Research collaborations between Brazil and IIASA have intensified since Brazil became a member of IIASA in 2011. New research projects are using the tools of systems analysis to find the smartest ways for Brazil to simultaneously reduce deforestation, increase the production of cash crops and biofuels, and intensify cattle- raising. Other projects have focused on energy: Ranging from long-term energy planning, to learning from Brazil’s leadership in the use of ethanol fuel, to advancing understanding of the complex global energy system and its multiple connections with Brazil’s economy, environment, and society. IIASA is also working with Brazilian agencies to build capacity in systems approaches to national and international policy issues, including support for Brazilian participation in IIASA’s Young Scientists Summer Program, specialized training in model development and application, and a new partnership with Brazil’s Science Without Borders program to bring Brazilian postdoctoral scholars to IIASA. Knowledge transfer between Brazil and IIASA is also facilitated through multiple exchanges with Brazilian researchers working at or visiting IIASA, and IIASA researchers visiting and attending events in Brazil. This IIASA Info Sheet provides a summary of this expanding and mutually beneficial relationship since 2008.

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<th>National Member Organization</th>
<th>The Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES)</th>
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<td>Membership start date</td>
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<td>Selected research partners</td>
<td>Brazilian Corporation of Agricultural Research (EMBRAPA)</td>
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<td>Brazilian Reference Center on Biomass (CENBIO)</td>
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<td>Federal Universities of Rio de Janeiro, of Mato Grosso, and of Minas Gerais</td>
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<td>Advancing the modeling of complex systems</td>
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<tr>
<td>Capacity building</td>
<td>Eight doctoral students from Brazil have taken part in IIASA’s Young Scientists Summer Program</td>
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<tr>
<td>Publication output</td>
<td>34 publications have resulted from IIASA-Brazilian collaborations</td>
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<tr>
<td>Other interactions</td>
<td>Researchers, advisors, and diplomats from Brazil have visited IIASA 23 times, while IIASA scientists have visited Brazil over 60 times.</td>
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<td>Over 65 Brazilian nationals have participated in IIASA events since 2008.</td>
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Activities with Member Countries: Brazil

IIASA Info Sheet 2014/15
January 2015 (pages 1-3 updated November 2015)

The electronic version of this document is available at www.iiasa.ac.at/brazil

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IIASA Info Sheets provide succinct summaries of IIASA activities.
They do not necessarily reflect the views of IIASA staff, visitors,
or National Member Organizations.

This Info Sheet summarizes IIASA’s recent interactions with Brazil.
It includes highlights with links to further information but is
not meant to be a comprehensive report on all interactions.
Feedback and updates are encouraged and should be sent to Iain Stewart.
IIASA’s National Member Organization in Brazil

Brazil became a member of IIASA in 2011. Brazil’s membership of IIASA is represented via its National Member Organization (NMO) which in 2015 became the The Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES). Previously, between 2011 and 2014, the Center for Strategic Studies and Management (CGEE) was the NMO. The Brazilian Ministry of Science, Technology and Innovation (MCTI) funds IIASA’s annual membership fee via the NMO.

Professor Carlos A. Nobre, President of CAPES, has represented the Brazil NMO on the IIASA Council since 2011. The IIASA Council consists of one representative of each of IIASA’s member countries and is responsible for setting the overall strategic direction of the Institute as well as governing IIASA. Professor Nobre is a climatologist with research interests in climate science, climate change, and the Amazon.

Since 2011 Brazil has been a member of IIASA with first the Center for Strategic Studies and Management (2011-14) and then the The Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES) (since 2015) Foundation representing Brazilian membership.

Web: www.capes.gov.br

Some leading Brazilian personalities in academia, business, and government who are associated with IIASA

**Professor Paulo Artaxo**, Professor of Environmental Physics at the University of São Paulo, chairs the regional Latin American assessment of short-lived climate pollutants, in which IIASA plays a key role as part of the international Climate and Clean Air Coalition.

**Dr Mateus Batistella**, Director, Brazilian Corporation of Agricultural Research’s (EMBRAPA) Satellite Monitoring, collaborates with IIASA on research into sustaining ecosystem services.

