Graduate Programmes in Sustainable Development at UnB, Resources, Environment and Development Programme at Australia National University and Forest and Future Conservation at Wageningen Universiteit. Rajão is also a regular visiting professor in various institutions, including Lancaster University, Universität Bremen, Radboud Universiteit and the University of Wisconsin-Madison. He has a Bachelor's degree in Computing Science from Università degli Studi Milano-Bicocca and a Master's and a PhD in Organisation, Labour and Technology by Lancaster University. Since obtaining his Master's, he has dedicated himself to studying the relationship between technology, science and public policy, focusing on the evaluation of policies to control deforestation and payment for environmental services. He has worked as a consultant for the UNDP, GIZ and the World Bank, and has published book chapters and scientific papers in high-impact journals such as Science, STHV, SSS and PNAS. Today, he coordinates two research projects, financed by CNPq and FAPEMIG, and participates in the *Pesquisador Mineiro* Programme (PPM) from both institutions.

## Renato Leonardi

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Renato Leonardi is a First Secretary at the Ministry of Foreign Relations (MRE). He became Adviser to the Director of MRE's Environment Department in 2019, and was nominated Brazil's Political Focal Point for the Global Fund for the Environment (GEF) and also an Adviser of the Brazilian Councilmember for the GCF. As a diplomat, he served at Brazilian embassies in Ottawa and Canberra. In Brazil, he worked at the MRE's Environment Department (DEMA) and in the Division of Sea, the Antarctic and Space (DMAE).

## Regina Sambuichi

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Regina Sambuichi holds a Bachelor's degree in Biological Sciences from Bahia Federal University (UFBA, 1987), a Master's in Ecology from the University of Brasilia (UnB, 1991) and a PhD in Ecology from the University of Brasilia (UnB, 2003). She was a professor at Santa Cruz State University (UESC) from 1996 to 2010, teaching undergrad and grad classes on Biodiversity Ecology and Conservation and Regional Development and the Environment. Today, she is a researcher at Ipea's Directorate for Regional, Urban and Environmental Studies and Research, acting in the field of sustainable development and covering themes such as environmental sustainability and evaluation of agro-environmental policies.

## Rogério Boueri

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Rogério Boueri holds a Bachelor's degree in Economics from the University of Brasilia (UnB), a Master's in Economics from Getulio Vargas Foundation (EPGE/FGV) and a PhD in Economics from the University of Maryland at College Park. An Ipea civil

servant since 1996, he acted as coordinator for Public Finances, coordinator of Studies for Federative Development, Director of Regional, Urban and Environmental Studies and Research and Director of Institutional Development. From 2002 to 2013, he was a Professor of Public Finance in the Postgraduate Economics Programme at the Catholic University of Brasília and was a fellow visiting researcher at the Copenhagen Business School (2014-2015). He was deputy secretary of Economic Policy of the Ministry of Finance (2015-2016) and president of the Caixa Econômica Federal Administrative Council (2016-2017). He is currently the Undersecretary for Agricultural Policy and the Environment of the Secretariat of Economic Policy of the Ministry of Economy (SPE/ME).

## **Ruben Lubowski**

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Ruben Lubowski, PhD, is Chief Economist of Natural Resources of the Environmental Defense Fund (EDG). He is known for his expertise in climate policy, economy and finance, focusing on the design of carbon markets and approaches to reduce emissions originating from deforestation and other land-use activities. He works with researchers and policymakers to design and implement carbon markets and other strategies to deal with global climate change. Ruben has testified before the United States Senate and developed analyses for decisionmakers around the globe. He has remained relevant in academic and political contexts and has published articles in books, government reports and specialised journals. He was the main author of the World Bank-ICAP's manual on the design and implementation of the Emission Trading System and has taught Economics and Environmental Policy as an Adjunct Professor at Columbia University's School of International and Public Affairs, as well as at New York University's Stern School of Business. Before joining the EDG, Ruben amassed professional experiences at the USA's Department of Agriculture, the UNDP, and at the Harvard Institute for International Development. He received his Bachelor's, Master's and PhD in Political Economy and Government from Harvard University.

## **Sandra Verônica Cureau**

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Sandra Cureau is an Associate Federal Prosecutor General of the Federal Prosecution Service (MPF). For 10 years, she coordinated the MPF's Chamber of the Environment and Cultural Heritage. Dr. Cureau co-authored a book on environmental law and wrote many articles on themes related to the environment and cultural heritage. She has been a member of the Examination Board for the position of Prosecutor General for over a decade. She is in the Director's Board of the Right for a Green Planet Institute of the Brazilian Association of Environmental Law Professors (ABRAMPA). She holds a Master's degree from the State University of Rio de Janeiro (UERJ) and has completed specialisation courses on Environmental Law in Limoges, Alicante and Porto. Dr. Cureau was the first female general director of the Higher School of the Prosecution Service of the Union (ESMPU), the first female Deputy Prosecutor General and the first Deputy Prosecutor General before the Superior Electoral Court (2009/2013).

## **Sergio Schlesinger**

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Sergio Schlesinger is an economist and a consultant for the Federation of Institutions for Social and Educational Assistance (FASE). He works in partnership with several civil national and international civil society organisations on themes related to the socioenvironmental impacts of agricultural activities. His most recent publications include: "Meat atlas: facts and figures about the animals we eat"; "Few Champions, Many Losers: the Concentration and Internationalization of the Brazilian Beef Industry"; and "Brazilian Beef Industry: What's at Stake"?

## **Steve Schwartzman**

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Steve Schwartzman is Senior Director of Tropical Forest Policy at the EDF. He leads the work of the EDF on themes such as tropical forests and large-scale economic incentives for forest protection. Steve has worked for over 30 years in the Brazilian Amazon with indigenous and traditional communities, governments, scientists and the private sector to reduce deforestation and protect the forests. The EDF's Brazilian partners have contributed significantly for the successful reduction in deforestation in the Amazon and setting ambitious national goals for the reduction of emissions. An anthropologist, Steve lived among the Panará people in the Brazilian Amazon for a year and a half, learning their language. His areas of expertise include tropical forests, reducing emissions from deforestation and forest degradation (REDD+), Brazil and the Amazon, indigenous peoples and incentives to environmental protection.



## SESSION SUMMARIES

### Day 1 – 14 May 2019

#### What are the new business opportunities for a sustainable rural economy?

##### Opening table

##### Participants:

- **Aristides Monteiro Neto**, Director of Regional, Urban and Environmental Studies and Policies (DIRUR), Ipea
- **Diana Sawyer**, Senior Research Coordinator, IPC-IG
- **Ruben Lubowski**, Chief Economist of Natural Resources, EDF

**Session summary:** Aristides Monteiro Neto, DIRUR Director at Ipea, began the opening session by thanking everyone's presence, especially Diana Sawyer (IPC-IG) and Ruben Lubowski (EDF) for their partnership in organising the event, highlighting the relevance and timeliness of the debates for Brazil. He hoped that the discussions fostered by the many experts and academics at the Seminar would result in significant progress for an agenda of research and work in the country, coinciding with Ipea's institutional role of contributing to the design, elaboration and evaluation of public policies.

He also underscored Brazil's current need to integrate policies through a more in-depth understanding of the environment, considering issues such as climate change and others to be discussed during the Seminar, as strategies for the promotion of regional and urban development. About this need for integration, he stressed the participation of Ipea colleagues in the debate, such as Gustavo Luedemann, Julio Roma and Regina Sambuichi. He reserved a special mention for the work carried out by ECLAC.

He also mentioned the ongoing debate at the Ministry of Regional Development, seeking to establish an agenda of development for target regions (North, Northeast and Centre-West) and noted that environmental issues need to be better incorporated, reinforcing the broad space for debate in favour of this orientation in policymaking.

Diana Sawyer, the representative from the IPC-IG—one of the institutions that hosted the event—brought up her experience as a researcher in the Amazon region, especially in areas of agricultural expansion. She noted that, between the 1980s and 1990s, population groups (traditional populations, farmers, among others) and institutional groups (NGOs, governments, corporations, unions) in the region represented largely conflicting interests and the current concern with territorial development did not exist in those days; therefore, many conflicts could be observed.

Although she has since left academia, Diana has kept up with the subject, given that one of the IPC-IG's areas of expertise is social protection, discussing strategies that can integrate the issues of territorial development and the environment, incorporating the human dimension. She highlighted that introducing the issue of sustainability has revealed many challenges, including the integration of crops, cattle rearing and forests, as illustrated by the event's programming. She highlighted the role of several local and state institutions working in the Amazon region and their ability to create solutions that meet the demand for sustainable development models. She then stated that the event's programming would go beyond business opportunities and also consider territorial issues.

Ruben Lubowski thanked everyone for their presence and praised the partnership with Ipea and the IPC-IG. He stated that the EDF, a US-based international non-profit organisation believes that the way to solve current global issues is to integrate the environmental and economic agendas to improve human development. He remarked that five years ago, the EDF, in partnership with the Centre for Studies on Sustainability of the Getúlio Vargas Foundation (FCVces) produced the report "Brazil—Economic and Environmental Power in the 21st Century",<sup>1</sup> highlighting that Brazil is in a globally privileged position to leverage development, respecting the environment, reducing GHG emissions and producing agricultural commodities, energy and biofuels in a sustainable manner.

He pointed out that the country was able to significantly reduce its GHG emissions due to a reduction in deforestation in the Amazon, while at the same time ensuring an increase in agricultural productivity, demonstrating it is possible to reconcile

1. Available at: <<http://gvces.com.br/brasil-potencia-economica-e-ambiental-no-seculo-21-2>>.

these activities. In the same vein, he mentioned a previous seminar organised by Ipea on the risks of climate change for agriculture and highlighted the important role of emergent climate markets in promoting the reduction of emissions through biofuels, for instance, and the improvement of supply chains with a lower environmental impact.

Finally, he highlighted the objective of the event: to determine the current juncture and which policies need to be improved. He thanked Ipea and the IPC-IG again for organising the event and the many Brazilian and international experts, representatives from the government and other institutions, emphasising his conviction that the economic and environmental agendas can significantly advance in Brazil.

**Video: Opening table and Panel 1 — “How should the rural economy be in the future?”** <<https://youtu.be/sqoc4hJ7nNs>>.

### Panel 1 — “How should the rural economy be in the future?”

**Moderator: Regina Sambuichi**, DIRUR researcher (Ipea)

#### Speakers:

- **Juliano Assunção**, Associate Professor of Economics (PUC-RIO) and Executive Director of CPI Brazil;
- **André Guimarães**, Executive Director of IPAM and member of the Brazil Coalition
- **Carlos Nobre**, Climatologist and Senior IEA-USP Researcher

### Presentation 1: “Towards efficient land-use in Brazil”

**Speaker: Juliano Assunção**, Associate Professor of PUC-Rio’s Department of Economics and Executive Director of CPI in Brazil

**Session summary:** Juliano Assunção presented information on land use distribution in Brazil, based on data from MapBiomias,<sup>2</sup> according to which around 60 per cent of the country’s territory is covered by forests, 27 per cent by pastures and 9 per cent by areas dedicated to agriculture.

The country’s land-use distribution lies at the core of the comparative advantages highlighted by Ruben Lubowski in his initial address. Considering only underutilised pasture areas, the country has a unique opportunity to increase its agricultural production through productivity gains, without the need for further deforestation.

Considering this distribution, to describe the total preservation areas one needs to discuss the past, which given the current international context is tricky as it can easily devolve into a blame game and become sterile. On the other hand, focusing on how to improve the use of Brazil’s large, already-available areas, which have been degraded or are underutilised by pastures and offer ample opportunity for gains, is a promising discussion about the future and prosperity that should be the starting point for further debates.

He presented data with some global and national trends that set the stage for the improvement of existing public policies and the design of new ones, which can contribute towards fostering the rural economy of the future.

Based on data from the Food and Agriculture Organization of the United Nations (FAO), Juliano discussed the evolution of worldwide food production from 1961 to 2016 in terms of productivity gains and land expansion. He pointed out that there was a continuous increase in agricultural production worldwide from 1961 to 2001, coupled with constant area expansion and productivity gains, although these were not very significant. However, from 2001 onwards there has been a significant shift in the pattern of expansion in global agricultural production, with increased productivity gains without the use of new areas.

Based on data from the 1970–2017 Agricultural Census and linking data on area expansion and productivity gains, he analysed food production trends in Brazil. Juliano drew attention to data from the Southeast region of the country, which drastically reduced the area used for cattle ranching since 1975, with increased productivity. The same occurred in the Centre-West region from 1995–1996 onwards. Therefore, he diagnosed that the process of productivity gains and substitution of pastures for croplands is a phenomenon that has been taking place in the country for some time, including when the environmental agenda was not as prominent as today and independently from public policies. He also highlighted the expansion of soybean production .

2. Project for the Annual Mapping of Land Use and Coverage in Brazil. Data available at: <<http://mapbiomas.org>>.

A study carried out by the CPI<sup>3</sup> developed an econometric model to estimate the potential for productivity gains in agriculture during the 2000s, simulating productive decisions under different scenarios. The first scenario considered the possibility of increased production unfettered by any restrictions—that is, allowing for area expansion through deforestation, converting pastures into croplands or obtaining productivity gains.

The second scenario used the same econometric model but discarded the possibility of using new deforested areas to estimate potential productivity gains. Results showed that both scenarios are similar, with an increase in agricultural production of approximately 120 per cent compared to the actual production obtained during the period analysed.

Study findings also demonstrate that areas suitable for agriculture are already open and corroborate the perception of experts in the field.

He then drew attention towards deforestation data for the Amazon, where a steep decline can be observed since 2004 due to the implementation of the Action Plan for the Prevention and Control over Deforestation in the Legal Amazon (PPCDAm).<sup>4</sup> He concluded that the system that was put in place was able to contribute with the reduction of deforestation in large areas.

Citing data from TerraClass,<sup>5</sup> he stressed that environmental protection and agricultural production in Brazil are not linked to each other. It is possible to verify that a full quarter of the deforested areas in the Amazon are regenerating naturally through secondary vegetation, which demonstrates that these areas were deforested and subsequently abandoned.

In this context, he highlighted a set of public policy instruments that he considers to be key to increased efficiency in land use and the protection of natural resources, which also confer various ecosystemic benefits. To this end, he underscored the importance of recognising, maintaining and improving policies that provide tangible results, such as those that reduce deforestation.

Another crucial element for the advancement of the agendas of environmental protection and productivity gains in agriculture is the Forest Code.<sup>6</sup> From an economic standpoint, by imposing limits to the expansion of agricultural areas through the legal provision of Areas of Permanent Protection (APPs) and Legal Reservations (RLs), the Forest Code promotes the intensification and modernisation of agriculture in existing spaces rather than the use of new areas. Juliano stated that, although some political groups question the instrument's importance, it is important to preserve it, especially for agricultural producers who may benefit from increased international trade.

Another crucial element of public policy in the sector is rural credit, which has been in place since the 1960s. The pillars of this policy were established at a time when Brazil was a food importer. Since then, Brazilian agriculture has evolved and, for Juliano, it is important to adapt rural credit to this new scenario. Given the volume of financial resources, he suggested a narrower alignment between rural credit and the Forest Code.

In his closing remarks, he pointed four ways through which he believes a more efficient use of land in Brazil can be pursued: i) combating illegal deforestation in the Amazon; ii) implementing the Forest Code; iii) rationalising of the use of public resources given the country's fiscal context; and iv) land regularisation, given that a large share of deforestation and some inefficiencies associated with land-use in Brazil are related to the poor definition of the right to property, especially in the North region.

**Link to the presentation:** <<https://bit.ly/2WYn7gE>>.

## **Presentation 2: “Vision 2030-2050: The future of forests and agriculture in Brazil”**

**Speaker: André Guimarães**, member of Brazil Coalition and Executive Director of IPAM

**Session summary:** André Guimarães stated that the Seminar came at an opportune time, as it proposed to discuss options for land use in Brazil—a historically relevant issue for the country given its successive economic cycles, from the exploration of redwood (*pau-brasil*), to coffee, sugarcane and finally agricultural commodities.

As a facilitator of the Brazil Coalition,<sup>7</sup> a network composed of almost 200 organisations from five different sectors (corporations linked to the use of land, civil society organisations, academia, individuals and the financial sector), he explained that the

3. Various CPI studies on the subject are publicly available at: <<https://www.inputbrasil.org/publicacoes/>>.

4. More information available at: <<https://bit.ly/2tCvNfo>>.

5. A project developed by various Brazilian institutions, aiming to quantify deforestation in the Brazilian Legal Amazon. More information available at: <[http://www.inpe.br/cra/projetos\\_pesquisas/dados\\_terraclass.php](http://www.inpe.br/cra/projetos_pesquisas/dados_terraclass.php)>.

6. Law No 12.651, from 25 May 2012. Available at: <[http://www.planalto.gov.br/ccivil\\_03/\\_Ato2011-2014/2012/Lei/L12651.htm](http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12651.htm)>.

7. See: <<http://www.coalizaobr.com.br/home/>>.

main issue at the moment is how to put Brazil on a path to increase its agricultural production, which is responsible for a significant portion of the country's GDP, without resorting to deforestation. In this vein, he remarked the country's important and strategic role in ensuring food security.

He recalled Lubowski's initial address to reaffirm the country's capacity to contribute to the reduction of GHG emissions from the forest sector, which cannot be ignored in lieu of increased agricultural production—this is the main challenge among the issues analysed by the Brazil Coalition.

As an IPAM collaborator, André commented on some research findings. He stated that between 2000 and 2010, there was a temperature increase of 1° C in the Xingu region, matching the IPCC forecast. He added that, according to his observations, farmers in the region are already suffering the effects of climate change, resulting in economic losses and greater GHG emissions.

According to him, 25 per cent of the Brazilian population depends on the use of land and they need the Amazon, which is responsible for regulating the rainfall regime. Proper use of land includes treating the forests well, given that 90 per cent of agricultural production is not irrigated and therefore relies on rain.

Regarding environmental services, he reported that, based on data from the Rural Environmental Registry (CAR) on territorial occupation in the Legal Amazon, a survey conducted by IPAM identified areas of native vegetation equal to 28 million hectares that are liable to legal deforestation. Although this surplus area provides important environmental services and sequestration of carbon from the atmosphere, from a producer's perspective it has little value. Yet, he echoed a statement by Mr. Jun Lyo, CEO of COFCO (a Chinese company that purchases 20 per cent of all Brazilian soybean production): "... farmers who conserve the forest must be compensated for their service of producing commodities for the planet"<sup>8</sup> In other words, there is a perceived value regarding the country's environmental assets, and it is "up to us to convert this perception into benefits for the country".

He alerted the audience that, in order to fulfil this potential, Brazil must respect its legal framework, especially the Forest Code, re-establish international credibility and promote technological development. Regarding the implementation of the Forest Code, he highlighted that it will not be possible for the country to attract investments if deforestation continues.

André concluded by stating that Provisional Measure 867/2018<sup>9</sup> and a recently proposed Bill of Law<sup>10</sup> undermine the Forest Code, only seven years after its enactment. He stated that the environmental protection values must be incorporated into the economic equation, and that the moment calls for implementing existing legislation rather than altering it.

**Link to the presentation:** <<https://bit.ly/2HRsKqv>>.

### Presentation 3: Amazonia 4.0

**Speaker:** Carlos Nobre, Climatologist and Senior IEA-USP Researcher

**Session summary:** Professor Carlos Nobre stated that his lecture would be the same as one he recently presented at the University of Harvard, but that he considered it would be important to repeat it given the moment Brazil is facing regarding its environmental policy.

He recognised that Ipea is a strategic research centre for Brazil's development and challenged the institute to think differently during moments of crisis. He clarified that although his affiliation currently lies with the Institute of Advanced Studies of the University of São Paulo (IEA-USP), he spent his 30 years at INPE alerting about climate-related issues and now he is dedicated to finding solutions.

If deforestation in the Amazon surpasses 25 per cent—it is currently at 16 per cent—there will be a disruptive scenario. On the deforestation model for the Amazon, he stressed that a symbolic statement from the 1970s—that deforestation in the region follows the "hoof of the ox"—is still applicable today, although it has been largely demonstrated that the productive system and deforestation are not connected.

Which trajectories are desirable: the utopia of completely ending deforestation, or the dystopia of unfettered deforestation? Instead, he suggested alternative, disruptive paths: strengthening conservation policies; maintaining the development model that has been in place over the past 50 years; and an economy based on biodiversity.

8. The full article can be found at: <<https://bit.ly/2S1Sgki>>.

9. This Provisional Measure alters Law No. 12.651, of 25 May 2012, to extend the deadline to register into the Programme for Environmental Regularisation. Available at: <<https://www25.senado.leg.br/web/atividade/materias/-/materia/136371>>.

10. PL 2.362/2019 repeals an entire chapter on legal reservation of the Forest Code. Available at: <<https://bit.ly/21FBmCT>>.

The Amazon is the most protected of all regions harbouring tropical forests in the world, but it is already suffering the effects of climate change. Conservation policies and those promoting better land-use are not enough. To illustrate this point, he showed image of 'burn scars' at the Xingu reservation.

Returning to Juliano Assunção's argument from the first presentation, he posited that, although productivity has increased, it is still not adequate; the Amazon's development model is senseless from an economic standpoint. He reported that 80 per cent of logging is illegal and data regarding soybean productivity is low for the Amazon region (2.9 tonnes/ha) when compared to US numbers (6.5 tonnes/ha). He added the higher risk of degradation when considering the infrastructure plans of the nine Amazon countries.

As a counterpoint to the argument that Brazil is an environmental power, he posited that increased production and conservation are not enough, given that sustainable intensification by itself yields more capital but also increases deforestation, according to the Jevons Paradox.<sup>11</sup> As an example, he mentioned the soy moratorium.

From this premise, he questioned why there has never been a development model based on biodiversity resources, which are present in countries harbouring tropical forests. Carlos cited a few known examples of the incredible potential for exploration of biodiversity resources, such as *açaí*. Based on data from the Brazilian Institute of Geography and Statistics (IBGE) and Raoni Rajão's study, he demonstrated that the profitability of *açaí* is seven to eight times higher than that of soybeans.

The Amazon 4.0 project is geared towards the application of new technologies to explain the biological and biomimetic resources of the region's biodiversity, whose development model is inclusive, ecologically robust and incorporates benefit-sharing\*. Recognising hardships such as distance and difficult access to energy and communication services, challenges include how to create sustainable businesses, how to live in the Amazon's climate and how to promote cultural valuation.

He pointed out that one of the elements of the Amazon 4.0 proposal is bringing development into the region based on a decentralised model—not concentrated in the *Zona Franca* (the free-trade zone)—and on regional bioindustries, linked to bioindustries around the world. Creative labs in the Amazon could strengthen the capacities of local populations. Some examples that were mentioned include the development of the *cupuaçú* and cocoa chains through a high-quality chocolate bioindustry; a genomics lab to seize the enormous potential of biotechnology with a blockchain system to deter counterfeiting, so that the local populations can ensure their ownership of their activities. These examples add value to the forest. Carlos also argued that the great difference-maker for Brazil is the knowledge of biodiversity, reconciling technology with traditional knowledge.

In his conclusion, he highlighted the need for EMBRAPA to invest more in science and technology, as well the need for improved education across the board.

**Link to the presentation:** <<https://bit.ly/2M2B0cM>>.

**Video: Opening table and Panel 1 — “How should the rural economy be in the future?”** <<https://youtu.be/sqoc4hJ7nNs>>.

## **Panel 2 — “How can Brazil benefit from emerging climate markets? The role of forest and carbon assets”**

**Moderator: Rogério Boueri**, Undersecretary for Agricultural Policy and the Environment, Bureau of Economic Policy, Ministry of Economy

### **Speakers:**

- **Ruben Lubowski**, Chief Natural Resources Economist, EDF
- **Gustavo Luedemann**, Ipea researcher (DIRUR)
- **Marcelo Stabile**, IPAM researcher
- **Cláudio Almeida**, Senior Technologist and Coordinator of INPE's Monitoring Programme for the Amazon and other biomes

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11. The Jevons Paradox, or boomerang effect, is a concept according to which the rate of consumption of a given resource rises due to increased demand, even while the efficiency of its use is also increased.



## Presentation 1: “International markets for the reduction of carbon emissions: opportunities and challenges”

**Speaker:** Ruben Lubowski, Chief Natural Resources Economist, EDF

**Session Summary:** Ruben Lubowski started the presentation by discussing current opportunities, such as those in the aviation sector. He pondered that, while the initiatives he would mention are still under development, he believes that they can benefit Brazil in the long term.

He identified that fulfilling the commitments to reduce GHG emissions through the Nationally-Determined Contributions agreed on by all countries under the Paris Accord will not be sufficient to limit global warming to 2° C. He presented a figure comparing the contribution of NDCs against necessary emission reductions and concluded that emissions still need to be reduced further.

Ruben indicated that carbon market-based financial mechanisms can help overcome the gap between what was agreed on at the international stage and what science indicates as the necessary goal to reduce GHG emissions. He stated that, given that countries must revise their commitments under the Paris Accord framework every five years, the gap will decrease as the ambition of signatory countries increases.

Another message that came across was the need to reduce emissions of all sectors, gearing negative emissions. Ruben mentioned the need to reduce deforestation, increase reforestation efforts and make good use of technological advances such as carbon capture.

According to a study that was presented, the reduction in emissions foreseen in the Paris Accord corresponds to 77 billion tCO<sub>2</sub>e from 2020 to 2035, which would not be enough to curb global warming. The following analysis consisted in assessing what would happen if countries could negotiate among themselves how best to reduce emissions in a cost-efficient manner. The estimate is that with global markets, without forest contributions, the reduction in emissions would be 42 per cent higher, equal to 109 billion tCO<sub>2</sub>e. When considering forests, the reduction in GHG emissions would increase by 91 per cent, to 147 billion tCO<sub>2</sub>e, at the same cost. He concluded that solutions that include forests are cheaper, faster and lead to a virtuous cycle that incentivises further emission reductions.

There are currently many mechanisms for the pricing of carbon, covering approximately 20 per cent of worldwide emissions, including policies, taxes, markets and hybrid mechanisms. As examples, he mentioned the carbon tax and offset in Colombia (a hybrid mechanism); and a pilot project in China to launch a carbon market for the energy sector, starting in 2020. Under the Paris Accord, almost 90 countries have shown an interest in using market mechanisms to help reach their goals.

Regarding the use of land and forests, some countries already use carbon pricing mechanisms that include compensations from forests, such as Colombia, China, South Africa, and the US. There is a great opportunity for Brazil to participate in some of these markets.

He also highlighted public incentives geared towards voluntary emission trade markets, such as the Amazon Fund, financed by the government of Norway. Regarding regulated markets, where companies have emission limits and can use the emission reductions of other countries outside the system to ensure conformity, he presented the case of California, which is internationally renowned for its environmental policy and which is currently developing rules to accept international forest credits. However, the market is still limited.

The system proposed by the International Civil Aviation Organization (ICAO), known as Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA),<sup>12</sup> purports to limit and compensate emissions in the aviation sector. Estimates indicate that the amount of credits needed for this sector will range from approximately 2.5 to 3 billion tCO<sub>2</sub>e. Regulations are also under discussion and this year a decision will be made on which types of credits will be accepted.

There is also an important market for voluntary compensation, especially for oil and gas companies such as Shell, which has already signalled its interest in forest credits to reach its goal of 50 per cent carbon neutrality. Other oil companies have also undertaken similar commitments and, therefore, will have an important role in the transition towards diminished fossil fuel use and the demand for high-quality credits.

Ruben concluded by stating that if countries raise their goals and if the quality of credits increase, the price of carbon will be higher and will deliver larger benefits. International public donors can ensure minimum prices, such as, for example, the 5USD/ tCO<sub>2</sub>e paid to the Amazon Fund. He reaffirmed Brazil's incredible potential to benefit from this market, given that

12. <<https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx>>.

the current situation is no longer about different sectors fighting each other, but rather countries doing more—and faster—to ensure their sustainability and environmental integrity.

**Link to the presentation:** <<https://bit.ly/2JSunai>>.

### **Presentation 2: “Considerations on carbon stocks and biomass: mitigation through biofuels, reforestation and soil carbon in relation to the reduction of fossil fuel emissions**

**Speaker: Gustavo Luedemann**, DIRUR researcher, Ipea

**Session summary:** Gustavo Luedemann started his presentation by explaining why it makes sense to view the use of cutting-edge biofuels as a sustainable business opportunity and why, on the other hand, it does not make sense to compensate the burning of aviation fuel with forest credits.

He showed slides picturing the earth with two schematics of carbon stocks and flows. The first, composed of atmosphere, biosphere and oceans, had carbon exchange flows that were visible among the three components. The second, composed only of fossil fuels, appeared initially as carbon stock, with no apparent flows. Gustavo explained that there is a short carbon cycle, represented by exchanges within the biosphere-atmosphere-oceans system, and a longer one, on a much larger time scale, where one could observe, for example, the flows of carbon from the biosphere to fossil carbon stocks. He then stated that the longer cycle does not matter for economic studies, as it has not produced significant flows during the entire existence of the human species. Before the prospecting of petrol and other fossil fuels, there was no exchange between the two systems.

Showing a unilateral flow originating from the fossil system and moving to the biosphere-atmosphere-ocean system, Gustavo explained that the enrichment of this system with more carbon, such as from the burning of fossil fuels, results in problems such as an increase in the greenhouse gas effect and ocean acidification, with subsequent loss of a significant food source for humans.

Even if forest fires result in greenhouse gas emissions, such emissions might potentially be compensated by deforestation. Fossil carbon enters the atmosphere-biosphere-oceans system, enriching one of its components and causing one of three problems: (i) inability to recapture carbon resulting from forest fires; (ii) ocean acidification; or (iii) greenhouse gas effect. After this point, in practice, it is no longer possible to remove this carbon from the system. The potential for reversing this process through carbon capture and storage is very limited. According to the Global Carbon Project a new record was broken in 2018 regarding the burning of fossil fuels and experts say that it remains a growing trend. The relevance of forest emissions is negligible compared with emissions resulting from the burning of fossil fuels. Therefore, Gustavo argued that it makes no sense, in environmental terms, to defend the position that it is possible to ‘trade’ an emission reduction of 1t CO<sub>2</sub> resulting from forest conservation efforts for a permit to emit 1t CO<sub>2</sub> resulting from the burning of fossil fuels, as stated in the proposal for the inclusion of forest credits in CORSIA. In other words, there should be no fungibility in forest credits to offset emissions originating from fossil sources.

To illustrate the consequences of the opposite scenario, Gustavo formulated the following question: If forests are so sensitive to climate change, being liable to disappear as a result, why should forest conservation generate a permit for CO<sub>2</sub> emissions originating from fossil sources? He explained that the fungibility between forest and forest credits would lead, in practice, to forest credits being used, as they are cheaper. This would replace the urgency of transferring the fossil carbon into the atmosphere-biosphere-oceans system, with the urgency of reducing deforestation. He posited that even though reducing deforestation is equally important for many reasons, including the preservation of biodiversity, generating emission permits based on deforestation containment efforts is a terrible strategy, given the threat of fossil-based emissions to the forests themselves.

Considering these arguments, and that the largest stock of carbon in the biosphere—the soil—emits carbon resulting from increased temperature and low precipitation, as well as forest fires increasing in frequency for the same reasons, Gustavo ended his presentation with the following question: How to ensure the permanence of carbon in the soil/forests with over 415PPM CO<sub>2</sub> in the atmosphere?

**Link to the presentation:** <<https://bit.ly/2Eslxj>>.

### **Presentation 3: “CONSERV: Conservation in private areas”**

**Speaker: Marcelo Stabile**, IPAM Researcher

**Session summary:** Marcelo Stabile commented on the initiative developed in partnership with the EDF and the Woods Hole Research Center, whose goal is to observe how to preserve native vegetation in private properties.

Showing a figure linking the deforestation in the Legal Amazon with production, he highlighted that, as discussed in previous sessions, from 2000 onwards the increase in production became disconnected from deforestation.

To define forest assets, he presented data from CAR and deforestation that revealed that the area liable to legal deforestation in the Amazon, in addition to what is preserved according to the Forest Code, is of 28 million hectares, and that this deforestation should be avoided. He underscored that in Mato Grosso, the area is of 7 million hectares.

Marcelo stated that it is IPAM's job to assess alternatives to preserve these areas and pointed that the first step, recalling Carlos Nobre's presentation, is to invest in innovation. It is necessary to show the world that these areas exist and that they are important and valuable.

He presented a study conducted by IPAM that considered carbon stocks, water production, connectivity through biodiversity corridors and risk of deforestation to construct a non-monetary indicator that identifies priority areas for preservation.

In addition, an opportunity cost map was drafted, which, when taken together with risk suppression, biodiversity and ecosystemic services data, results in a preservation value, or, in other words, areas that are important to conserve due to risk of deforestation. They are currently in search of partners to finance the project, which intends to pay producers, via CONSERV, to avoid deforestation. Marcelo suggested that after the implementation of transaction markets the project would replace donors with investors to recoup financial losses.

He highlighted that many production and conservation institutions are grouped within CONSERV, as there is already a recognition of the pressing need to conserve, adding that they are already evaluating ways to upscale the project. Marcelo ended his presentation by presenting some options, such as fostering the participation of the banking sector so that this information can be used instead of risk calculation to grant credit, or as collateral for loans.

#### **Presentation 4: “Capacities of INPE monitoring systems for public policies related to forestry and agriculture”**

**Speaker: Cláudio Almeida**, Senior Technologist and Coordinator of INPE's Programme for the Monitoring of the Amazon and other Biomes

**Session summary:** Cláudio Almeida explained that the monitoring work started with a focus on science and was subsequently incorporated into public policy, integrating the strategies of the Brazilian government to monitor the country's biomes. Elements to be monitored include: forest fires; land use; vegetation recovery; and loss and deforestation of native vegetation.

The Project for the Satellite Monitoring of the Amazon Forest (PRODES) started in 1988 and has been monitoring the loss and suppression of primary forest in the Brazilian Legal Amazon. This loss occurs during the critical dry season. In over 30 years of monitoring, the 'arc of deforestation', mentioned in various studies, was carried out based on data produced by INPE and led to the creation of a public policy: when the Brazilian government took on the responsibility to reduce 80 per cent of its emissions resulting from deforestation, this commitment was based on INPE data. The existence of these public data allowed for the government to design a public policy and for society to monitor it.

Cláudio then presented information about the System for the Real-Time Detection of Deforestation (DETER), a project that INPE has been working on since 2004 and that intends to demonstrate, once a year, how much of the Amazon Forest has been lost. Given IBAMA's need for real-time information in order to be able to control and deter deforestation, INPE started operating the DETER system in a different way: initially, it produced 25-hectare polygons once a month; afterwards, every two weeks; and subsequently, once a week. INPE currently produces data every day, based on images generated by a partnership between Brazil and China through the CIBERS-4 satellite. These data produce images at a resolution of 64 metres, which allow for monitoring polygons larger than three hectares. Thus, any deforestation of over three hectares can be detected. For a clearer perspective, the average size of deforestation in the Amazon is 10 hectares. In the Cerrado it is slightly lower—around 8 hectares. Today, 92 per cent to 95 per cent of deforestation in the Amazon and the Cerrado are monitored through DETER data. Claudio showed how these data can be openly accessed through INPE's website.

INPE developed assessment tools so that public administrators can carry out an aggregate monitoring of monthly deforestation data, being able to compare data month on month. In addition to suppression data, they can work with TERRAClass data through a partnership between INPE and EMBRAPA. INPE is now raising funds to continue developing this line of work.

The Cerrado Deforestation Monitoring Programme started in 2010 with the participation of various donors, as INPE did not have enough resources in its budget to fund the project on its own. INPE has been examining Cerrado deforestation from 2000 to 2019 in great detail, through the availability of more sophisticated tools that allow inserting images generated every four days into the system.

INPE implemented a DETER for the Cerrado in 2010, in the same moulds as the Amazon DETER, to carry out a daily monitoring of loss of coverage and so that oversight bodies can monitor what is happening in the production chain in real-time. This allowed for the creation of a time series for the Cerrado, from 2000 to 2015. The system allows for this monitoring to be carried out daily and for fresh, spatially explicit data—far beyond just numbers in a spreadsheet—to be constantly fed to the user community.