**Professor Gilberto Camara**, former Director General of the National Institute for Space Research (INPE), collaborates with IIASA on a major project to develop policies to reduce emissions from deforestation and forest degradation.

**Professor Suani T. Coelho** is the Executive Secretary of the Brazilian Reference Center on Biomass and was a member of the executive committee of IIASA’s Global Energy Assessment.

**Professor José Goldemberg** of the University of São Paulo where he was the rector from 1986-1990, has served in various capacities in the Brazilian government including as the Secretary of State for Science and Technology; interim Secretary of the Environment; and Minister of Education. He was Co-President of IIASA’s Global Energy Assessment Council and has been a long-term collaborator of IIASA’s on issues associated with energy and sustainable development.

**Dr Jose Roberto Moreira**, a former Under-Secretary of Energy for the Federal Ministry of Mines and Energy in Brazil and former President of the Electric Company of São Paulo, is a long-term collaborator with IIASA on energy research.

**Professor Carlos Nobre** is the IIASA Council member representing Brazil, President of CAPES and former National Secretary for R&D Policies at the Ministry of Science, Technology & Innovation of Brazil. Formerly, he was the Director of the Center for Earth System Science and Senior Scientist at the National Institute for Space Research (INPE) in Brazil, Executive Secretary of the Brazilian Research Network on Global Climate Change (Rede CLIMA), and Scientific Director of the National Institute for Climate Change Research.

**Professor Glaucius Oliva**, President, National Council for Scientific and Technological Development (CNPq) signed a Memorandum of Understanding with IIASA in 2013 to cooperate on capacity building for Brazilian postdoctoral scholars.
Some leading Brazilian personalities in academia, business, and government who are associated with IIASA

**Professor Adilson de Oliveira**, Federal University of Rio de Janeiro, was responsible for creating the University’s first research group on energy economics and was a Lead Author on IIASA’s Global Energy Assessment.

**Professor Jacob Palis**, President, Brazilian Academy of Sciences discussed scientific collaborations between Brazil and IIASA during a visit by IIASA’s Director General to Brazil in November 2013.

**Professor Suzana Kahn Ribeiro**, Federal University of Rio de Janeiro and Vice Chair of Working Group III of the Intergovernmental Panel on Climate Change was a member of the executive committee of IIASA’s Global Energy Assessment.

**Professor Roberto Schaeffer**, Federal University of Rio de Janeiro, is a member of IIASA’s Science Advisory Committee (2014-17), was a member of IIASA’s visiting evaluation committee in 2013, and has been a long-term collaborator with the Institute’s energy experts.

**Professor Suzana Kahn Ribeiro**, Federal University of Rio de Janeiro and Vice Chair of Working Group III of the Intergovernmental Panel on Climate Change was a member of the executive committee of IIASA’s Global Energy Assessment.

**Professor Roberto Schaeffer**, Federal University of Rio de Janeiro, is a member of IIASA’s Science Advisory Committee (2014-17), was a member of IIASA’s visiting evaluation committee in 2013, and has been a long-term collaborator with the Institute’s energy experts.

**Dr Izabella Teixeira**, Minister of Environment of Brazil, discussed high-level collaborations between Brazil and IIASA during a visit by IIASA’s Director General to Brazil in November 2013.

**Dr Alexandre Ywata Carvalho** is head of the econometrics group at the Institute for Applied Economic Research (IPEA) and collaborates with IIASA on forestry and ecosystem services research.

Research Partners in Brazil

IIASA works with research funders, academic institutions, policymakers and individual researchers in Brazil. The following list includes the names of the organizations or the individual’s affiliated institutions that have all recently collaborated with IIASA.