More recently, with funding from the World Bank under the framework of the Forest Investment Programme, and in partnership with MCTIC, INPE started carrying out yearly monitoring. This was performed in 2016, 2017 and 2018, and resources are guaranteed for 2019. INPE will have to seek other sources of funding to finance this initiative from 2020 onwards.

Claudio also said that a TERRACLASS project was developed for the Cerrado, in partnership with EMBRAPA, to monitor land use and coverage in 2013. This project was carried out by INPE with funds from the Ministry of the Environment. More recently, the FIP Paisagens project was signed into effect, which will lead to the monitoring of land use and coverage for 2016, 2018 and 2020. Landscape analyses will also be carried out to show the extent of change for the same period. In addition to making crucial data on deforestation available, INPE also wants to be able to understand how the region's landscape is being altered as a result of land use.

There are no extra resources available for the monitoring of other biomes in Brazil; INPE has sought extra-budget funding through the Amazon Fund, given that it reserves 20 per cent of its resources for applications in other biomes. It has recently released data for the Pampa and Pantanal biomes up to 2016 and raise data for the 2017-2022 period and calculate a regression line to 2004. The time period considered for these biomes will be 2004-2018 and an average emission line will be calculated. INPE hopes to use this line for further fundraising purposes in the future. This time series will be made available through INPE's website in the second half of 2019.

Claudio defended the importance of maintaining INPE's monitoring data. It is a robust and reliable system that feeds academia and scholarly, indexed journals, as well as providing support for the design of public policies such as the National Plan for Climate Change. He concluded his presentation by demonstrating to Seminar participants how to use data from INPE's website in their various monitoring systems.

**Link to the presentation:** <<https://bit.ly/2JzIWkM>>.

**Video: Panel 2 — “How can Brazil benefit from emerging climate markets? The role of forest and carbon assets”**  
<<https://youtu.be/rprTbRGU0f0>>.

**Panel 3 — “How can Brazil and companies in the country build large-scale, mutually beneficial and sustainable production chains?”**

**Moderator: Camila Gramkow**, Economic Affairs Officer, ECLAC—Brazil Office

**Speakers:**

- **Fernando Sampaio**, Executive Director, PCI Strategy
- **Bernardo Pires**, Sustainability Manager of the Brazilian Association of Vegetable Oil Industries (ABIOVE)
- **Mariane Crespolini**, Director of the Sustainable Production and Irrigation Department of the Secretariat of Innovation, Rural Development and Irrigation of MAPA
- **Regina Sambuichi**: DIRUR researcher (Ipea)
- **Sérgio Schlesinger**: Economist and FASE consultant

## Presentation 1: The PCI Programme (Produce, Conserve and Include) in Mato Grosso

**Speaker: Fernando Sampaio**, Executive Director, PCI Strategy in Mato Grosso<sup>13</sup>

**Session summary:** Fernando Sampaio explained that the PCI Strategy (Produce, Conserve and Include) in the State of Mato Grosso is an initiative borne out of the cooperation between civil society, agricultural companies, rural producers and the state government, all involved in sustainable rural development. It was presented in the 2015 Paris Climate Change Conference.

Mato Grosso has conserved over 60 per cent of its territory. The territorial extension of the state is equivalent to the territories of France and Germany combined. It is the country's greatest exporter of grains (soybeans, maize and cotton) and harbours the country's largest cattle herd—over 30 million heads. At the same time, the state has around 125,000 families involved in family farming. They occupy just slightly over 10 per cent of the state's private areas but represent 60 per cent of the state's rural population. Mato Grosso also harbours 43 different indigenous ethnicities in 79 territories.

The territorial occupation of the state is recent, with large areas cleared for grain production due to the conquest of the Cerrado through technology. Deforestation peaked in 2004/2005. Afterwards, a series of public and private efforts to contain it, including improvements in control systems, the soy moratorium and other initiatives, led the market to help reduce deforestation. At the same time, productivity increased, and agriculture expanded mainly to areas that had already been cleared, as well as pastures. This process is still under way, but despite all efforts to reduce deforestation, the state has still not managed to convert results into capital. Fernando explained that the PCI Strategy originated from the desire to provide a long-term vision for Mato Grosso, based on how multiple players see this rural territory 15 years into the future. The initiative understands that players are able to produce more because they have space to increase their agricultural production, but on the other hand they are also able to conserve the state's environmental assets, while working towards the inclusion of smallholder farmers and traditional populations in this process of economic development.

The PCI seeks to guide sustainable development in the state through a set of specific goals: expand the area for grains on top of pasture areas; improve agricultural productivity; expand forest management areas; implement the Forest Code; eliminate illegal deforestation by 2020; reduce deforestation as a whole; improve access to credit; regularise land areas; and improve technical assistance for smallholder producers in the state.

These goals were discussed and agreed on with various players in the state of Mato Grosso. However, it has become clear that the state government cannot act alone; therefore, it is necessary to involve public and private actors as well as civil society to secure investments.

PCI initiatives derive from consensus about what needs to be done: investing in good practices; improving technical assistance; and increasing productivity. This translates into the necessity to expand agricultural production onto areas that have already been cleared, to conserve forests and to implement the Forest Code, to create compensation mechanisms for areas that could be legally deforested and to try and remunerate the environmental assets of the state. According to Fernando, 7 out of the Amazon's 28 million hectares that are liable to legal deforestation lie in the state of Mato Grosso. At the same time, the state has around 8 million hectares currently used for pasture, but which are highly suitable for agriculture and could be used without leading to any losses for livestock rearing.

He then listed opportunities to be pursued by the PCI: a) to garner public and private efforts around a consensual vision of the future; to attract investments; to promote partnerships leading to funding; to test mechanisms that are being created (including financial and technology dissemination instruments); to test these solutions; to test and monitor public policies and suggest new ones. He highlighted that when the PCI was created, over 200 initiatives were mapped around the stated goals, which were being brought to fruition by producers' associations, NGOs or government agencies.

The first phase of the PCI strategy, from 2015 to 2018, sought to identify the necessary elements for the correct functioning of such a legal approach. This involved questions such as the consolidation of an external coalition, with actors discussing and effectively participating in the PCI's functioning; a shared vision among actors; the monitoring of goal progress; in addition to a need for planning priority initiatives. Fernando said that the current state government set aside funds for 50 extra analysts to accelerate the implementation of the Rural Environmental Registry and the Forest Code. He also highlighted the creation of a deforestation control programme, elaborated in a participatory manner. Mato Grosso is acquiring a satellite monitoring system that will identify deforestation patterns and will allow preventing further deforestation. Also through a participatory process, an agenda to support family farming was elaborated, as well as a survey of 43 indigenous ethnicities in the state to identify investment priorities within the framework of the REDD Early Movers project.

13. See: <<http://pci.mt.gov.br>>.

Finally, he stated that in 2019 the PCI is seeking to create a legal entity of its own, outside the organisation of the state (which is an acting member, but does not own the initiative), to enact this governance role. Today, the PCI seeks to achieve sustainability as a whole—not restricted to production chains—through various financing sources (public, REDD, etc.), with estimated transition costs for the state's production chains into a low-carbon structure of BRL46 billion over the next 15 years. Some results have already been presented, such as a reduction of 3.2 billion tons of carbon credits, recognised by the UNFCCC. The federal government would allow states to access part of this total to raise funds; Mato Gross would be entitled to around 800 million tons. However, the state has only been able to use around 2 per cent of this amount, through the REM programme. Mato Grosso accrued around BRL180 million for this reduction in deforestation, whereas the sale of maize, soybeans, beef and cotton yielded BRL377 billion to the state. To Fernando, this situation shows that it is necessary to value state initiatives and one of the ideas is to allow for these credits to be linked to the export of agricultural commodities, so that in the future it will be possible to export carbon-neutral soybeans, for example, using this type of credit to reinvest in local jurisdiction.

**Link to the presentation:** <<https://bit.ly/2M18SXq>>.

### **Presentation 2: “Sustainability in the Brazilian soybean chain”**

**Speaker: Bernardo Pires**, Sustainability Manager of the Brazilian Association of Vegetable Oil Industries (ABIOVE)

**Session summary:** Bernardo Pires opened his presentation by presenting ABIOVE, an association founded in 1981 and composed of vegetable product industries. Together with the National Association of Cereal Exporters (ANEC), ABIOVE represents 90 per cent of the soybean purchasing power in Brazil and aids the government in the development of public policies geared towards the sector.

He initially highlighted some numbers of the soybean sector, mentioning that China imported 75 per cent of Brazilian soybeans in 2018, but Europe imported almost 60 per cent of Brazilian soybean meal. He highlighted that, for that year, exports added up to USD41 billion and that Brazil was the world's largest producer and exporter of soybeans for the second consecutive year, ahead of the US.

Consumers are demanding when it comes to sustainability. In this context, Bernardo recalled that in 2006 there was a strong campaign to devalue Brazilian products. At the time, when there was no satellite imaging to monitor deforestation, the sector decided to create the 'soy moratorium',<sup>14</sup> which was signed in 2006 and is still active. Other initiatives included the creation of environmental governance for the Cerrado; the Soja Plus programme,<sup>15</sup> the largest private technical assistance programme; and the Para Grain Protocol, in partnership with the Federal Prosecution Service. He also highlighted that the sector industries, which in addition to being concerned with aspects of sustainability in the production chain, also incentivise post-production initiatives such as recycling PET bottles and cooking oil.

Regarding the use of land, Bernardo highlighted that soybean production corresponds to about half of the 67 million hectares of land used for agriculture in Brazil (around 34 million hectares), 17 million of which are in the Cerrado biome.

Brazil still has native vegetation in over 65 per cent of its territory. Half of all Cerrado-covered areas are preserved. In this context, he highlighted that the soy moratorium is very stern, targeting zero deforestation—it does not matter whether the producer has a license to practise legal deforestation. The producer is not liable to any punishment or legal restriction, but it is a commercial requirement from clients in the European market and it is strictly observed.

This initiative is joined by the main national and international NGOs, the Brazilian government (MMA, INPE and Banco do Brasil) and various companies. Almost 100 per cent of the area cultivated with soybeans is monitored in the Amazon states. Of 5 million hectares of soybeans planted in the Amazon, almost a full million is blocked by the soy moratorium. Therefore, ABIOVE does not buy or finance soybeans planted by around 800 identified producers, which do not possess the same market access as the association. Currently, ABIOVE uses satellite identification and monitoring is carried out by INPE and an outsourced firm.

Bernardo attributed the success in reducing deforestation after 2008 to integrated control and monitoring policies, in addition to the moratorium.

In the Amazon biome, there are five million hectares with planted soybeans, corresponding to 14 per cent of the area occupied by soybean culture in Brazil—98 per cent of this expansion occurred in previously cleared areas. Only 65,000 hectares of these five million were cleared after 2008. The conclusion is that producers do not cultivate in recently deforested areas. In the case

14. More information about this initiative is available at: <<http://www.abiove.org.br/site/index.php?page=moratoria-da-soja&area=NS0zLTE=>>>.

15. See: <<http://www.sojaplus.com.br/site/br>>>.



of the Cerrado, Bernardo recalled the existence of a workgroup composed of various actors, including civil society, producers and the government), which has been acting to drive an increase in productivity in already converted areas.

Some of the projects jointly developed with IPAM and The Nature Conservancy identified the surplus native vegetation in the Cerrado and are negotiating with consumers in Europe in favour of compensation for the conservation of this surplus. However, for this to happen, a payment of around USD300 million is necessary over the next five years, considering an average opportunity cost of USD150 per hectare per year, which must be paid to producers with a Legal Reserve surplus.

Bernardo presented data that show that 10 million hectares of soybean crops have expanded to the Cerrado over the past 15 years: from 7,5 million hectares in 2001 to 17 million hectares in 2019. From 2001 to 2005, 27 per cent of cultivated soybeans used new Cerrado areas. From 2006 to 2014, expansion was observed in 18 per cent new areas and 82 per cent cleared areas. From 2014 onwards, 7 per cent of soybeans were planted in areas of native vegetation and 93 per cent in already cleared areas. The expansion of soybeans to native forest areas was observed in only 7 per cent of the total planted area. This decrease was attributed to the fact that areas with greater aptitude for soybean cultivation were used first, as well as the need to ensure legal security related to increased monitoring.

He concluded his presentation by arguing that although private environmental governance has proven to be efficient, he deems it necessary to strengthen public environmental governance. To illustrate this need, he cited as a negative aspect the recent proposals to alter the Forest Code.

**Link to the presentation:** <<https://bit.ly/30FhPZF>>.

### **Presentation 3: “The beef production chain”**

**Speaker: Mariane Crespolini**, Director of the Sustainable Production and Irrigation Department of the Secretariat of Innovation, Rural Development and Irrigation of MAPA

**Session summary:** Mariane’s presentation dealt with beef cattle sustainability, her previous professional experience in MAPA and the government’s commitments regarding the sustainability of the beef production chain. She defined herself as a cattle breeder, raising calves and cattle in semi-confinement in Mato Grosso.

International experience on beef cattle shows that it is easier for smaller countries to stick to a national plan. France, the largest agricultural country in Europe, is 17 times smaller than Brazil. Scotland is 11 times smaller than Mato Grosso. Australia is the largest beef exporter in the world, despite having a smaller herd size than Mato Grosso. She highlighted that most areas in Brazil are protected, 51 per cent of them in the Amazon; from that perspective, the rural producer in Brazil is a conservationist.

Mariane stated that most of the country’s rural producers, farmers and cattle breeders do not receive any compensation for environmental services, as stated in the Brazilian Forest Code. In Europe, where she studied agricultural policy, direct payment for environmental services is a pillar of sustainability, something that has yet to become a reality in Brazil.

Regarding beef cattle, 60 per cent of the country’s productive area is composed of pastures. There are controversies regarding how much of this pasture area is degraded. According to Mariane, pasture areas that have been degraded by cattle ranching have been seconded to other cultures and agriculture and, even under these conditions, production has increased.

She explained that there has been an increase in beef productivity in Brazil since 1990 and a reduction in areas occupied by pasture, freeing up space for agricultural activity. She cited a study by EMBRAPA researcher Geraldo Bueno Martha Junior, which used an econometric model to measure how much of this beef production increase was due to an increase in pasture area and how much was due to increased productivity.

Many countries, such as the US and Canada, slaughter their beef cattle at a very young age. A weaned calf goes straight to confinement and intensive slaughter. In Brazil, the process is different—less than 14 per cent of beef cattle are slaughtered in confinement. In addition, there is a system of short confinement (90-120 days) for cattle. Therefore, there is a sustainable effect of pastures absorbing greenhouse gases, which earns Brazil a competitive edge.

Mariane said that, up until 2006, most animals were slaughtered within three years in Mato Grosso. Currently, some animals are slaughtered within two years. The speaker questioned what the incentives for a cattle rancher would be to wait four or five years for the animal to reach slaughter age. To answer this question, she presented data from the Centre for Advanced Studies in Applied Economics (Cepea), showing that almost all beef cattle ranches exhibit good performance and economic sustainability in the short term. However, considering a performance analysis over the medium and long terms, say a period of

ten years, when the producer would have to reform his pasture or replace a tractor, the situation changes. She said that if, in a period of 10 to 20 years, the price of beef cattle does not rise to record levels, half of Brazilian cattle breeders will no longer be financially sustainable in their properties.

This is the profile of the cattle breeder that is leasing his land, as soybeans have much higher yields and return to investment per hectare. The economic pressure for cattle breeders to become more profitable will eventually drive the system to become more sustainable.

She presented some simulations showing that, for average and high productivities, land valuation is not a crucial aspect for economic viability. In a property with a system to integrate agriculture and cattle rearing, the rate of return to investment—not considering the purchase and sale of land, leasing the land of a neighbour with degraded pasture—is higher than for a situation with the purchase of land and its subsequent sale after valuation. To Mariane, this would illustrate a significant trend: land valuation is becoming less important for beef cattle rearing. This would allow for more productivity and competitiveness, including in agriculture.

To explain the challenges and opportunities of integration with agriculture, she cited a study from 2018 showing the evolution of profitability of a rural property since 2011. During that year, the producer was engaged in cattle rearing when he realised that he needed to increase the property's productivity. He did not have enough resources for pasture reform—an expensive procedure—and therefore sought integration with agriculture. By integrating cattle rearing and agriculture, the producer increased the profitability of his property: from around BRL600,000 per year in 2011 to BRL1,400,000 in 2014. In this sense, economic pressure can help catalyse sustainability in Brazilian production.

Mariane said that Brazil is one of the only countries in the world where it is possible to have a negative balance of GHG emissions. She cited a study on how beef consumption can help reduce emissions, published in the *Nature Climate Change* journal<sup>16</sup>

She then spoke about the Brazilian government's commitments, citing the 12 years of the ABC Plan and MAPA's national policy. She mentioned the recent conclusion of the first phase of the Sustainable Rural Project, whose environmental and social data were made available, and the ABC Cerrado plan, which is currently being implemented. About the system for the integration of agriculture–cattle rearing–forests (iLFP) within the ABC plan, she cited examples of rural properties where there is an alternance between the cultivation of soybeans and maize and pasture areas for cattle, which demonstrates sustainability, technology and innovation, while generating additional income for the rural producer.

Despite the increased productivity of the beef cattle production chain, indicators point to an average of four *arrobas*<sup>17</sup> per hectare per year, a low value in her estimation. Answering the question of how much would beef consumption increase worldwide if Brazil increased its productivity, she cited data from the 'Cattle Rearing Rally': if there was a 25 per cent increase in the productivity of the country's most productive rural properties, Brazil alone would be responsible for increasing worldwide beef consumption from the current 10 kilos per capita per year to 15 kilos per capita per year. This projection illustrates the country's productive potential in the beef sector.

Finally, she stated that most of the country's meat production (including poultry, pork and beef) is destined for domestic markets. According to her, 80 per cent of the Brazilian beef production stays inside the country, leading to direct and indirect jobs and taxes, reinforcing the sustainability of production.

**Link to the presentation:** <<https://bit.ly/2we4f1k>>.

#### **Presentation 4: "Sustainability indicators"**

**Speaker: Regina Sambuichi**, DIRUR Researcher (Ipea)

**Session summary:** Regina Sambuichi began her presentation by defining what an indicator is: a tool to provide information about a complex reality. Based on a mathematical formulation, the indicator is translated into an index, which in turn will inform decision-making processes. Characteristics of a good indicator include being faithful to reality and presenting no biases or distortions. In addition, the indicator must be well constructed and synthetic enough to be objective and easily assimilated.

She presented the concept of sustainability, according to the Brundtland Report definition, and the principle of precaution. It is important to consider the viewpoint of welfare and social justice in addition to simply economic development. To illustrate the principle of precaution, she recalled information from previous lectures that identified the importance of preserving vegetation for agriculture with a view to preserving the rainfall regime and ecosystemic services.

16. See: <<https://www.nature.com/articles/nclimate2916>>.

17. 1 *arroba*=14.6kg.

Regarding Ipea's study areas related to sustainability and agriculture, she highlighted studies on biodiversity conservation areas, water availability and emissions, among others. For these studies to produce results, it is important to identify which indicators and which formulations are best able to answer the questions that are raised.

She stated that there are many ways to approach the issue of sustainable agriculture, highlighting the importance of the indicators of the 2030 Agenda for Sustainable Development as a guiding tool in the definition of initiatives and public policy. Sustainable Development Goal (SDG) 2, "Zero Hunger", contains Target 2.4, which intends to ensure sustainable food production systems by 2030. The indicator of this goal is the share of agricultural area engaged in productive and sustainable agriculture. There are no data for this target available at IBGE's website<sup>18</sup>—the institution responsible for the development of SDGs in Brazil—but in fact there is no indicator for this target. There is still no methodology or indicator that translates the number of hectares engaged in sustainable agricultural activity in the country.

As examples of methodologies that might be used to define indicators, she cited: the Organization for Cooperation and Economic Development (OECD)'s Pressure-State-Response framework; the Ecological Footprint, which, although being hard to quantify, shows how much ecologically productive territory is used by a given sector or population; the MESMIS method, used to evaluate whether a productive area is used in a sustainable manner; the IDEA method, developed upon request by the French Ministry of Agriculture, using the main dimensions of sustainability in agricultural systems with various indicators of the agro-environmental, socio-territorial and economic areas; and the ISA method developed by Emater.

Regina explained that Ipea researchers also work with indicators that aim to reconcile sustainability variables in agricultural endeavours with economic and social variables. To that end, microdata from the Agricultural Census are used and an analysis is performed of data on biodiversity, emissions and water. However, she pointed out difficulties: secrecy at IBGE offices and alterations resulting from the reformulation of the survey in 2017.

She finished her presentation by indicating that the main objective of these surveys is to monitor public policies to improve available information on the sustainability of agricultural establishments, as well as to establish parameters to evaluate them.

**Link to the presentation:** <<https://bit.ly/2JyRc3j>>.

### **Presentation 5: "Economic and environmental challenges of beef and soybean production chains"**

**Speaker: Sérgio Schlesinger**, Economist and Consultant for FASE

**Session summary:** Sérgio Schlesinger began his presentation by highlighting the issue of social justice, whether considering sustainability of a particular production chain or sustainability as a whole. This theme should be approached from the perspective of income distribution, which is a serious problem in Brazil. It is important to realise how the social issue is embedded into agriculture, especially in soybean and beef production chains—which, on final analysis, would be one and the same, since soybeans are used as animal feed.

On the economic issue and the perspective of foreign trade, Sergio said that Brazil is reliant on agricultural exports. The soybean complex accounts for 40 per cent of those exports in terms of value; meat for 14 per cent; maize for 4 per cent. That is, almost 60 per cent of the country's agricultural exports are concentrated in those three items, and soybeans represent 17 per cent of Brazil's total exports.

Although Brazil alternates its position with the US regarding productive capacity, it is the largest soybean exporter in the world. Beef comes in second place. According to IBGE data, 150 million hectares are occupied by beef cattle; on the other hand, data from the National Supply Company (CONAB) show that 35.8 million hectares are used by soybeans. Corn comes in third, with 17.3 million hectares, followed by sugar cane. Rice, beans and wheat combined—which are the grains the average Brazilian sees at their table—take up only 6.7 million hectares of planted area. Sergio stated that the land dedicated to growing these grains has been decreasing, and therefore he would use data from beef cattle ranching and soybean crops to analyse the impacts on the country's territory and society.

He stated that soybean production is concentrated in the Centre-West region of the country, especially in Mato Grosso, after migrating from the South due to stagnation. Beef cattle ranching, in turn, migrated largely to Pará. Maize production is concentrated in the Centre-West and is rotated with soybeans. Beef cattle growth is concentrated in the Centre-West, followed by the North region.

18. See: <<https://ods.ibge.gov.br/xcc/global?page=ods>>.

Soybean production increased from 18 million tons in 1985 to 52.5 million tons in 2006. Over the same period, the number of jobs created by the soybean production sector fell from 700,000 to 419,000. To Sérgio, much is said about productivity, but the higher the production, the lower the employment level. The application of high-end technology and the level of job generation are very important themes for the agricultural sector in particular, and for society as a whole.

Another issue is the use of pesticides. Brazil is the world leader in the consumption of pesticides; around 56 per cent of total pesticide sales are used in soybean cultivation, and the purchase of pesticides is subsidised by the government. The application of pesticides is yet another dimension of the problem: in Rio de Janeiro, pesticides that are applied through airborne pulverisation were detected in the water supply. This shows that it is not possible to control the reach of pesticides, especially in regions where there are populations neighbouring soybean, maize and cotton plantations, for example. He highlighted that the water supply of 25 per cent of all Brazilian cities is contaminated by 27 different kinds of pesticides, as their impact is not contained to the area where they were applied.

Water security and the risk of water shortage in large cities, such as São Paulo, Rio de Janeiro and Brasília are additional economic and environmental challenges for beef and soybean production chains. Water risk is not immediately associated with the Cerrado biome, which harbours some of the main river basin sources in Brazil. For that reason, it cannot be dissociated from beef cattle rearing in Brazil.

Beef cattle rearing is responsible for most of the GHG emissions worldwide, but in the Brazilian case, the main factor is changes in land use—especially deforestation and cattle rearing.

Brazil is a large consumer of beef. Citing data from the previous presentation that show that 80 per cent of Brazilian beef is consumed within the country, Sérgio questioned who consumes it and who does not. Brazil is characterised by very unequal wealth and income distributions. The agribusiness sector benefits the most from business opportunities, and the GDP related to agriculture is concentrated in the industry and commercialisation of agribusiness production.

Concluding his presentation, Sergio detailed the potential to mitigate the economic and environmental challenges of beef and soybean production chains by: i) incentivising the production of organic soybeans—EMBRAPA is already acting on this; ii) promoting less intensive methods of cattle rearing—EMBRAPA has developed a system to integrate agriculture, livestock rearing and forestry in Brazil In 1993, but its reach is still limited; iii) incentivising the use of degraded areas; iv) transitioning to a model that is less dependent on the use and export of natural resources; and v) changing food consumption patterns.

**Link to the presentation:** <<https://bit.ly/2QgVGMMy>>.

**Video: Panel 3 — “How can Brazil and companies in the country build large-scale, mutually beneficial and sustainable production chains?”** <<https://youtu.be/PHDw24vX-Qk>>.

#### **Panel 4 — “How can Brazil expand existing opportunities for multilateral investments?”**

**Moderator: Renato Leonardi**, Adviser for the Department of the Environment for the MRE

##### **Speakers:**

- **Daniela Baccas**, Chief of the Department of the Environment and Management of the Amazon Fund, BNDES
- **Miguel Lanna**, Project manager—KfW
- **Jaine Ariély Cubas Davet**, Director of Enrolment and Forestry Fostering of the Brazilian Forest Service (FSB) of the Ministry of Agriculture, Livestock and Supply (MAPA).

##### **Presentation 1: “The Amazon Fund”**

**Speaker: Daniela Baccas**, Chief of the Department of the Environment and Management of the Amazon Fund, BNDES

**Session summary:** Daniela Baccas’ presentation focused on Brazil’s unique experience with development and the results of the Amazon Fund after 10 years.

The Amazon Fund was created based on an initiative of the Brazilian federal government in 2008, due to the extraordinary reduction in deforestation in the Amazon registered at the time—from 2004 to 2008, deforestation in the Amazon was reduced by half. This led to the idea of creating a financial incentive to reduce emissions, deforestation and degradation—REDD—and of raising funds abroad which could enable the maintenance of conservation projects in the Amazon region.

Donors supported this initiative: of the BRL3.4 billion raised in the 10 years since the Amazon Fund's creation, 93 per cent came from donations from the government of Norway, 6 per cent from the KfW Bank and a small amount from Petrobras. GiZ also participated in technical assistance that supports many of the Fund's initiatives.

The Fund is managed by the BNDES, which is responsible for raising funds and selecting projects to be financed, as well as being accountable for these choices. There is a multi-stakeholder Steering Committee, with representatives from the federal and state governments, which provides guidelines, approves the annual report and validates accountability, and monitors the application of resources.

The Fund's Technical Committee, on the other hand, is in charge of validating deforestation data which allows to calculate the value of a ton of carbon (currently at USD5/ton). This validation yields numbers that inform BNDES fundraising efforts to support the Fund's projects. This governance and transparency are the main pillars of the Amazon Fund. Information on all projects is available online. Daniela explained that there are two separate auditing procedures: one related to compliance and the other related to finances. There is also an evaluation regarding the effectiveness of projects.

The BNDES, together with GiZ, is carrying out a procurement process for an independent midterm evaluation of the effectiveness of the Amazon Fund for the past 10 years, to extract contributions and lessons learned. Issues of transparency are crucial for donors and new fundraising efforts.

The Fund has BRL1.9 billion in commitments to contracted projects, in addition to an additional BRL1 billion in disbursements. Projects involve various partners in the public sector (states, federal government) and 60 per cent of the funds come from the public sector.

Of the 103 projects supported by the Fund, most are from the third sector, but in terms of resources, those from the public sector are more prevalent. Support to Amazon Fund projects come from the PPCDam's thematic areas, which are divided into four axes: a) land-use planning; b) planning of sustainable productive activity; c) monitoring and evaluation; and d) science and technology and economic instruments. Each project financed by the Fund must adhere to at least one of these axes. For example, there are projects supporting monitoring and evaluation to deal with bottlenecks in satellite resolution that monitor deforestation. There is an international project dealing with the Amazon Cooperation Treaty, which expands monitoring cooperation among all countries harbouring the Amazon.

There are projects that strengthen the prevention and control of forest fires, providing better infrastructure for fire brigades. Forest fires are a significant source of GHG emissions. The Fund has a line geared towards capacity development. Other projects focus on the environmental protection of protected areas with indigenous populations, within the framework of the national policy of managing indigenous land, involving the improvement of monitoring for these territories.

There are science and technology projects linked to other themes, such as sustainable productive activity and monitoring. There are also oversight projects that strive to improve the inspection capacity of environmental bodies such as IBAMA.

Daniela highlighted two axes geared towards sustainable rural economy. First, the Rural Environment Registry (CAR). The Amazon Fund dedicated over BRL300 million to support the enrolment of 12 states. Projects in five states outside the Amazon biome were also contemplated, given that 20 per cent of the Amazon Fund resources can be used in monitoring and control of biomes in other states and countries harbouring tropical forests.

She also mentioned the massive challenge of implementing the Forest Code, underscoring the help of the Amazon Fund with, for example, enrolment in CAR. Some states are already in the implementation validation phase. Currently, funds are being applied with a view towards production chains.

The second axis refers to sustainable productive activities supported by Amazon Fund resources. They directly and indirectly support 338 institutions in activities that seek to preserve the forest, with economic alternatives to deforestation and whose target audience is composed of traditional, indigenous and riverbank communities, supported through various sustainable development projects. These projects include the açaí, honey, eco-tourism, copaiba, manioc and arts and crafts production chains, as well as others that are based on the forest economy. Sales of products from these chains result in over BRL140 million in income benefiting over 160,000 people.

In its search of a vision of commerce chains and business plans to logistically reach other markets and attain a larger scale, the Fund has acted with greater capillarity through agglutinative agents. Daniela believes that it is necessary to seek a deeper combination of resources, such as from private and international agents and from the Brazilian economy, with the possibility of blended finance and resources from environmental and social pacts, in addition to other economic instruments, to provide environmental sustainability and innovation in bioactivities, bolstered by science and technology.

## **Presentation 2: “KfW–REM (REDD Early Movers)”**

**Speaker: Miguel Lanna**, KfW Project Manager

**Session summary:** Miguel Lana presented the REM (REDD Early Movers) project, one of the German Cooperation’s initiatives, and explained some of its most important aspects. He focused his presentation on REM initiatives in partnership with the government of Mato Grosso and stressed that the KfW is the German State bank, which promotes the German government’s bilateral cooperation policies.

REM is one of the German government’s financing instruments for climate protection and EUR312 million have been committed to it. Miguel highlighted that the KfW is also working on two other projects with SFB, related to the Rural Environmental Registry and sustainable forest management. The German cooperation with Brazil is structured around two main axes: forest conservation and renewable energy sources. EUR200 million have already been destined to forest conservation.

The German government is interested in acknowledging and compensating pioneering national or subnational initiatives to reduce emissions from deforestation and forest degradation (REDD). The REM project has sought to promote the improvement of initiatives towards better land use and the preservation of forests.

Unlike the Amazon Fund, the national and international REDD mechanisms do not yield Carbon emission certificates, for the German government or any other. In other words, it does not generate an offset, consisting simply in a recognition of preservation efforts.

The project revolves around three pillars: verified, monitored and certified reduction; payment according to attained results; and distribution of benefits. In the case of Mato Grosso, around 60 per cent of benefits are reverted to the local population to promote sustainable rural development, based on the PCI perspective.

REM projects are present in other countries, such as Colombia, Guatemala, Mexico, Peru, Indonesia and Ecuador. In Brazil, a REM project has already been concluded in the state of Acre and two additional projects are currently under way (the second phase of the Acre project and one in Mato Grosso).

The approach of REM initiatives is subnational, by biome. As it uses international tools, but works at a subnational level, it is crucial to establish a healthy dialogue with governments. In this sense, although the project to determine the forest reference emission level (FREL) takes place in the state of Mato Grosso, the whole suite of tools from the federal Ministry of the Environment was used.

As it is a bilateral cooperation initiative, the project’s operational team is small and faces difficulties in developing and implementing new initiatives in Brazil. Miguel highlighted the partnership’s long negotiation process, citing as an example the history of the project in Mato Grosso, talks for which began in 2015 but whose contract was only signed in 2017.

As for guiding criteria, projects must have positive environmental and socioeconomic impacts, adhere to principles safeguards and good governance principles, and be consistent with public policies. The REM project in Mato Grosso receives resources from the German Cooperation (EUR17 million) and from the government of the UK (GBP24 million). As the financial agent promoting this cooperation, the KfW has a mandate to implement these resources. The Brazilian Fund for Biodiversity (Funbio) is the financial manager, the Secretariat of the Environment (SEMA) is responsible for the programme’s technical coordination and the government of Mato Grosso is an implementation partner.

The funds invested by the German Cooperation were agreed on based on deforestation to be prevented over an established period at a rate of USD5/tCO<sub>2</sub>.

Concluding his presentation, Miguel mentioned the SISRED management committee and a Project Committee that is responsible for planning and strategic decisions. On the operational side, Funbio is the financial manager with four main financing lines; indigenous territories; family farming; sustainable production and innovation; and institutional strengthening.



REM is a complex project that is active in many different fields; however, even though its financial resources are significant, they are still scarce given the project's breadth.

**Link to the presentation:** <<https://bit.ly/2JYgabV>>.

### Presentation 3: "Forest Investment Programme (FIP)"

**Speaker: Jaine Ariély Cubas Davet**, Director of Enrolment and Forestry Fostering of the Brazilian Forest Service (FSB) of the Ministry of Agriculture, Livestock and Supply (MAPA).

**Session summary:** Jaine Davet explained that one of the many themes that fall under the framework of the Strategic Climate Fund is the Forest Investment Programme, created to facilitate deforestation reduction and the implementation of the Forest Code, promoting a more sustainable management of forests that can contribute towards the GHG emission reductions and the maintenance of forest carbon stocks.

The Fund is a trust fund created in 2009 by 14 contributing countries and managed by the World Bank Group. The FIP in Brazil is an initiative of the federal government geared towards the reduction of deforestation, which intends to improve environmental management in anthropized areas for the generation and provision of environmental data of Cerrado areas, the second largest biome in the country.

Under the scope of the FIP, Jaine has followed the Amazon Fund in the Caatinga biome as well as projects that incentivise the registration of rural properties. The FIP's operationalisation comprises the ministries of the Environment (MMA), Science and Technology, Innovation and Communications (MCTIC), and Agriculture, Livestock and Supply (MAPA).

The following FIP projects are under the purview of the Brazilian Forest Service: the National Forest Inventory (IFN); the Project for the Environmental Regularisation of Rural Properties in the Cerrado (FIP CAR); and the recently-released FIP Rural Landscapes. These are all coordinated by the MMA.

In her presentation, Jaine covered two projects: FIP CAR and FIP Rural Landscapes. FIP CAR's goal is to improve the environmental regulation of rural properties in the Cerrado, to conform with federal law. It covers 11 states: Bahia, Distrito Federal, Goiás, Maranhão, Minas Gerais, Mato Grosso, Mato Grosso do Sul, São Paulo, Paraná, Tocantins and Piauí. The project was approved by the Board of Directors in 2015, the loan agreement was carried out in 2017 and it is expected to last until February 2020. It is the only project among all FIPs in Brazil that is configured as a loan. It is currently undergoing a midterm review and is being restructured.

It has recently been changed to fall more in line with other international programmes, which has led to significant progress in the registration of rural properties. Brazil has a database of over five million registrations. The reformulation of FIP CAR seeks to enable the analysis of registrations as well as their validation, so that owners can implement the Environmental Regularisation Programme (PRA). In other words, it would be up to the governments of Cerrado states to inform land owners if any adjustments are required to register rural properties, allowing for environmental regularisation and the definition of their Environmental Reserve Quota.

The deadline for implementation is February 2020, but an extension is being negotiated. Financial resources (USD32 million) are made available via loans, with a non-financial counterpart of USD17.5 million. Project components include: a) strengthening of states to operationalise the CAR in all registration procedures; b) registration of rural properties in selected municipalities; c) management, monitoring and evaluation of the project.