- Amazon Environmental Research Institute (IPAM)
- Brazilian Corporation of Agricultural Research (EMBRAPA)
- Brazilian Reference Center on Biomass (CENBIO)
- Center for Development and Regional Planning (Cedeplar)
- Center for International Forestry Research (CIFOR), Brazil office in Rio de Janeiro
- Center for Strategic Studies and Management (CGEE)
- Federal University of Rio de Janeiro
- Federal University of Mato Grosso
- Federal University of Minas Gerais
- Institute for Sustainability (IIS)
- Institute of Applied Economic Research (IPEA)
- Ministry of Mines and Energy (MME)
- Ministry of Science, Technology and Innovation (MCTI)
- Museum of Tomorrow
- National Council for Scientific and Technological Development (CNPq)
- National Institute for Space Research (INPE)
- National Institute of Energy Efficiency
- Petrobras
- São Paulo State Environment Agency
- São Paulo State University
- University of Brasilia
- University of São Paulo
Recent Research Collaborations

**Toward a sustainable energy future in Brazil**

For over ten years an IIASA model has been helping Brazil find cost-effective approaches to meeting future energy needs. In 2002, IIASA’s MESSAGE model was introduced to a team of Brazilian researchers including Professor Roberto Schaeffer of the Federal University of Rio de Janeiro. The resulting assessment was so successful that the Energy Research Company of Brazil’s Ministry of Mines and Energy, the company in charge of producing long-term energy scenarios for Brazil, has continued to use MESSAGE as one of its official modeling tools ever since. The model helps energy planners to design long-term strategies by analyzing cost-optimal energy mixes, investment needs, and other costs, as well as technical, financial or policy constraints such as energy supply security or the rate at which new technologies can be introduced.

Developing a sustainable energy system in Brazil also requires a thorough understanding of the complex global energy system and its multiple connections with Brazil’s economy, environment, and society. Integrated, international assessments are one of the few research approaches that have the breadth and depth to explore such complex problems across multiple sectors, regions, and timeframes. IIASA has developed substantial expertise in international energy assessments, most recently in the Global Energy Assessment (GEA), which involved significant collaboration with Brazil (see: Global Energy Assessment and Brazil: page 6).

Collaborations between researchers at the Federal University of Mato Grosso and IIASA have explored what could be learnt from Brazil’s leadership in the use of ethanol fuel. This work fed into the GEA chapter on policies for energy technology innovation and a subsequent book dedicated to learning from the successes and failures of energy technology innovation. IIASA agricultural experts have also explored ethanol production in terms of the land it uses in Brazil. Joint studies include:

- In 2008 IIASA researchers contributed to an in-depth analysis of sugarcane production for ethanol led by researchers at the University of São Paolo and Wageningen University in the Netherlands. The IIASA research assessed the global production and potential production of sugarcane.
- From 2010-2012 this biofuel research has been further extended in partnership with the car maker Daimler to explore the potential for growing biofuel on residual land in Brazil.

IIASA’s work is underpinned by high-quality science, which is regularly published in high impact publications. A selection of current publications is presented here and full list can be found in appendix 5:


IIASA and Swedish partners have developed a Brazilian version of IIASA’s BeWhere model. This analyzes the alternative uses of sugarcane biomass for second generation ethanol and/or bio-electricity production in Brazil. Biofuels combined with carbon capture and storage (BECCS) also offers the potential of tackling climate change through negative emissions of greenhouse gases. IIASA researchers in collaboration with the University of São Paulo have explored BECCS in the context of Brazil’s energy and climate change policy, and presented the options for Brazil at a workshop in São Paulo in 2013.

Global Energy Assessment and Brazil

The Global Energy Assessment (GEA), published in 2012, defines a new global energy policy agenda—one that transforms the way society thinks about, uses, and delivers energy. Coordinated by IIASA and involving over 500 specialists from a range of disciplines, industry groups, and policy areas, GEA research aims to facilitate equitable and sustainable energy services for all, in particular for around three billion people who currently lack access to clean, modern energy.

- The Brazilian multinational energy corporation, Petrobras, was a sponsor of the GEA.
- Brazilians played important leadership roles in the GEA; notably, Professor José Goldemberg of the University of São Paulo was Co-President of the GEA; and Celso Fernando Lucchesi, a former Managing Director of Petrobras, was a GEA Council Member. Professors Suani T. Coelho and Suzana Kahn Ribeiro were members of the GEA executive committee.
- Brazilian researchers made a significant contribution to the GEA with two Convening Lead Authors, six Lead Authors and one Contributing Author.
- The final assessment was launched at a high-level side event during the Rio+20 United Nations Conference.