The beneficiaries are smallholder producers, with a CAR registration of up to four fiscal modules.<sup>19</sup> The project seeks to extend environmental regulations to all rural properties. In this vein, the Directorate for Forest Fostering and Registration of the Brazilian Forest System will attempt to fund analysis to help states bolster their personnel and equipment, as well as improve the federal government's system to make it more dynamic and efficient when analysing registrations.

The objective of the recently-released FIP Rural Landscapes programme is to incentivise the adoption of environmental conservation and restoration practices, as well as the use of sustainable, low carbon emission agricultural practices in selected river basins in the Cerrado biome. The integration of the Brazilian Forest Service intends to help rural landowners understand and implement this project adequately. According to Jaine, this will make it possible to promote the restoration of pastures and improve productivity and income.

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19. Fiscal modules are units of measurement, in hectares, whose value is determined by the National Institute of Colonization and Agrarian Reform (INCRA) for each Brazilian municipality according to set standards. The value ranges between 5 and 110 hectares.

The programme was also designed for the Cerrado biome and covers nine states: Bahia, Goiás, Maranhão, Minas Gerais, Mato Grosso, Mato Grosso do Sul, São Paulo, Tocantins and Piauí. The resources allocated to this project add up to EUR21 million.

It is characterised by: a) institutional development and professional training in landscape management through the application of the National Rural Learning Service (SENAR), providing technical assistance for producers in 53 selected basins; b) a new diagnosis in these 53 basins; and c) a target audience of 4,000 rural landowners, who will all be visited.

In 2016, MAPA and the SBF invited other institutions to elaborate and implement the project, including EMBRAPA, INPE, SENAR and the GIZ. In 2017, MAPA and the SBF, together with partner institutions, forwarded the project to the World Bank. In June 2018, the project was approved by the World Bank and the FIP committee. In November, the donation contract was signed by the GIZ and the World Bank. The GIZ will receive the funds to execute the project, with coordination falling under the purview of the SBF, MAPA and the Bureau of Innovation. Launched in April 2019, the Project will select nine priority basins with degraded pastures and environmental liabilities to provide rural producers with opportunities to increase income and productivity.

**Link to the presentation:** <<https://bit.ly/2HxrQRe>>.

**Video: Panel 4 — “How can Brazil expand existing opportunities for multilateral investments?”**  
<[https://youtu.be/ClzoP\\_jjK8M](https://youtu.be/ClzoP_jjK8M)>.

### Key messages from the first day of the Seminar

#### Discussants:

- **Juliano Assunção**, Associate Professor of Economics (PUC-RIO) and Executive Director of CPI Brazil;
- **André Guimarães**, Executive Director of IPAM and member of the Brazil Coalition

**Júlio Assunção** started by highlighting some common points in the day's presentations:

1. **Brazil's comparative advantage** in the reconciliation of agricultural production and preservation of natural resources. It was clear in many of the presentations, from the early interventions discussed in the first panel to concrete examples such as the PCI strategy and the ABIOVE initiatives, that the country has been able to reconcile both agendas.
2. **Land use in Brazil is a global issue.** The way the country uses its natural resources has international repercussions, especially related to the climate. This happens in different ways: i) a concrete, commercial sphere, related to stricter demands by consumer markets such as those that drove the soy moratorium; ii) international participation through cooperation; and iii) the creation of a carbon market, with the interest of several sectors in compensating their emissions.
3. **There are many initiatives under way to improve the use of natural resources**, contributing to their protection and better management, with increased productivity.
4. He stressed the country's need to review its international attitude regarding climate change. The concern of the international community with climate change leads to a greater appreciation of Brazil's exports and natural resources because of the country's capacity to expand agricultural production in tandem with environmental protection.

Brazil needs to maintain its deforestation-reducing efforts and strengthen its command and control instruments. The country's economic development is only tenuously linked to low-productivity activities related to deforestation. There is a need to implement and maintain the Forest Code, a unique piece of legislation that links agricultural production with the protection of environmental resources. Juliano believes that Brazilian society should not stand for recent attempts to dilute this important framework, given that it undermines recent efforts to strengthen institutions, mobilise the private sector and attain comparative advantages to access international markets.

Finally, he stressed that it is necessary to carefully think about the set of public policies surrounding agriculture, especially rural credit. There is a need for better alignment between public financial resources with the Forest Code to meet the new needs of the agricultural sector.

**André Guimarães** commented that he has always worked in the environmental field, and that the Seminar would not have happened even five years earlier, when the negotiations around the Forest Code ended. He recalled that the Minister of the Environment at the time, Izabella Teixeira, said that discussions around the Code were some of the largest debates in Congress since the Constitutional Assembly.

He highlighted that there was a consensus during the Seminar that it is possible, necessary and timely for Brazil to reconcile production and conservation. Brazil currently has two main responsibilities: i) to ensure the food security of around one billion people worldwide as one of the largest food producers—Brazil has a market share of around 7-8 per cent of the global agricultural commodities; and ii) to continue contributing effectively towards mitigation of climate change through a reduction in deforestation; the country proved capable of reducing deforestation in the Amazon by 80 per cent in 2010-2011. Brazil's contribution in mitigating the effects of climate change between 2003-2004 and 2012-2013 was equal to the contribution of the entire EU.

André stated that Brazil cannot prioritise its food production in detriment of environmental preservation, not only because of possible market restrictions, but also because preservation positively influences agriculture—for example, by sustaining the rainfall regime.

To him, it is necessary to put a stop to the ideological and unproductive debate between conservation and production, and to promote a country-wide collaboration on the issue. Brazil needs to be better inserted in the global climate agenda as it once had a protagonist role, for example during the negotiation of the Kyoto Protocol.

He concluded by stressing the importance of joint initiatives by the Ministry of Agriculture, the Ministry of the Environment and the Ministry of External Relations to lead the process of environmental conservation and sustainable production.

## Day 2 – 15 May 2019

### How can Brazil seize new business opportunities using existing public policies?

#### Panel 5 — “What opportunities are offered by the Forest Code?”

**Moderator: Flavia Witkowski Frangetto**, Visiting Researcher, DIRUR, Ipea

#### Speakers:

- **Joana Chiavari**, Senior Analyst, CPI Brazil
- **Raoni Guerra Lucas Rajão**, Professor and Researcher, UFMG
- **Beto Mesquita**, Director of Policy and Institutional Relations, BVRio

#### Presentation 1: “The 20120 Forest Code: institutional and legal frameworks”

**Session summary:** Joana Chiavari explained that Brazil has a normative set of refined and comprehensive land use policies, including protection, sustainable forest management, deforestation monitoring and command and control, reforestation and restoration of degraded areas, economic instruments for conservation, among others. She highlighted the Forest Code, which reconciles the goals of increased agricultural production and the protection of natural resources in Brazil. On the one hand, the Forest Code establishes rules for the protection of native vegetation through the compulsory Legal Reserve and Permanent Conservation Areas, which impose certain restrictions on the use of rural properties. The Code can accelerate the modernisation of Brazilian agriculture and foster greater productivity. It has also adopted a series of information systems that contribute to reducing deforestation, including the Rural Environmental Registry (CAR) and the National Source Control System for Forest Products (SINAFLOR).

The Forest Code represents a guarantee that food production in Brazil will be carried out with a view towards protecting the country's natural resources, acting as a quality control certificate that can improve access to international markets.

It was approved in 2012 after a long, tumultuous process which resulted in legislation that is difficult to apply, full of nuance and complexities that must be properly understood.

Joana went over its main instruments and obligations. First, she explained the instruments for the protection of native vegetation in private properties: Areas of Permanent Preservation (APPs), the Legal Reserve and the Authorisation for the Suppression of Vegetation (ASV).

APPs are sensitive areas where vegetation must be preserved for the maintenance of essential services. Examples include waterway protection lanes; areas surrounding water sources, lakes and ponds; hilltops; regions at an altitude higher than 1,800m; and sandbanks and mangroves.

The Legal Reserve represents a percentage of the rural property's total area where native vegetation must be preserved. It varies from 20 per cent to 80 per cent, according to the type of vegetation and geographic region of the property. Deforestation of areas of the property not covered by the APPs or Legal Reserve—in other words, areas liable to legal deforestation—still require formal authorisation (ASV) by the competent body. Even given this proper authorisation, reforestation is still mandatory.

Joana also mentioned another aspect of the CFP—the creation of two coexisting legal frameworks. The new Forest Code requires all rural landowners to respect the legal provisions of the APPs and the Legal Reserve. However, it foresees a special legal framework, with more flexible rules, for areas consolidated in APPs and Legal Reserve, where the vegetation was illegally suppressed to carry out agricultural, livestock rearing or forestry activities before 22 July 2008. In addition, the new forest law granted small rural landowners an even more benevolent treatment in consolidated areas.

This special framework was the way legislators found to facilitate the enforcement of forest law by landowners that did not follow the rules of the previous code. However, it is important to point out that those who did abide by the rules and respected the law, maintaining the APPs and the Legal Reserve, did not receive any compensation.

Joana highlighted other important instruments of the Forest Code: the CAR is a nationwide, electronic public registry that is mandatory for all rural properties, which stores and processes georeferenced information regarding APPs and the Legal Reserve to conduct effective environmental and economic planning in rural areas and to better monitor and combat deforestation in private areas. Sinaflor, whose goal is to integrate origin control of timber and other forest products, aims to afford more transparency in the issuance of authorisations and in forest transactions, helping in deforestation control. The Environmental Regularisation Programme (PRA) comprises a set of rules and instruments through which rural land owners can promote the environmental regularisation of APPs and Legal Reserve areas that were occupied with agrosilvopastoral activities before 22 July 2008. In addition, there is a series of fiscal and economic instruments, such as the Payment for Environmental Services (PSA), the Environmental Reserve Quota (CRA) and the alignment of the Rural Credit with the Forest Code.

The Forest Code is federal legislation; however, its implementation by rural land owners depends on state legislation, which may vary significantly from state to state according to specific norms and procedures.

The requirement of registering every rural property into the CAR, including georeferenced information, reveals not only environmental but also land property issues. The better defined the right to property is, the more accurate the identification of those who are environmentally responsible and, therefore, the better the implementation of the Forest Code. On property rights, Joana highlighted several positive aspects of the CAR; however, it is but one of many elements of a complex system of rural registries that are active in the country. Although it has led to many advances in environmental planning and fighting illegal deforestation, the lack of integration of CAR's database to other rural registries is a lost opportunity in making progress against squatting, helping resolve land conflicts and ensuring greater legal security. She also cited the difficulty in applying the Forest Code in areas of collective land ownership, such as *quilombola* territories, indigenous lands, conservation units, agrarian reform settlements and land occupied by traditional communities.

Finally, she cited threats to the implementation of the Forest Code, motivated by proposals to alter the Forest Code by both the Executive and Legislative branches of the government, especially by way of parliamentary amendments, provisional measures and draft legislation. In particular, she cited Provisional Measure (MPV) 867/2018, whose original text proposed only the extension of the deadline to adhere to the PRA, but which was used to propose changes in other articles of the Forest Code. She mentioned that the approval of the draft bill conversion of MPV 867/2018, which alters the original text to incorporate several suggestions presented through parliamentary amendments, represents a step backwards as it weakens and delays the implementation of the Forest Code. It leads to a great risk of paralysing all PRAs that are under way, increases

benefits to rural landowners that have carried out illegal deforestation, and carries a real risk of judicialising the new rules, as they drastically alter the Forest Code's pillars and might stop advances in the implementation of the Code from consolidating.

Finally, she recalled that proposals for the alteration of the forest law might have implications in the fulfilment of Brazilian climate commitments, established in the Nationally-Determined Contributions, in the use of land, and in the access to international markets, given that measures to weaken the Forest Code might hurt Brazilian exports and agribusiness internationally. The implementation of the Forest Code allows for Brazil to link climate negotiations with commercial negotiations in its best interests.

**Link to the presentation:** <<https://bit.ly/2VXi4Re>>.

## **Presentation 2: “Deciphering the Brazilian Forest Code”**

**Speaker: Raoni Guerra Lucas Rajão**, Professor and Researcher, UFMG

**Session summary:** Raoni Guerra Lucas Rajão stated that he would present numeric and economic arguments in favour of the implementation of the Forest Code, as well as go over some of its potential challenges. His presentation was based on a study<sup>20</sup> carried out by a large team of researchers, including Professor Britaldo Soares Filho.

The implementation of the CAR was an absolute numerical success, but its validation remains a great challenge. PRAs must be implemented to combat illegal deforestation—the producers with a legal reserve deficit will have to pay for it somehow, whether through monetary compensation or through some initiative in the rural property. In this scenario, it is important to consider the costs and benefits to the rural producers in implementing PRAs.

First, one must acknowledge the heterogeneity of the Forest Code across the Brazilian territory. Raoni pointed out that over 10 per cent of the territory can be legally converted, and it would be up to the public authority to create regulations and provide options that would inhibit this possible conversion. However, he indicated that there are regions with a deficit of legal reserves, such as the states of São Paulo and Mato Grosso.

He pondered that, among the alternatives for regularisation, there are the CRAs, forest areas within small rural properties, and the legal reserve surplus. However, at the national level, there is a total offer of over 100 million hectares, while the maximum demand is only for 18 million hectares.

He then sought to identify where the demand for regularisation is concentrated and possible strategies for implementation. Under the Forest Code framework, it is necessary to validate around 5 million rural properties in the CAR, which might seem like an insurmountable task at first glance. However, when considering that 90 per cent of rural properties in the country are small, with few hectares—and a small number of properties are very large—and if registration is prioritised according to the size of the property, that perspective can change.

An exercise was carried out to examine the deficits in the states of Pará and Mato Grosso, sorting rural properties according to size, and it was possible to conclude that, in Pará, of the 163,000 registered properties, only 2,000 had a Legal Reserve deficit. Raoni explained that the requirement for regularisation was waived for small properties (up to 400 hectares). At the end of the survey, 117 properties were responsible for half of Pará's deficit. He does not believe that a deadline extension is adequate.

After this survey, the team sought to characterise the profile of producers that would be willing to regularise their properties. Socioeconomic profiles were collected for over 100 producers in 5 regions of the country, and these producers were questioned regarding the possibility of regularising their land, from the perspective of three hypothetical situations: whether regularisation could be carried out spontaneously (willingness to pay); through government pressure, liable to the application of a fine (enforcement); or through market demand.

When the land value is low, there is a higher willingness to regularise, as the producer considers that they stand to lose less money, or they might intensify cattle rearing by clearing larger areas. Another influencing factor is the age of the producer. The younger they are (less than 52 years old), the more likely they are to worry about the future legal situation of the rural property and the more likely they are to seek to regularise it.

Survey results were spatialised. The type of land use, profitability, price, and age of producer were calculated for each property enrolled in the CAR in the states of Pará and Mato Grosso, to understand the producers' reactions under different contexts.

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20. Soares-Filho, Britaldo et al. 2014. “Cracking Brazil's Forest Code.” *Science* No. 25, Vol. 344, Issue 6182, 363-364. DOI: 10.1126/science.1246663

In the business-as-usual scenario, only 9 per cent of the Amazon's deficit would be regularised. Results showed that 34 per cent of producers with land occupied by agriculture in the Amazon, the Cerrado and the Pantanal combined would seek regularisation, while only 4 per cent of land owners with land used for cattle rearing would seek to regularise their rural properties.

In the law enforcement scenario, 24 per cent of the area occupied by cattle rearing would be regularised, whereas agriculture presented marginal gains. In the market demand scenario, 100 per cent of the area occupied by agriculture would seek regularisation compared to 40 per cent of the land occupied by cattle rearing. Finally, in a scenario with stricter government control combined with market pressures, 67 per cent of the area occupied by cattle rearing would seek regularisation.

Given that these areas will be restored, Raoni said that in a business-as-usual scenario, carbon credits would go from 4 tCO<sub>2</sub>/y to 46 tCO<sub>2</sub>/y.

He concluded that rural producers are currently well-informed and realise that without registration, the cost of being outside the CAR is high as it hinders obtaining credit. However, once producers realise that data from CAR is not being used to fight deforestation, there are no concrete incentives for them to seek regularisation. Therefore, the benefits of regularisation must be increased, both in terms of avoided costs and in terms of environmental benefits (climate, regularisation of water services). Finally, he stated that it is very important to stop altering the Forest Code and extending deadlines.

**Link to the presentation:** <<https://bit.ly/2HwEZd8>>.

### **Presentation 3: “The Market for Environmental Reserve Quotas (CRAs)”**

**Speaker: Beto Mesquita**, Director of Policies and Institutional Relations, BVRio

**Session Summary:** Beto Mesquita started his presentation by discussing market expectations, specifically regarding CRAs. A CRA is a monetary bond, a marketable security that has a guaranteed reserve: native vegetation in private rural properties, whether protected or in the process of being restored in excess of the minimum required by law. The CRA has a voluntary character: every owner with a property that has more native vegetation than the minimum required by law can require the surplus to be converted into a marketable bond. It is up to the property owner, out of his own volition, to require the accreditation of that area as a bond.

He explained that each quota is equal to a hectare of vegetation. The ecosystemic and environmental services within the hectare are not carried by the quota, but the quota can back environmental services. There is a challenge regarding this point: he cited, as an example, the offer of 100 million hectares contrasted against a demand of approximately 19 million hectares. This would configure only one possible use for the quotas: Legal Reserve compensation. If this were the case, the Forest Code would not have established ‘environmental servitude’ or other similar mechanisms.

It is possible to use quotas for other ends, backed by native vegetation. It is necessary to consider these opportunities when thinking about the recurring discourse that the rural land owner who protects and preserves native vegetation above and beyond what he is required to by law deserves compensation and needs to be rewarded for it. To Beto, this will not only occur through compensation of legal reserve deficit. CRAs can be a more feasible market instrument and should be quicker to implement. However, this has not been the case so far.

Although there was a certain enthusiasm with the approval of CRAs in December 2018—BVRio has been working with a quota bank since 2012—there has been no progress since regarding the effective implementation of this market instrument, which rewards land owners with surplus native vegetation in their properties. Rural producers who protect forests effectively and beyond what is required by law are being hurt by the procrastination of this instrument, which is part of the implementation of the Forest Code.

The SICAR module of the government's website, through which rural land owners can request that surplus native vegetation in their property be converted into quotas, is not operational. State environmental bodies that participate in the process of implementing and validating quotas are also not prepared to deal with the demand from rural producers. To Beto, the main issue is the interaction between strategies, and determination and political will to prioritise the implementation of the project. At the state level, there is no certification process for over 100 million hectares of surplus vegetation awaiting regulation. There is no indication that this issue will be solved in the short or medium term.

BVRio is a non-profit organisation, whose mission is to promote the use of market mechanisms to facilitate the implementation of environmental legislation. It built the first platform for quotas of surplus vegetation in the country and works in several other fronts, such as the National Policy for Solid Waste (PNRS) and a proposal for reverse logistics credits.



Beto demonstrated the workings of BVRio's quota platform, highlighting that between 2012 and 2014 the organisation carried out significant fieldwork to disseminate it, counting on the implementation of the new law and the regularisation of the quotas. While the SICAR module was not yet completed, the organisation started the registration of rural property owners across all Brazilian states and biomes.

However, as the fieldwork dwindled down, BVRio almost decommissioned the platform. Afterwards a survey was carried out with rural land owners to determine if they still had surplus native vegetation and if they still wished to convert them into quotas. The survey had a positive response (of over 90 per cent) for both questions. However, legislation still needed to be enacted to allow for the actual issuance of quotas. Beto said that there are 1,500 enrolments in the BVRio platform, between offers and demands. Around 900 offers comprise around 8 million hectares, 71 per cent of which are located in the Amazon, 20 per cent in the Cerrado and the rest in other biomes.

Challenges of the sector include delay in the regularisation of quotas and their implementation, in addition to the notion that quotas are only good for Legal Reserve compensation. This notion arises from misinterpretation of the legislation that the state can deny the right to acknowledge the quota given the inexistence of a property to buy the quota. Beto clarified that although the state has the power to deny a quota to compensate for the legal reserve deficit of a given property, it cannot deny the property owner with surplus vegetation the right to have their quota acknowledged. Although quotas do not carry environmental services, they can cover for their payment.

Another issue is that the focus of public policy debate is always on environmental liabilities. For example, when discussing CAR validation, priority is given to those with more environmental liabilities rather than those with environmental assets. Land owners with vegetation surpluses are not receiving their due benefits or recognition for proper land management.

**Link to the presentation:** <<https://bit.ly/2EsrlWz>>.

**Video: Panel 5—“What opportunities are offered by the Forest Code?”** <<https://youtu.be/baqXs1n2dbl>>.

### **Panel 6 — “What are the opportunities afforded by Nationally-Determined Contributions (NDCs)?”**

**Moderator: João Francisco Adrien Fernandes**, Chief Adviser for Socioenvironmental Issues, Ministry of Agriculture, Livestock and Supply (MAPA)

#### **Speakers:**

- **Aline Soterroni**, Researcher, IIASA
- **Felipe Lenti**, Researcher, IPAM
- **Luiz Adriano Maia Cordeiro**, Researcher, Embrapa

#### **Presentation 1: “The Paris Accord and the NDCs: Insights from the GLOBIOM—Brazil model”**

**Speaker: Aline Soterroni**, Researcher, IIASA

**Session summary:** In her presentation, Aline Soterroni discussed the GLOBIOM–Brazil land use model for the design and evaluation of public policies and spoke about the goals and commitments of the Paris Accord. She presented a figure of the platform of the System for Estimating Gas Emissions (SEEG), depicting GHG emissions by sector in Brazil.

In 2015, approximately 70 per cent of Brazilian emissions came from the land use and agricultural sectors. Land use alone contributed to 78 per cent of emissions in 2004, and 46 per cent in 2015. All other productive sectors in Brazil have been increasing their emissions since.

Therefore, for Brazil to reach its NDC goals and contribute to the mitigation of climate change, it needs to pay special attention to land use and agriculture. Between 2004 and 2012, the reduction in GHG emissions from land use was largely due to the decrease in deforestation in the Amazon, from 27,772km<sup>2</sup> in 2004 to 4,571km<sup>2</sup> in 2012.

Aline recalled that Brazil has committed to reducing 37 per cent of its GHG emissions by 2025 (compared to 2005 levels) and 43 per cent by 2030. Other NDC commitments in the land use sector include eliminating all illegal deforestation in the Amazon by 2030, recovering 12 million hectares of native vegetation and implementing the Forest Code, which is indispensable for Brazil to fulfil its Paris Accord commitments and promote sustainable agriculture.

Aline described GLOBIOM–Brazil, which is a partial equilibrium, bottom-up economic land use model. It is spatially explicit, and the agriculture, cattle rearing, bioenergy and forestry sectors compete for the use of land. She presented an illustration of the model, according to which the products resulting from these sectors meet the demands of 30 countries and global regions, including Brazil's own internal demand, in a simulation stretching until 2100. Elements that are taken into account in the projection of these demands include population and GDP growth, per capita income, dietary preference and technological changes through increased productivity. She provided an example of how regions are connected through the GLOBIOM–Brazil model, demonstrating that China's increased demand for soybeans leads to increased soybean production in Brazil.

IIASA has been developing the GLOBIOM model since 2007. Since late 2012 and early 2013, a team of collaborating INPE and Ipea researchers has been adapting and developing the regional version of this model for Brazil. GLOBIOM–Brazil shares all original characteristics of the GLOBIOM model, in addition to specificities to reflect land use in the country. The model is simulated between 2000 and 2050, with 5- or 10-year intervals. In the base year, various Brazil-specific input data were introduced to the model. From 2000 to 2015, it is possible to validate GLOBIOM–Brazil projections to verify whether the model captures changing trends in the use of land in the country, which lends credibility to future projections. This model intends to aid in the analysis of medium- and long-term public policies.

Using one of the validation results, Aline compared the accumulated deforestation in the Amazon from 2001 to 2015, in a spatially explicit manner and in aggregate numbers, based on satellite data from Prodes/INPE and GLOBIOM–Brazil projections. She explained that the model captures deforestation trends in Brazil. It does not use historical deforestation as input data— all changes in land use captured in the model are due to competition in the use of land to meet demands for commodities. The main commodity acting as a driver for deforestation in the Amazon is beef. In the same vein, Aline showed validation results regarding soybean production and expansion, as well as Brazil's GHG emissions, reiterating the use of the model as a tool to help in the evaluation of public policies.

She then presented the evaluation of the Forest Code, which is essential for the fulfilment of the Paris Accord. Two scenarios were created in GLOBIOM–Brazil: one where the Forest Code was strictly observed and enforced, and another, counterfactual scenario, where it was not. It is exactly the difference between these two scenarios that allows for the evaluation of this policy.

In terms of governance, she presented the results of two scenarios: the no-Forest-Code or counterfactual scenario, where all competition for the use of land occurs to answer demands, without any deforestation control; and the Forest Code scenario, with its rigid control of legal deforestation, requirement for the preservation and/or restoration of Legal Reserves and APPs, among other devices. The counterfactual scenario has no restoration and the Forest Code scenario has 12 million restored hectares, according to 2016 CAR environmental debt values and their compensation via CRAs.

In the first result of the comparison, a bar graph shows the increase in agricultural area under both scenarios. Even if the Forest Code is strictly observed, the agricultural area will decrease only 4 per cent by 2050, compared to the no-governance scenario. In other words, there will be no significant loss in agricultural production if the Forest Code is enforced. However, the prevention of converted vegetation (deforestation) is of 53.4 million hectares from 2010 to 2050, an area almost equal to the state of Bahia. Aline raised the following question: "How is it possible to reconcile forest preservation and agricultural growth?" The model indicates that such a thing is possible through intensification of agriculture.

Citing model projections of the conversion of native vegetation, she said that most deforestation, under a no-governance scenario, happens in the Amazon. As the Forest Code is not a legislation that targets zero deforestation, legal deforestation can still happen in this biome.

She went back to the subject of the Paris Accord and interpreted the results of the model in terms of GHG emissions. Contrasting the Forest Code and counterfactual scenarios and positive emissions due to land conversion, and negative emissions due to CO<sub>2</sub> absorption (carbon uptake) through 12 million hectares of restored forest vegetation, the Forest Code contributes to the reduction of 1.03 GtCO<sub>2</sub>eq. In the NDCs, Brazil is committed to reducing its emissions from 2.1 to 1.3 GtCO<sub>2</sub>eq by 2030. It is essential for Brazil to adhere to the Forest Code in order to meet its goals, however the Code alone is not enough, given that other sectors are contributing to the increase of GHG emissions. That is why it is important to look at other initiatives such as the ABC Plan and RenovaBio.

Two intermediate scenarios were included in the model to introduce some nuance between the Forest Code and counterfactual scenarios. In the first, there is imperfect control of deforestation in the Amazon and Cerrado biomes. From 2000 to 2020, this business-as-usual scenario predicts a deforestation close to what is already observed. Control of illegal deforestation is carried out through the probability of legislation being enforced by the actions of IBAMA and distance from roads and highways.

The second intermediate scenario is one of strict control of illegal deforestation, applied only to the Amazon biome. Under this scenario, we can observe leakage of deforestation towards the Cerrado. In other words, there is an increase in illegal deforestation when deforestation control is enforced only in the Amazon. The Cerrado, in addition to being a crucial biodiversity hotspot and the place of origin of several Brazilian rivers, has at least 20 per cent of non-anthropized native vegetation. Trajectory graphs of the reduction in GHG emissions—considering the goal of reaching a reduction of 0,9 GtCO<sub>2</sub>eq by 2030—show that the scenario with strict deforestation control is crucial for Brazil to reduce its emissions and comply with its Paris Accord goals. However, deforestation control in the Amazon alone is not enough; it is necessary to include other biomes, restore 12 million hectares of native vegetation, promote sustainable vegetation through the ABC plan and incentivise the use of renewable fuels.

Aline concluded her presentation by stating that, in order to fulfil the Paris Accord, Brazil must fully implement the Forest Code, not only to contribute to worldwide efforts to mitigate climate change, but most importantly because it is good for Brazil and national agricultural production.

**Link to presentation:** <<https://bit.ly/2X03nt3>>.

## **Presentation 2: “The cost of forest restoration in Brazil and compliance with the Forest Code”**

**Speaker: Felipe Lenti**, IPAM researcher

**Session summary:** Felipe Lenti stated that, although he is currently a researcher at IPAM, his presentation would focus on his work at Ipea—a study that sought to map opportunities and costs related to the implementation of the Forest Code.

The study originated from the assumption that the rational use of resources in the long term must be incentivised, given that non-preservation generates societal costs, damaging overall well-being and biological diversity. He added that non-conservation also has negative impacts on agriculture, such as increased risks associated with climate change, precipitation regime, among other environmental services that are essential for agricultural production.

The Forest Code and the Federal Constitution guarantee Brazilian society’s right to a preserved environment, highlighting the social role of these provisions, given that environmental liabilities, materialised in forest degradation, manifest overlooked rights. At the time the study was being carried out, the researchers believed that the question of the need for forest restoration had already been settled, but current initiatives such as Draft Bill 2362/2019<sup>21</sup> require that discussion around the issue be rekindled.

The question that the study sought to answer was how to measure the cost of implementing the NDCs. In this context, the National Plan for the Recovery of Native Vegetation (Planaveg)<sup>22</sup> carried out initial estimates but did not use restoration per biome; rather, it used more generic methods. Cost components and main vectors would need to be detailed; complexity, operationalisation in different biomes and contexts regarding biophysical stressors, scalability and value for conservation (i.e. how to measure the value of a successful restoration project in relation to its environmental benefits). The goal was to understand how the cost of restoration varies according to biome and technique.

Felipe explained the methodology used in the study to determine the cost of restoration by biome and by technique. The results can be found in a TNC publication.<sup>23</sup> Restoration techniques vary according to biome, with a duration varying between 1 and 2 years, and planting seedlings is not necessarily the best technique for restoration.

In addition to the costs of restoration, the study sought to catalogue potential benefits such as generation of jobs and income, professional training for technical assistance, improvement of the reputation of the agricultural sector, environmental services, protection of the soil and landscape connectivity.

**Link to the presentation:** <<https://bit.ly/2Jz5O2G>>.

21. Available at: <<https://www25.senado.leg.br/web/atividade/materias/-/materia/136371>>.

22. Available at: <[http://www.mma.gov.br/images/arquivos/florestas/planaveg\\_plano\\_nacional\\_recuperacao\\_vegetacao\\_nativa.pdf](http://www.mma.gov.br/images/arquivos/florestas/planaveg_plano_nacional_recuperacao_vegetacao_nativa.pdf)>.

23. Available at: <<https://www.nature.org/media/brasil/economia-da-restauracao-florestal-brasil.pdf>>.

### Presentation 3: “Restoration of damaged pastures and integrated agriculture-livestock-forest systems (iLPF)

**Speaker: Luiz Adriano Maia Cordeiro**, Embrapa researcher

**Session summary:** Luiz Adriano Cordeiro stated that his goals were to present concepts and introductory elements, as well as examples adopted in integrative agricultural-livestock-forest systems and how they have been important for sustainable agriculture and cattle rearing.

Degraded pastures are currently the main problem in the Brazilian productive scenario. In environmental and economic performance terms, Brazil has over 160 million hectares of cultivated pastures, two thirds of which are performing significantly below their potential, especially regarding beef cattle rearing.

Brazil has the potential to produce above 15-20 *arrobas* of beef per hectare, but the national average is around 4-5. This indicates that a significant share of the country’s pastures suffers from some degree of degradation. The same applies to both beef cattle and dairy cattle. In terms of daily yield (the national average is 4 litres of milk per cow per day), dairy cattle ranching in Brazil is 10 times less productive than in the US. One of the biggest challenges is increasing the productivity of cultivated areas.

Luiz cited studies from Lourival Vilela, a researcher at EMBRAPA Cerrados, according to which 70 per cent of pastures in Brazil are occupied by less than one animal unit (one animal unit equals around 450kg of live weight) per hectare. This is significantly below the possibilities of existing technology. Using areas more efficiently and intensely would yield greater productivity, which translates into greater wealth for the country and less pressure on native vegetation. The Cerrado presents similar numbers for both beef and dairy cattle rearing.

Pasture degradation is an evolutionary process starting with a lack of nutritional replacement, but it can be avoided. The volume of nutrients and fertilisers used in pastures in Brazil is significantly lower than for agriculture. Therefore, pastures become degraded over time, with exposition and even erosion. This impacts both the producers and the production chain as a whole.

There are readily available technologies to recover and renew pastures. One of them is the use of agriculture in the reformation of pastures, which is known as agriculture-livestock integration. This system has grown significantly, being adopted by both cattle ranchers and farmers. EMBRAPA and other institutions have developed research in these areas, generating knowledge and transferring technology.

He cited the most recent agriculture-livestock-forest integration system, whereby agricultural and forestry components, as well as fodder and livestock. Initially the system combines agriculture and trees and end up with the integration of livestock in the same area. To that end, special arrangements are necessary: EMBRAPA has been studying this process, which is not yet completely understood.

These technologies are foreseen in the ABC plan and in the NDCs. They have agronomical and iso technical efficiency and lead to large impacts on carbon balance regarding the recovery of degraded pastures, the integration of agricultural land and especially in agriculture-livestock-forest integration, due to the trees’ carbon stock potential.

The integration between agriculture and livestock rearing is a cycle where activities are rotated—part of the time is dedicated to agriculture and the other to livestock rearing. This leads to numerous advantages for cattle ranchers; especially being able to use agriculture to offset the costs of pasture recovery. There are also advantages for farmers, such as improvements in direct planting, soil quality and in income during the dry off-season.

Luiz highlighted that the cycle starts with trees and crops and ends with fully grown trees and livestock rearing. In the early implementation of this system, it is not recommended to put cattle in areas where trees are growing in a spaced-out manner, as there might be damage to the trees. However, once the trees are able to bear the impact arising from the presence of animals, cattle rearing can be reconciled with the broad diversification of planting activities, such as soybean, maize, etc. in the same area where trees are growing.

At the end of the cycle, if there is a compelling market, deforestation can generate income. Diversification has the positive effect of sparing the land, whether by the avoidance of deforestation, whether by proper land management. There is enormous productive potential for such integrated areas. Other positive effects for cattle rearing include improvement of the animals’ overall well-being and thermal comfort provided the shade cast by spaced-out trees.

Luiz ended his presentation by illustrating how compensation for GHG emissions occurs in the agriculture-livestock-forest integrated system: methane produced by enteric fermentation is emitted by cattle, a by-product of rumination;

carbon is absorbed in the soil through proper pasture management and in biomass, especially from trees. This process results in surplus carbon and there is great potential for gains. EMBRAPA has proposed special certifications for beef produced in integrated agriculture-livestock-forest systems, with added value from neutral carbon emissions.

Although much has been said of such systems and EMBRAPA has been making significant efforts in to increase their use, it is evident that they are complex and demand technological and farmstead managerial improvements. There is still much to be done for this type of integration to occur at a national scale

**Link to the presentation:** <<https://bit.ly/2wf6Bxi>>.

**Video: Panel 6 — “What are the opportunities afforded by Nationally-Determined Contributions (NDCs)?”**  
<<https://youtu.be/tYFe2lbb8yQ>>.

### **Panel 7 — “What are the existing financing mechanisms in Brazil?”**

**Moderator: João Ferrari Neto**, Sub-unit chief, Derop/Diore, Central Bank of Brazil

#### **Speakers:**

- **Priscila Souza**, Senior Analyst, CPI/PUC-Rio
- **Leila Harfuch**, Managing Partner, Agroicone
- **Camila Yamahaki**, Senior Researcher, FGV-EAESP
- **Francisco Erismá**, General Coordinator for Rural Credit and Regulations of the Bureau of Economic Policies, ME

#### **Presentation 1: “Rural Credit and insurance”**

**Speaker: Priscila Souza**, Senior Analyst, CPI/PUC-Rio

**Session summary:** Priscila Souza started her presentation by providing a broad overview of the Rural Credit policy in Brazil.

Rural Credit is established by the Agriculture and Livestock Plan (PAP), targeting medium-scale and large rural producers and released annually by the Ministry of Agriculture. The total budget announced for 2018-2019 was of around BRL194 billion, divided into several credit lines, many of them featuring subsidised interest rates. In addition, every year the National Programme for the Strengthening of Family Farming (Pronaf) is enacted, also with various credit lines and even more subsidised interest rates. In 2018-2019, Pronaf had a budget of BRL31 billion.

Priscila highlighted that this yearly combined budget of BRL 200 billion (between the PAP and Pronaf) corresponds to 40 per cent of Brazil’s agricultural production. Therefore, it is a significant policy with considerable impacts in agricultural activity.