Outcomes from the GEA include the adoption of GEA findings as the three key objectives of the UN Secretary-General’s Sustainable Energy For All (SE4ALL) initiative on energy access, energy efficiency, and renewable energy. Several senior Brazilian officials are involved in SE4ALL.

Many of today’s most pressing challenges do not stop at international borders. IIASA’s research areas such as climate change, water scarcity, and poverty are affected by multiple factors across the globe. In turn these global problems have impacts on nations, regions, and continents. Finding long-lasting solutions to these challenges requires scientific expertise that is free from the interests of a single nation. IIASA’s National Member Organizations recognize this need and that their investment in IIASA is a contribution to a global public good. And the benefit of this contribution is paid back to global researchers, policymakers, and citizens in multiple ways as the following examples show:

1. IIASA supports the climate change research community by hosting the Representative Concentration Pathways (RCP) database. The database provides data on greenhouse gas emissions for four different future scenarios that underpin the analysis of thousands of climate change researchers. IIASA also calculated the data for one of the scenarios, all of which have been developed for the world’s most comprehensive analysis of climate change—the IPCC’s (Intergovernmental Panel on Climate Change) Fifth Assessment Report.

2. IIASA’s research provides scientific guidance to the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe. This international environmental treaty between 33 countries has slashed air pollution in Europe, improving people’s health and countries’ crop production. IIASA’s GAINS model guided negotiators and policymakers as they worked on the treaty to identify the most cost-effective approach to cleaning Europe’s air. The negotiators chose the GAINS model not only because of its accuracy and usability but also because it had been developed by an international team with funding from multiple countries, which assured them that the model was nationally unbiased.
Activities with Member Countries: Brazil

including Edison Lobão, a former Brazilian Minister of Mines and Energy and Luciano Coutinho, President of the Brazilian Development Bank. IIASA is also one of several institutions responsible for building up a global research and knowledge network for the initiative.

**Stopping deforestation in Brazil**

Brazil has made substantial progress in reducing deforestation in recent years. However, further progress both in Brazil and worldwide requires tackling a range of complex issues simultaneously, including: reforming agricultural practices, increasing the use of agroforestry systems, conserving natural capital and the sustainable development of forest-dependent communities. The holistic approach of systems analysis can help identify strategies that reap multiple benefits across sectors and regions, as well as avoid policies that lead to negative side effects in remotely connected activities. Numerous joint studies between IIASA and Brazilian researchers have adopted this approach:

- As part of the Unlocking Forest Finance (2013-17) project, IIASA is working with the Amazon Environmental Research Institute (IPAM), the National Institute for Space Research (INPE), and other international partners to design financial mechanisms that enable integrated investments in halting deforestation.
- Researchers from INPE and IIASA along with the Institute of Applied Economic Research (IPEA) and other international partners are developing technical know-how and capacity in designing efficient, effective and environmentally relevant policy strategies for REDD (Reducing Emissions from Deforestation and forest Degradation). The project, known as Joint studies by Brazilian and IIASA scientists are applying IIASA’s models and data verification systems to identify smart ways to reduce deforestation, increase the production of cash crops and biofuels, and intensify cattle-raising.

Through intense data gathering, computer modeling, and other advanced research methods, IIASA provides a country’s researchers and their policymakers with the essential numbers and tools to select the most effective policies. For example:

- Brazil may be able to curb up to 26% of global greenhouse gas emissions from deforestation by encouraging the intensification of its cattle production. The study, published in the journal *Proceedings of the National Academy of Sciences*, showed that by subsidizing semi-intensive pasture-based cattle production or taxing conventional pastures Brazil may be able to deliver a substantial cut in global greenhouse gas emissions, even in the absence of a global agreement to prevent deforestation. The two policies would both reduce deforestation in the Brazilian Amazon by about 50% between 2010 and 2030. This would lead to a 25% reduction in global greenhouse gas emissions from deforestation during that time. Combining the two policies could provide a revenue-neutral way for the Brazilian government to reduce greenhouse gas emissions. (Source: IIASA’s GLOBIOM model. Research published in: Cohn AS, Mosnier A, Havlik P, Valin H, Herrero M, Schmid E, O’Hare M & Obersteiner M (2014). Cattle ranching intensification in Brazil can reduce global greenhouse gas emissions by sparing land from deforestation. *PNAS*, 111(20):7236-7241.).

Many of the research projects summarized in this Info Sheet draw on analyses from IIASA’s models, tools, and data including:

- Reducing air pollutants and greenhouse gas emissions simultaneously (GAINS model).
- Planning a sustainable energy system (MESSAGE model, Global Energy Assessment Scenario Database).
- Reducing energy poverty (Energy Access Interactive Tool [ENACT]).
- Improving food security through identifying yield gaps (GAEZ model) and assessing competition for land use between agriculture, bioenergy, and forestry (GLOBIOM model).
- Financial disaster risk management (CATSIM model).
- Projecting future population (Demographic multistate modeling).
- Utilizing the power of citizen science to verify and improve land use data (GEOWiki).
REDD-PAC (2011-2015), has a strong focus on Brazil including analyses on whether REDD policies can act as an incentive to reach Brazil’s 80% deforestation reduction target for the period 2006-2020; and on the impact REDD policies have on the recovery of areas already deforested. In addition, the researchers are developing a Brazilian version of IIASA’s GLOBIO model to assess the competition between Brazil’s goals for reducing deforestation, increasing production of cash crops and biofuels, and intensifying cattle-raising. Various workshops have taken place in Brazil as part of the project and to strengthen collaborations between IIASA, INPE, IPEA as well as the Brazilian Corporation of Agricultural Research (EMBRAPA).

The system analytical approach is also being applied to a recently-launched, international IIASA-led initiative to research policies that both conserve tropical forest resources and create opportunities for the sustainable development of such resources. The Tropical Futures Initiative is a multi-year project developed by IIASA with IPEA, INPE, and international partners in Indonesia, Malaysia, and Vietnam.

The above research on incentives to reduce deforestation builds on several studies with Brazilian partners including:

- In 2008 IIASA scientists together with collaborators from the Center for International Forestry Research in Belém and the US published a study that shows paying land-owners to reduce tropical deforestation is a cost effective way of cutting greenhouse gas emissions compared to other current options, such as carbon capture and storage from coal power plants. The REDD approach also protects bio-diversity, regulates rivers, maintains the environment of some of the world’s poorest people, and brings other important environmental benefits.

- A subsequent study by researchers at the Institute for Sustainability (IIS) in Rio de Janeiro and IIASA, among others, showed that while the current rate of deforestation threatens to cause massive species extinctions worldwide, prompt implementation of an effective carbon payment system to avoid deforestation could reduce extinctions by more than three-quarters. The research, published in Nature Climate Change, used an advanced global land-use model cluster and comprehensive biodiversity data to predict the impacts of deforestation on biodiversity.

**Co-benefits: Improving air quality and tackling climate change**

IIASA’s GAINS model is a scientific tool that helps policymakers select a smart mix of measures to simultaneously cut air pollution and greenhouse gas emissions in the most cost-effective way. It has been applied successfully in international negotiations of the Convention on Long-range Transboundary Air Pollution and the European Union to curb air pollution; and it has been used to analyze mitigation efforts for the climate negotiations under the UN Framework Convention on Climate Change.
Researchers from the University of São Paulo, IIASA and other Latin American countries are developing the GAINS model to identify measures to curb the release of short-lived climate pollutants such as black carbon and methane in Latin America. By implementing an integrated approach to reducing these pollutants, there is potential to simultaneously increase human wellbeing through reduced local air pollution, improve local environmental quality, increase security of food and energy supply, and lower water demand as well as reducing greenhouse gas emissions.

The work started in 2014 as part of a regional assessment of short-lived climate pollutants in Latin America for the Climate and Clean Air Coalition to Reduce Short Lived Climate Pollutants—the first international effort to treat these pollutants as a collective challenge. IIASA and international partners provided the intellectual underpinnings for this coalition via an article in Science in 2012.