She presented slides showing the various sources of funding and how they are divided into Rural Credit programmes. The main ones are mandatory funds—a percentage of cash deposits—and rural savings. There is a plethora of funding resources and programmes, leading to complex regulations. It is necessary to recall that, in Brazil, plans are yearly and therefore subject to changes in the rules for financing and overlapping credit lines. Thus, there is a need to simplify regulations and increase system predictability regarding financing and rural credit lines.

A CPI/PUC-Rio study analysed the fragmentation of rural credit rules. Priscila cited the case of Constitutional Funds, which define which municipalities can benefit from this type of financing. Municipalities are classified according to priority and income levels (low, average and high income). This classification might change from year to year and determines different financing conditions under the purview of the Constitutional Funds.

She presented the discontinuity and fragmentation substantiated on fiscal modules, which are the basis of Pronaf. Although it is not one of the lines with the largest credit volume, it is the most significant in terms of contract numbers as it serves most rural producers—Pronaf is responsible for around 75 per cent of all contracts. One of its main eligibility rules is that the rural producer has at least four fiscal modules.

Fiscal modules range between 5 and 110 hectares—an enormous variation to consider areas for minimum subsistence. It is common for a fiscal module to be 3 or 4 times higher than that in a neighbouring municipality (even 10 times in some cases). This situation has practical implications: for example, two farmers in neighbouring municipalities, with the larger producer having access to Pronaf while the other does not, due to how the fiscal module is defined in their respective municipalities. This leads to many distortions and inefficiencies. Another example: there are many very large fiscal modules in the Cerrado, as they were defined in the 1980s, when productivity was low in the region. Even though production has been greatly modernised since then, the fiscal module's definition has remained unaltered for the past 40 years.

On the implications for public policies, Priscila highlighted that the complexity, unpredictability and multitude of sources of funding and rules for Rural Credit programmes make it difficult for rural producers and banks to identify the correct resources for each case, especially as there are significant overlaps in credit lines. Other issues include: Rural Credit is based on a structure defined in the 1950s; there is a need to correct a series of distortions to improve transparency; and constant changes in financing conditions can lead to uncertainty, causing underinvestment and lower agricultural productivity.

One of the recommendations of the CPI/Puc-Rio study is to increase the predictability of funds, for example by adopting agricultural plans with longer time periods, as is the case in the EU with the Common Agricultural Policy, and in the US with the Farm Bill. Another recommendation is to loosen restrictions on the use of funds, which can limit producers' decisions. For example, there are limits on what can be done in terms of technical assistance and necessary investments for environmental compliance. The fewer the rules and the less restrictive the use of funds, the more efficient the production will be.

CPI/PUC-Rio's proposal, which has already been presented to important ministries in Brazil, is to try and align agricultural policy, especially Rural Credit, with the country's environmental goals manifested in the Forest Code. One way to promote this alignment is to increase credit limits for producers who comply with the Code.

Regarding the benefits of the alignment between the Forest Code and Rural Credit, preservation is a common good in the economic sense, which generates externalities, and the rural producer does not reap all the benefits of preserving native forest areas in their property. The targeting of Rural Credit to producers that strive to preserve native vegetation would enable the expansion of the provision of this public good. This is aligned with international best practices, such as the EU policy of providing direct conditional payments linked to the preservation of natural resources by rural producers.

Another argument is that having Brazil's main agricultural policy target producers who comply with strict environmental legislation would help the country in climate negotiations and in joining new markets. In addition, Rural Credit could contribute to the pool of resources necessary for the implementation of the Forest Code, through producers that would have increased available credit and therefore would be able to mobilise their own funds. Priscila highlighted that the goal is not to increase the total funds available for Rural Credit, but rather to direct available resources to producers that comply with environmental legislation.

Finally, she explained that the process of modernisation of agriculture and the adoption of sustainable best practices has altered the producers' risk profile. Better risk management instruments can simultaneously facilitate advances in agricultural activity, help increase production and allow for progress in sustainable practices. Therefore, it is important to reflect on how to balance the Rural Credit policy with stronger insurance instruments.

**Link to the presentation:** <<https://bit.ly/2YEzqzM>>.

## **Presentation 2: “ABC Programme—Low-Carbon Agriculture”**

**Speaker:** Leila Harfuch, Agroicone managing partner

**Session summary:** Leila Harfuch stated that she would speak about some assessments of the ABC programme and proposals for its improvement, which have been discussed with the government and the private sector and which demonstrate how rural sustainability has been financed by official Rural Credit.

In 2018, 34 per cent of the gross value of Brazilian agricultural production was financed by official Rural Credit. Of the total credit that was made available, 30 per cent—BRL 40 billion—is investment funding (including machinery, infrastructure, soil recovery, etc.). Considering that the ABC Programme is an investment programme that is part of the national Rural Credit system, it represented 5 per cent of the total funds allocated for investment.



However, many of the sustainable practices are financed outside of the ABC programme. For example, from 2013 to December 2018, BRL240 billion were allocated for investment through rural credit, BRL11 million of which were set aside for soil correcting measures to increase productivity; 34 per cent of this total was obtained through the ABC Programme.

Analysing the data presented, Leila concluded that many producers use other rural credit lines and therefore do not benefit from the better conditions offered by ABC.

From 2013 to 2018, the ABC Programme was responsible for financing a large share of investments destined for pasture management activities: 41 per cent of the BRL8 million used for this purpose. In addition, 59 per cent of funds destined to forestation and reforestation activities—BRL2.3 billion—originate from the ABC Programme.

To illustrate the opportunity of reconciling production and preservation, she stated that there are 19 million hectares of degraded pastures in the Cerrado alone, for which, considering only agriculturally-apt areas (5.4 million hectares), the amount of financing needed to carry out activities to improve the condition of pastures would be of BRL8 billion (excluding other investments to increase productivity in rural properties).

She also discussed how to reconcile the opportunities identified with public policies. The ABC Plan, which comprises the ABC programme, is eligible for review in 2020, and could incorporate the implementation of the NDCs, the Forest Code and the support of practices such as agriculture-livestock-forest integration.

The ABC Programme is the only programme targeting the productive system and the adoption of technology in rural properties. In this vein, understanding that less resources must be used, but with higher impact, she emphasised that agricultural policy must choose priorities such as the implementation of the Forest Code and the adoption of technologies.

She listed some of the issues to be faced in order to improve the ABC Programme, such as: fostering the adoption of technology in the field; incentivising banks to offer the ABC Programme and differentiate it from other credit lines; and seeking funds outside of the National Treasury.

The Programme goes beyond incentivising practices to reduce GHG emissions, fostering increased productivity gains and risk management in the properties, which eventually translate into environmental gains.

As an example for proposals included in the 2020 Agricultural Plan, whose main objective was to reconcile the sector's development with positive externalities through the ABC Programme and the implementation of the Forest Code, Leila stated the need to reinforce investments to adopt technologies, especially those geared towards the recovery of pastures; to incorporate related programmes (such as, for example, Moderagro and Inovagro) to increase funding; and of aligning credit with compliance with the Forest Code.

Finally, she reinforced the need to expand the significance of the ABC Programme beyond GHG emissions, as it means the adoption of technologies in rural areas, improvement of productive resilience, facilitating market access and solving long-term challenges.

**Link to the presentation:** <<https://bit.ly/2MdXSGu>>.

### **Presentation 3: “Challenges of the banking sector”**

**Speaker:** Camila Yamahaki, Senior Researcher (FGVces), FGV-EAESP

**Session summary:** Camila Yamahaki explained that FGVces is the FGV's Centre for Studies on Sustainability, where strategies, policies and tools for sustainability are developed for the public and private sectors. She spoke of a partnership developed between FGVces and the Brazilian Bank Federation (Febraban) between 2014 and 2018, which resulted in several studies about how the financial sector can contribute to the transition towards a green economy. These studies discussed themes such as Green Bonds, environmental reserve quotas, energy efficiency, solar energy, risk of deforestation and forest recovery.

One of the main lines of work was a methodology to analyse the amount of resources allocated by the financial sector for green economy sectors. This methodology was later incorporated by Febraban. In 2017, it was found that approximately 27.6 per cent of the corporate portfolio—around BRL412 million—was allocated to green economy sectors, such as sustainable agriculture, renewable energy, sustainable transportation, productive inclusion and local and regional development, among others.

The studies also analysed the volume of resources allocated to sectors with potential socioenvironmental impact, defined by a decision of the National Council for the Environment (Conama), which establishes which enterprises and other activities

require environmental licensing. Around 42.3 per cent of the corporate portfolio—around BRL632 million—are directed towards sectors such as electricity/gas and other utilities, manufacturing of food products, agriculture/cattle rearing and related services, manufacturing of petroleum-based products and biofuels, waterborne transportation, among others. These lines of financing demand greater socioenvironmental risk management.

Regarding deforestation risk management, Camila highlighted that banks are increasingly more concerned with analysing deforestation risk when granting credit, due to legal risks. This is because both the Rural Credit Manual and Central Bank resolutions establish a series of requirements that banks must adhere to when granting credit to agricultural activities. For example, she cited the fact that, in the Amazon biome, banks must check for CAR enrolment receipts, verify if the property is on the IBAMA embargo list and if it is, payment instalments must be suspended until the property's situation is rectified.

Given this scenario, Febraban required a deforestation risk analysis for financial institutions when funding the agricultural sector. The study was published in Febraban's and FGVces' websites. It was carried out in four stages.

First, a mapping was made of the soybean, livestock, paper and cellulose, and palm oil production chains. An analysis was carried out of the links and profiles for each of these chains, identifying the main actors and the main risks of deforestation, both inside the chain and geographically.

The second stage comprised an analysis of how companies in these chains have managed the risk of deforestation, taking into account CDP data and company reports. In the third stage, an analysis was carried out of the legal requirements that banks must adhere to in order to grant credit to rural producers. Finally, in the fourth stage, the study identified the main databases and existing tools that might aid banks in better managing risks.

Three official databases were analysed, in addition to free tools made available by NGOs, as well as commercial tools. As the study was published in 2018, other types of tools have since been made available, and previous ones have been updated.

Two additional opportunity analysis studies were carried out to identify the financial feasibility of forest restoration. The first addressed the economic viability of forest restoration for APPs without economic exploitation, and the second analysed forest restoration in Legal Reserve areas with economic exploitation. Among the cases that had an impact of under 7 per cent in the borrower's capacity to pay were soybean and sugarcane cultures, and the adoption of certain productive arrangements in the Legal Reserve.

Another area of study at the FGVces is deforestation risk analysis for institutional investors. A study was carried out in partnership with the WWF about the Brazilian environment where these companies are inserted, risk to investors and risk arising from the environment where investors are inserted.

Study results pointed out that the credit and investment sectors are increasingly concerned with managing risks related to deforestation; there is an interest from these sectors in opportunities arising from the forest economy, and technology can help companies and banks better manage these risks, making it more difficult to conceal deforestation.

She concluded with the notion that there are still several challenges related to forest restoration, such as the mismatch between the timeframe of long-term forest restoration projects and the banks' business models; the legal insecurity of the Forest Code; the lack of technical assistance for forest recovery; and the lack of experience of rural producers themselves, in addition to lack of compensation for environmental services.

#### **Presentation 4: "Rural Credit in Brazil"**

**Speaker: Francisco Erismá**, General Coordinator for Rural Credit and Regulations of the Bureau of Economic Policies, ME

**Session summary:** Francisco Erismá stated that the first part of his presentation would complement the information presented by other panel members and that he would then provide details on how the government has worked to improve the credit-granting process and to facilitate businesses.

He illustrated the complexity of Rural Credit legislation, listing a series of laws (insurance, family farming, debt renegotiation, etc.) that deal with the subject. In general, all legislation presented deals with risks from Rural Credit operations as risks from financial institutions; therefore, these institutions must seek to mitigate risks, including regarding environmental aspects, which are not always considered in federal legislation.

The Agribusiness Credit Letter (LCA) is the second most important line of funding for rural credit, after rural savings. Francisco highlighted the importance of BNDES source lines, despite the high cost of operations.

He presented a figure illustrating the relationship between the resources that were made available for rural credit and the amount of funds that were actually executed. It is possible to verify that, from 2014 onwards, there has been a detachment between availability and use.

Regarding rural credit and the environment, he added that it is necessary to regularise land status to receive funds from the Rural Credit—for example, through verification of CAR registration. Among other policies, he cited Pronaf's credit for organic and agroecological agriculture, price floors for extractive products and increased credit limits for defraying.

Many initiatives were undertaken to improve Rural Credit, including: the possibility of financial institutions to hire rural credit agents; new rules to reduce the complexity of inspection of rural credit operations; and removal of LCA controlled rates.

Finally, Francisco revealed some initiatives developed by the federal government to facilitate granting loans, such as: the elaboration of metrics to monitor the outcomes of the ABC Programme; updating legislation for granting Rural Credit (for example, the requirement of collecting signatures); and the elaboration of a registry of rural producers, which could be consulted by government bodies.

**Link to the presentation:** <<https://bit.ly/30A1rKd>>.

**Video: Panel 7 — “What are the existing financing mechanisms in Brazil?”** <<https://youtu.be/tls-HslopPs>>.

### **Presentation: “Rights and guarantees at the heart of the Forest Code and the Constitution”**

**Moderator: Flavia Witkowski Frangetto**, Visiting Researcher, DIRUR, Ipea

**Speaker: Dr. Sandra Verônica Cureau**, Associate Federal Prosecutor General, MPF

**Session summary:** Dr. Sandra Cureau started her presentation by recalling that, for 10 years, she was Coordinator of the Chamber for the Environment and Cultural Heritage of the Office of the Prosecutor General. Previously, she acted as Deputy Prosecutor General before the Superior Electoral Court and Deputy Prosecutor General, when she filed three Direct Actions of Unconstitutionality (ADIs) against the new Forest code.

She highlighted that the 1988 Constitution enacted very significant, paradigmatic changes regarding previous Brazilian constitutions. It changed from a State-inspired instrument into a citizen-inspired one. Therefore, it includes not only civil and political rights—but also social rights—under fundamental rights. In addition, it has provided for collective and diffuse rights, which are citizenship rights. These fundamental rights and guarantees have projected themselves across the entire universe of the Constitution, making themselves noticed in healthcare, the environment, cultural heritage, workers' rights, etc.

There were consequences to this projection. As an example, she cited the fact that human rights, the right to a healthy and balanced environment and the right to development now comprise a 'trilogy' which cannot be dissociated; all these rights must be conjoined and coordinated.

She cited article 225 of the Constitution, which states that the State and society must protect the environment for present and future generations. Therefore, the defence of the environment has been elevated to the category of constitutional principle, which governs economic activities.

With this in mind, she analysed Law No. 12.651, of May 2012—the new Forest Code. She highlighted that the previous Forest Code (Law No. 4.771/1965) was elaborated during military rule. Although it dated from the early 1960s, it had not been completely regulated or carried out when the new Code was created, under strong influence from the rural caucus. The new Forest Code egregiously reduced the standard of environmental protection. At the time, she recalled that she filed three ADIs (divided into themes) to the Federal Supreme Court (STF), questioning 53 of the 84 articles of the new legislation.

ADI No. 4.901 dealt with the Legal Reserve, ADI No. 4.902 addressed the consolidation of environmental damages (amnesty), and ADI No. 4.903 questioned the APPs. These actions were scientifically backed by studies released by the Brazilian Science Academy and by the Brazilian Society for the Progress of Science, the country's two foremost scientific institutions. They were filed in January 2013, less than one year after the promulgation of the Forest Code. At the time, the presiding Justice was Luiz Fux, who carried out a public hearing only in April 2016. In this interim, many things occurred, and she recalled that the STF considered most of the legally-contested points constitutional.

Regarding the Legal Reserve, the only point deemed unconstitutional was Paragraph 2 of Article 48 of the Forest Code, dealing with environmental compensation. In the new code, compensation would be granted in any area of the same biome. The STF understood that compensation should be allowed only between areas sharing an ecological identity.

As for the consolidation of environmental damages—the so-called ‘amnesty’—Dr. Sandra explained that only partial allowance was given to interpret according to Article 59, Paragraphs 4 and 5, to avoid the risk of decadence or expiration of time limits in the execution of the Terms of Adjustment of Conduct (TACs), signed in the environmental regularisation programmes, whether for unlawful environmental acts practised before 22 July 2008, or for sanctions arising from them.

The Supreme Court of Justice (STJ) started receiving a large volume of lawsuits from rural land owners that wanted the STF’s decision to be applied to all suits that had been filed before the enactment of the new Forest Code, so that this precedent could benefit them. The STJ understood that material laws do not have a retrospective effect and that only procedural laws are retroactive. Therefore, actions such as the TACs that had been filed and were ongoing prior to the new law were still subject to the previous Forest Code.

This had significant implications regarding the amnesty, Legal Reserve areas and especially APPs, as the new Forest Code significantly diminished the APP’s environmental protection. Therefore, many land owners who had built in APPs tried to take advantage of this fact. However, the STJ stood its course and the legislation dating from before the actions were filed prevailed.

One of the most contested points was the use of the APPs for waste management and the facilities that were needed for national and international sports competitions. Another point was the conditioning of intervention in APPs by social interest or public utility to the inexistence of a technical alternative and/or alternative sites. This question had been specified to some extent in previous legislation and even in the process of environmental licensing, whereby it is necessary to carry out an environmental impact study, demonstrating that the alternatives are worse or less satisfactory.

She recalled that it was possible to establish the interpretation that areas surrounding water sources and intermittent water springs configure APPs. Another point was to establish the unconstitutionality of the terms ‘demarcated’ (*demarcadas*) and ‘titled’ (*tituladas*), from Article 3, which required indigenous lands to be demarcated and areas in traditional communities to be titled. According to her, these points were manifestly unconstitutional, and it would be difficult for the STF to uphold them.

After the new Forest Code, deforestation in the Legal Amazon in June 2018 had already reached 184 square km, an increase of 437 per cent compared to the same period of the previous year. The STF’s decision had been announced around a year before. The states most affected by deforestation were Pará, Amazônia, Mato Grosso and Rondônia. Therefore, one can easily see the impacts of the STF’s decision in the deforestation of the Legal Amazon.