Another greenhouse gas, nitrous oxide, contributes to global warming and stratospheric ozone depletion. Researchers from the Ministry of Science, Technology and Innovation, INPE, the University of Brasilia, and IIASA are part of the International Nitrogen Initiative which aims to optimize nitrogen’s beneficial role in sustainable food production and minimize nitrogen’s negative effects on human health and the environment resulting from food and energy production.

**Projecting demographic change in Brazil**

IIASA’s demographers study and project the changing composition of population for all countries of the world. They produce one of the few independent alternatives to the demographic projections of the UN Population Division. As a testament to the quality of IIASA’s demography, the IPCC in 2011 adopted IIASA’s population projections as its source data in all modeling for the Fifth Assessment Report; and UNESCO has adopted IIASA’s demographic methods as part of its literacy forecasting.

The Institute’s interdisciplinary approach has encouraged its demographers to reach beyond the traditional boundaries of demography and to explore how changes in society, economy, and the natural environment influence the health and mortality, migratory patterns, and reproductive behavior of human society.

A recent innovative example of this broader approach has been the development of research methods to project population by level of education. This equips researchers with the tools to explore the implications of different education policies on a country’s future fertility, life expectancy, migration, and population level as well as economic growth and ability to adapt to climate change. In 2014, IIASA published a book with Oxford University Press that offered the first projections of educational attainment by age and sex for 171 countries. Findings for Brazil show how different policies over the next few decades could lead to the country’s 2010 population of 194.9 million declining to 148 million by 2100 or increasing to around 279 million.

IIASA’s demographers also collaborate with researchers from the Center for Development and Regional Planning (Cedeplar) at the Federal University of Minas Gerais on demographic methods to analyze the formation of human capital.

Between 2009 and 2011, IIASA social scientists explored the factors that determine people’s capacity to cope with and adapt to adverse climatic conditions through case studies of two low income settlements, one of which is ‘Rocinha’ in Rio de Janeiro. In both case studies the research found that formal education had a direct effect on reducing risk as well as a mitigating effect on issues that increase risk.

**Advancing the modeling of complex systems**

New frameworks and new models are being developed via joint studies between Brazilian and IIASA researchers, these include:

- CGEE, INPE and IIASA co-organized a land-use change vision workshop in Rio de Janeiro in 2012. Resulting papers from the workshop argue for a new globally consistent and expandable systems-analytical framework to guide and facilitate decision making on sustainability from the planetary through to the local level, and vice versa. This framework...
would strive to link a multitude of Earth-system processes to the local level and so allow countries like Brazil, a case study in this article, to understand domestic or even local sustainability measures within a global perspective and to optimize them accordingly. Other authors on this journal article were also from EMBRAPA, São Paulo State University, Federal University of Minas Gerais, and Brazil’s Ministry of Science, Technology and Innovation. Collaborations continue between these partners in the area of uncertainty in environmental services.

- Researchers from INPE, IIASA and collaborators in Ukraine and Poland worked together on reducing uncertainties in greenhouse gas inventories at a workshop in 2010 in Ukraine.
- Collaboration with the University of São Paulo is developing a model of plant growth that analyzes how vegetation in the past has responded to changes in climatic conditions in order to project how vegetation may be affected by future changes in temperature and precipitation.
- In collaboration with INPE and other international partners, IIASA has developed plausible scenarios of Eastern African food security for stakeholder groups and policymakers using its GLOBIOM model as part of the CGIAR Climate Change, Agriculture, and Food Security Program.

Business functions in the same complex global systems as nations, and IIASA’s systems approach can offer new insights for sustainable operations in the global economy. In turn, IIASA’s analyses can benefit from business, learning from its experience on the ground and in implementation. IIASA also recognizes that closer collaboration between business and its researchers can increase the impact of the Institute’s work.

IIASA is seeing a growing number of contracts with commercial partners worldwide, including:

- The global insurer, Zurich Insurance Group, began working with IIASA in 2013 to identify and address research gaps on flood resilience and community based disaster risk reduction, demonstrate the benefits of pre-event risk reduction over post-event disaster relief and to improve public dialogue around disaster resilience.
- The German carmaker, Daimler AG, has collaborated with IIASA researchers to assess biofuel potential from marginal and degraded lands in India and Brazil.
- The Brazilian energy company, Petrobras, was one of nineteen sponsors of IIASA’s Global Energy Assessment.
- The research institute of the Japanese carmaker, Toyota, has an ongoing collaboration with IIASA to research measures to reduce ozone emissions in Asia.
- The multinational consumer goods company, Unilever, funded IIASA’s agricultural experts from 2008-10 to analyze yields and land suitability of key agricultural crops under a changing climate.

IIASA is exploring ways that it can work more closely with these and other multinational corporations to support global sustainable business plans.
Activities with Member Countries: Brazil

Capacity Building

**Young Scientists Summer Program**

The Young Scientists Summer Program (YSSP) develops the research skills and networks of talented PhD students. Program participants conduct independent research within the Institute’s research programs under the guidance of IIASA scientific staff. Funding is provided through IIASA’s Brazilian National Member Organization (NMO) unless otherwise stated. Since 2008 the following eight Brazilian students have participated in this program:

**Gustavo Burin Ferreira** (YSSP ‘11 & University of São Paulo) extended a model of plant growth in order to study how salient aggregate properties of vegetation such as net primary productivity and total biomass are likely to change under future changes in temperature and precipitation. (Funded by IIASA).

**Juliana Gil** (YSSP ‘13 & University of Hohenheim), a Brazilian national, explored the land use change dynamics in Mato Grosso, Brazil, to improve our understanding of the extent to which anti-deforestation measures and high grain prices may lead to livestock farming intensification. (Funded by the German NMO).

**Minella Martins** (YSSP ‘14 & National Institute for Space Research) evaluated the vulnerability of agricultural production in major cities in the semi-arid region of Brazil in order to suggest priority sectors (economic, social and/or environmental) for investments and improvements. (Funded by IIASA).

**Victor Maus** (YSSP ‘13 & National Institute for Space Research) developed a new methodology for satellite time series analysis in order to use it to produce accurate land use and land cover data.

**Guilherme de Paula** (YSSP ‘14 & Yale University), a Brazilian national, analyzed and explained the significant cost reductions in sugarcane ethanol production in Brazil since 1975. (Funded by the US NMO).

**Flora Piasentin** (YSSP’08 & University of Brasilia) assessed the suitability of land in the core cacao region of Brazil for growing alternative crops in combination to cacao by applying the Agro-Ecological Zoning (AEZ) methodology. (Funded by the Norwegian NMO).

**Pedro Rochedo** (YSSP’13 & Federal University of Rio de Janeiro) further developed the Brazilian version of IIASA’s energy planning tool, MESSAGE, by introducing carbon, capture and storage in association with biomass or bioenergy development as one of the many low-carbon technologies.

**Aline Soterroni** (YSSP ‘10 & National Institute for Space Research) developed a methodology to calibrate the inputs to the EPIC (Environmental Policy Integrated Climate) model and validate its outputs based on remotely sensed data. (Funded by IIASA).

**Special Awards**

A young Brazilian scholar has been a recipient of the annual YSSP Peccei Awards, which rewards a YSSP participant whose research paper has met standards of the highest quality, originality and relevance of research. The winner received a scholarship to return to research at IIASA.

In 2008, **Flora Piasentin** (Federal University of Brasilia) won the Peccei award for her assessment of the land suitability for different cacao agroforestry production systems in Bahia, Brazil.

**Regional Young Scientists Summer Program**

In 2012 IIASA launched its first regional YSSP called the Southern African Young Scientists Summer Program (SA-YSSP). The Program is organized jointly by the South African National Research Foundation, the South African Department of Science and Technology, the University of the Free State in Bloemfontein, South Africa, and IIASA. The following Brazilian national has participated in the program:

**Alan de Barros** (SA-YSSP 2014-15 & University of São Paulo) conducted statistical analysis of jaguar movements in order to enhance the conservation of a critically endangered population of jaguars in the Atlantic Forest, Brazil.