She also cited the Plan for the Conversion Law (PLV) of Provisional Measure 867, which altered the Forest Code only to increase the deadline to enrol in the CAR. According to her, this PLV ‘smuggled’ into the MP themes that had absolutely nothing to do with the subject. For example, it alters article 68 of the Forest Code, extending the amnesty to large rural producers—which causes impacts in the most degraded areas of the country, given that large producers are the ones who degrade the most—and alters article 59, ending the understanding that only producers that adhere to the PRA by a set date are able to enjoy amnesty of fines and areas to be recovered. With the new article, any land owner would be eligible for amnesty.

She highlighted that rules that exempt those who degrade the environment from promoting its restoration contradict the Federal Constitution, especially Paragraph 3 of Article 225, which states that “the conducts and activities considered harmful to the environment will subject transgressors, both individuals and corporations, to penal and administrative sanctions, independently of the obligation of repairing the damages caused”.

Dr. Sandra considers these initiatives a grave mistake, citing in particular the impacts of the deforestation of the Amazon on climate change. Although these initiatives might lead to short-term gains, they also lead to profound long-term losses. She finished her presentation by highlighting that this is a moment for reflection: the laxer the law becomes, allowing for the reduction of APPs, ending the Legal Reserve, and providing amnesty to producers who deforest their properties, the greater the negative impact will be for the environment.

**Link to the presentation:** <<https://bit.ly/2KmMvth>>.

## Panel 8 — “What are the biophysical impacts of forest protection on agriculture?”

**Moderator:** Breno Pietracci, Economist, EDF

### Speakers:

- **Avery Cohn**, Professor, Tufts University
- **Jon Strand**, Consultant, World Bank Group
- **Giampaolo Queiroz Pellegrino**, EMBRAPA Researcher
- **Antonio Donato Nobre**, Scientist and Researcher, INPE

### Presentation 1: “Valuing local benefits provided by native vegetation to the agricultural sector in Brazil”

**Speaker:** Avery Cohn, Professor, Tufts University

**Session Summary:** Avery Cohn presented the results of his project, whose goal is to calculate the economic benefits of the conservation of the Cerrado and the Amazon ecosystems, considering their ability to regulate the rainfall regime and provide other environmental services.

The conversion of ecosystems alters the climate and increases GHG emissions, resulting in lower agricultural productivity and, therefore, future social costs.

In this context, the first part of the study focused in identifying local effects, especially the increase in temperature that can be observed after conversion. Avery detailed the model they used to determine the variation in temperature, using data from Brazilian meteorological stations and satellites for the frontier deforestation regions in the Amazon so that it would be possible to determine how the temperature effect varies according to the distance from the place where deforestation occurs. According to him, it was possible to observe that the effect does in fact decrease as distance increases and that over half of the effect can be felt in a 10km radius around the deforestation site.

The study then sought to measure possible alterations in agricultural productivity due to differences in temperature, capturing alterations in variables such as rain and evaporation. Although variability was high, it was possible to verify that the resilience of systems against these variations depend on where they are located; in other words, places where it is possible to grow two crops are less vulnerable to climate variations. He exemplified by stating that the Matopiba region (an acronym resulting from the junction of the initials of the states of Maranhão, Tocantins, Piauí and Bahia) is more vulnerable than Mato Grosso.

Additionally, Avery indicated that, in certain locations, it was possible to predict that the loss in productivity might be of 15 per cent, with a variation of 1° C in some regions of Matopiba. Regarding the second harvest, considering maize culture, it was possible to identify a loss in productivity of 11-20 per cent, which might be attributed to the fact that many producers decide not to plant the second harvest due to climate conditions.

Finally, he presented results from the loss of productivity due to the conversion of vegetation between 2001 and 2017 in the Matopiba and Mato Grosso regions, which indicated significant financial losses. Avery concluded that the conversion of forests affects warm places more intensely. However, he highlighted that producer regions can reduce risks and benefit from conservation activities.

**Link to the presentation:** <<https://bit.ly/2HvqS8a>>.

### Presentation 2: “Mapping the value of the Brazilian Amazon rainforest”

**Speaker:** Jon Strand, World Bank Consultant

**Session summary:** Jon Strand presented the results of a project<sup>24</sup> developed by the World Bank in partnership with researchers of Brazilian institutions, such as UFMG and UFV.

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24. More information at: <[www.biosfera.dea.ufv.br/en-US/deforestation-and-rainfall](http://www.biosfera.dea.ufv.br/en-US/deforestation-and-rainfall)>.

He showed a map with projections for forest coverage in the Amazon region by 2050, observing that only the westernmost part of the Amazon would remain preserved. In this context, he highlighted that the objective of the study was to develop methods that would allow for the estimation and mapping of ecosystemic values for conservation purposes.

To estimate the value of ecosystemic services, researchers considered revenues from the exploration of timber forest resources, extracted through low-impact techniques, and non-timber forest resources (nuts and rubber). In addition, they observed the impacts of the loss of vegetation, leading in alterations in rainfall patterns, pollination and generation of hydroelectricity, in addition to the value of carbon.

Jon stated that the purpose of creating a map that spatially explains the value of conserving the Amazon is to discourage the conversion of forests for agricultural purposes. This type of information—about the value of conservation—is important to calculate opportunity costs, in addition to contributing to the process of allocating parks and conservation units.

The team is now working on calculating opportunity costs and estimating the intrinsic values of preservation linked with tourism, impacts on health, protection of water sources and other forest products. Global values such as biodiversity, and the existential value (i.e. how much people would be willing to pay for preservation alone) are significant and should also be considered in the research.

Jon concluded his presentation by stating that, in general, people are now more sensitive than ever to themes related to conservation and climate change.

**Link to the presentation:** <<https://bit.ly/2M79fQi>>.

### **Presentation 3: “Adaptation to climate change in agriculture”**

**Speaker: Giampaolo Queiroz Pellegrino**, EMBRAPA researcher

**Session Summary:** Giampaolo Pellegrino explained that his presentation would cover the issue of adaptation to climate change in agriculture. It is important to avoid maladaptation in such an unfavourable moment, when more radical members of the rural caucus wish a return to older concepts or reinforce the old agriculture-versus-environment dichotomy. He cited Carlos Nobre’s presentation, which highlighted a scenario of non-acceptance of science, with scientists having their image increasingly tarnished and research funds becoming scarce. To Giampaolo, this situation is a clear step backwards.

The current polarisation affects both sides of the debate. This is harmful because for agriculture to adapt to a changing environment, both sides need to interact in search of a common solution.

He went back to themes previously discussed during the Seminar, such as cattle rearing disconnected from deforestation, which is a factor that reduces GHG emissions, land speculation and the critique that cattle rearing does not currently adopt iLPF strategies to reduce emissions. It is necessary to identify all drivers of deforestation to properly tackle the issue.

On the adaptation of agriculture to climate change, he stated that it is important to seek improvements and integration with the environment. The main issue resulting from climate change, especially in dry regions, is water deficit. According to Giampaolo, to adapt agriculture and cattle rearing, there needs to be a focus on the more biophysical aspects of the water deficit, but it is also important to consider technical and economic efficiency, economic productivity, diversification with alternative inputs that produce less emissions, among other aspects.

He observed that the theme of mitigation was prevalent throughout the Seminar, but little was said about adaptation. The two aspects are not disconnected—in many cases, mitigation measures are adaptation initiatives and vice versa.

The ABC Plan is one of the two most successful adaptation policies. Although it is namely about low-carbon agriculture and is connected to mitigation, it was conceived around the pillars of recovering degraded areas, iLPF, direct plantation, and biological nitrogen fixation, in addition to actual adaptation initiatives. Giampaolo participated in its elaboration.

When these aspects were being considered for inclusion in the Plan, it was a necessary condition that they would all promote efficiency in the systems, regardless of climate change. In other words, the intent was not just reducing GHG emissions per se, but rather to foster the adoption of technologies to promote efficiency for agricultural systems—that is, adaptation.

He tried to introduce the issue of reducing the water deficit, when considering the restoration of iLPF, direct plantation or degraded areas. The main convincing factor for the adoption of the policy is showing that it leads to economic efficiency.



Therefore, no programme can be scaled up if the economic benefits it brings are not properly understood. In this context, carbon quantification would almost be an externality.

The rationale behind the ABC plan is fostering income, economic improvement, increasing system resilience and reducing GHG emissions. It is the government's job to discuss reducing emissions and to make it clear to producers that if they adopt emission-reducing procedures, they will earn credit. Therefore, producers' commitment to adopting technologies is important and the review of the ABC Plan is essential to seek greater efficiency.

Agricultural Zoning for Climate Risk (ZARC) is another adaptation policy, which fosters a risk and vulnerability analysis of Brazilian regions and is the basis for most agricultural credit and insurance programmes. In addition, it is a significant fomentor of technological improvement, because the granting of credit requires the adoption of proposed technologies. The rationale of stimulating and disseminating technologies is embedded in the ABC Plan and in ZARC. Demands for better zoning, regional development and quantification of production are being incorporated into a proposal for an expanded system of risk management and resilience in agriculture. There is also a demand for a broader concept of risk management that covers other socio-environmental variables in a more integrated manner, in addition to the zoning theme.

To Giampaolo, the National Adaptation Plan (PNA) is an opportunity to integrate all of these rationales. In addition to the mitigation issue, adaptation must also be incorporated in a diversified manner, beyond irrigation and genetic improvement. There are many opportunities and alternatives for adaptation that are still not being explored. This debate is embedded in the PNA and the Centre for Climate Intelligence seeks to integrate ZARC, the ABC Plan and a broader search for the implementation of technological devices for risk management and data integration, into a broader risk-management system. Finally, he highlighted that EMBRAPA has been working since 2007 under the rationale of integrating climate change and agriculture initiatives.

**Link to the presentation:** <<https://bit.ly/30FtR5e>>.

#### **Presentation 4: "The magic of the Amazon: a river that flows invisibly around us"**

**Speaker:** Antonio Donato Nobre, INPE Scientist and Researcher

**Session summary:** Antonio Donato Nobre opted for a less academic presentation. He began speaking about functional biodiversity, as there is no environmental regulation activity without the unfathomable complexity of billions of living organisms. The human genome alone contains 23,000 genes, which codify 92,000 proteins and every day new proteins are being discovered in just a single cell. One can only imagine making a similar projection for the Amazon and the number of organisms that exist there. Therefore, he proposed to talk about four 'mysteries' related to the Amazon.

He showed an image produced by a NASA sensor, depicting in full colour the extraordinary daily process of evaporation over the Amazon, which yields 20 billion tons—20 trillion litres—of water in a single day. This is a greater volume than what the Amazon river drains into the ocean. The forest humidifies the air, as observed by Alexander von Humboldt. Antonio cited the anomalous precipitation activity over South America, especially in the Amazon region. What would cause this great precipitation, other than the presence of trees?

As for the second mystery, he stated that one of the great discoveries of the Large-Scale Biosphere-Atmosphere Experiment (LBA), in which he participated, was of gas emissions that produce condensation seeds—a very fine powder that attracts water and produces rain. This is one of the ways in which the biodiversity in the Amazon influences the atmosphere, which has kept the forest alive for over 56 million years.

The third mystery refers to the draw of moisture into the continent. To illustrate his point, he showed an animation of thermal convection over the Australian continent, composed largely of deserts. The explanation resides in the study of the process of shifting moist air from the ocean into the continent. When there is a forest, what occurs is the exact opposite of this phenomenon. This is because in forests, in addition to evaporation, there is nucleation with fine powder; the condensation cores that lower pressure over the continent and draw moist air into it, similar to an 'atmospheric vacuum'. Therefore, when a tree transpires water, even though many would think it is losing water, it is in fact drawing moisture from the ocean and feeding the continental water cycle.

The fourth mystery explains why the southcentral region of South America is not a desert: 30 years of precipitation data drawn from climatological rain gauges reveal that the water cycle of the region pulses from the Amazon, which is in the same latitude as the desert belt. The region that stretches from Cuiabá to Buenos Aires and from São Paulo to the Andes produces 70 per cent

of Latin America's GDP, is green, productive, has hydroelectric plants and all of this is thanks to the Amazon. According to Antonio, a healthy climate depends directly on green areas.

He recalled a point highlighted in Dr. Sandra Cureau's presentation, about a study carried out by INPE in Mato Grosso, a significant grain producer, linking agribusiness with rainfall. The study compared two municipalities: Lucas do Rio Verde and Querência, about 400km apart. Both share the same latitude, are equally distant from the Amazon and employ similar techniques and machinery in their high-input agriculture.

To understand the difference in grain production between the two municipalities, he stated that his team studied the influence of the Amazon's 'flying rivers' in the region. There are critical differences between early rainfall and the dry season between the two municipalities; while the dry season—which prevents any plantation activities—lasts five months in Lucas do Rio Verde, in Querência it lasts seven months. This two-month difference influences Lucas do Rio Verde's second crop, which is not feasible in Querência.

Regarding the 'flying rivers' and airflow, the difference between the two municipalities is the Xingu indigenous reserve, with its 150km of forests that humidify the air that passes through the municipality of Lucas do Rio Verde, ensuring its second harvest. According to Antonio, 'flying rivers' explain why Querência is drier than Lucas do Rio Verde—airflow over both locations. This understanding of the relationship between the type of soil, vegetation and the functioning of the atmosphere is rather new.

Based on this information, he posited that a share of the profits resulting from the second harvest in Lucas do Rio Verde should be reverted to indigenous people in the Xingu reservation, because they have kept the forest standing. He lamented the gradual loss of the forest in the region due to fires and climate change, highlighting the relevance of conservation units.

Future climate has already arrived in the Amazon. Citing a 15-year old study conducted by Carlos Nobre, Antonio highlighted that the savannization of the Amazon is real. Farmers have been delaying their plantations, temperature has been rising and this directly leads to lower precipitation rates. This is an oscillating process—there might be too much heavy rain in one year, while the next has too little rain, and both scenarios compromise agricultural production. The climate is inextricably linked to agriculture.

He further highlighted that over 800,000km<sup>2</sup> have been deforested in the Amazon, which corresponds to an area thrice the size of the state of São Paulo. Soot destroys the rainfall mechanism described earlier in the presentation and 30 per cent of the Amazon's area is already degraded.

Prior to 2004, deforestation was attached to GDP; increased economic activity led to increased deforestation. Since that year, thanks to the decisive application of the Forest Code, GDP has been detached from the equation and deforestation plummeted, falling an average of 80 per cent across the entire Amazon. As a result, Brazil gained international recognition and was awarded funding from various sources. However, with the ensuing amnesty to deforesters and the questioning of environmental registration, deforestation started increasing again, although GDP was decreasing. Therefore, he concluded that deforestation is linked to the (non-)enforcement of legislation.

He finished his presentation by presenting five steps towards climate recovery: total war on ignorance, increasing awareness across the board; engagement of children and youth; popularisation of knowledge, urgent zero deforestation; and the rekindling of the promotion of novel ideas to restore forests.

**Video: Panel 8 — “What are the biophysical impacts of forest protection on agriculture?”** <[https://youtu.be/Jgz3pGT\\_D1o](https://youtu.be/Jgz3pGT_D1o)>.

### Final remarks on the Seminar, conclusions and next steps

#### Speakers:

- **Gustavo Luedemann**, DIRUR Researcher, Ipea
- **Ruben Lubowski**, Chief Economist of Natural Resources, EDF
- **Breno Pietracci**, Economist, EDF

**Session summary:** As a final message, Breno highlighted that the data and arguments presented throughout the Seminar demonstrated that agriculture and cattle rearing evolve at completely different speeds. While agriculture is very close to the technological frontier, as in, for example, sugarcane and soybean production and planted forests, cattle rearing must still make significant efforts to adopt existing technologies to increase productivity.

Brazil has a unique set of legislation, institutions, data, experts and researchers which must be thoroughly explored to foster sustainable economic development.

He noted that all sessions highlighted the importance of upholding the Forest Code, which the event organisers did not entirely expect. Limiting deforestation does not affect GDP and upholding the Forest Code leads to incentives to rural producers. He also commented on the importance of monitoring results to provide inputs for the financial sector.

Ruben recalled that the first panel of the Seminar highlighted Brazil's competitive advantage to increase agricultural production, while at the same time protecting its forests and the environment. The presentations of the last panel demonstrated that these links are even tighter—forest conservation is essential for agricultural production. It is of vital importance for the country to align rural economic development with environmental preservation.

He compared the different elements that were discussed in the Seminar, about the importance of the Forest Code, public policies, market forces, international cooperation, financial and rural credit policies, technical assistance and biophysical aspects to pieces of a puzzle. The Seminar began to show how these pieces might fit, so that Brazil might rapidly advance towards a sustainable rural economy. To reach this goal, a greater engagement of agricultural producers is necessary, as well as further efforts in communication and a strategy to ensure greater legal stability.

He thanked all speakers, moderators and audience at the event. Finally, he especially thanked the EDF, Ipea and IPC-IG teams, which contributed to the organisation of the Seminar.

**Videos:** Watch the Seminar's panels in full

1. **Video 1:** Opening and Panel 1 — "How should the rural economy be in the future?": <<https://youtu.be/sqoc4hJ7nNs>>
2. **Video 2:** Panel 2 — "How can Brazil benefit from emerging climate markets? The role of forest and carbon assets": <<https://youtu.be/PHDw24vX-Qk>>
3. **Video 3:** Panel 3 — "How can Brazil and companies in the country build large-scale, mutually beneficial and sustainable production chains?": <<https://youtu.be/PHDw24vX-Qk>>
4. **Video 4:** Panel 4 — "How can Brazil expand existing opportunities for multilateral investments?": <[https://youtu.be/ClzoP\\_jjK8M](https://youtu.be/ClzoP_jjK8M)>
5. **Video 5:** Panel 5 — "What opportunities are offered by the Forest Code?": <<https://youtu.be/baqXs1n2dbl>>
6. **Video 6:** Panel 6 — "What are the opportunities afforded by Nationally-Determined Contributions (NDCs)?": <<https://youtu.be/tYFe2lbb8yQ>>
7. **Video 7:** Panel 7 — "What are the existing financing mechanisms in Brazil?": <<https://youtu.be/tls-HslopPs>>
8. **Video 8:** Panel 8 — "What are the biophysical impacts of forest protection on agriculture?" and event conclusion: <[https://youtu.be/Jgz3pGT\\_D1o](https://youtu.be/Jgz3pGT_D1o)>





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