Since 2008, eight Brazilian students have developed research skills and networks by taking part in IIASA’s Young Scientists Summer Program
Postdoctoral Program

Postdoctoral researchers at IIASA work in a rich international scientific environment alongside scientists from many different countries and disciplines. The Institute’s research community helps its postdoctoral researchers to develop their research from fresh angles, to publish widely in journal articles, and to establish their own global network of collaborators. One postdoctoral fellow from Brazil has participated in the program since it began in 2006:

Edmar Teixeira (2007-09), a Brazilian national, explored the responses of crop production to changes in climate and tropospheric ozone, using the FAO/IIASA Agro-ecological Zones (AEZ) methodology. (PhD in Crop Physiology from Lincoln University, New Zealand).

Luciano Barreto Mendes (2015 to present) will develop a nitrogen, phosphorous, and carbon flow and balance model for agricultural and food chains in South American countries, that includes farm versus forest competition, in order to assess mitigation strategies against nutrient loss. (PhD in Agricultural Engineering from the Federal University of Viçosa).

At the end of 2013, the National Council for Scientific and Technological Development (CNPq) and IIASA agreed to cooperate on Brazil’s Science without Borders (Ciencia sem Fronteiras, or CsF) program, which provides funding for Brazilian postdoctoral scholars to conduct research at high-quality scientific institutes around the world. Brazilian nationals and permanent residents are eligible to apply for postdoctoral fellowships at IIASA for 6-12 months, extendable up to 24 months, in the CsF priority areas in Science, Technology, Engineering, Maths (STEM). IIASA scientists have provided letters of support for a range of applicants in the present CsF round, and decisions are expected in April 2015.

Other Capacity-Building Activities

IIASA participates in the European Forestry Masters Program, a training initiative for advanced university students. As part of the EU sponsored program, candidates work for a 3-month period at IIASA to further their studies. Two Brazilian students have participated in the program since 2008:

- In 2011 Mariah Pereira Vargas worked on a database of traditional wood fuels in tropical countries (Brazil, Congo Basin, Indonesia and India). And in 2012 Abel Alain Marcarino applied, validated and further developed IIASA’s ecosystem services modeling tools.
- In October 2012, eight Brazilian researchers from INPE and IPEA were trained to use the General Algebraic Modeling System (GAMS) software and IIASA’s GLOBIOM model at IIASA.
- In September 2013, three Brazilians from CGEE took part in a summer school at IIASA on future studies and foresight as an instrument for public engagement in policymaking for a complex and uncertain world.
- In March 2014, IIASA became a partner of Rio de Janeiro’s new Museum of Tomorrow. This partnership will see IIASA’s research being displayed in the museum’s Observatory of Tomorrow.
Several IIASA researchers hold positions at universities and other institutions in Brazil. For example, Jose Goldemberg, served as Co-President of IIASA’s Global Energy Assessment (2007-12) while also serving on the faculty of the University of São Paulo, and in 2012 Clarissa Rodrigues held Research Scholar positions with IIASA’s World Population Program and with the International Policy Center for Inclusive Growth in Brasilia.

IIASA researchers regularly make presentations in Brazil, a recent selection follows:

Pavel Kabat on “Science for Natural Resources” at the 2013 World Science Forum in Rio de Janeiro in 2013.

Florian Kraxner on “The REDD+BECCS connection, assessing global potentials and sustainability” at the IEA-IIASA-USP workshop on ’Bioenergy and carbon capture and storage (BECCS): Options for Brazil’ in São Paulo in 2013.

Nebojsa Nakicenovic on the “Global Energy Assessment” at the University of São Paulo in 2013.


Reinhard Meckler on “Reframing Risk and Uncertainty in the Economics of Climate Adaptation” at the ISEE 2012 Conference in Rio de Janeiro in 2012.

Keywan Riahi on “Integrated assessment scenarios, the multiple co-benefits of an integrated approach to energy transformation” at Rio+20 in Rio de Janeiro in 2012.


Michael Obersteiner on “Land use transitions in South America: Framing the present, preparing the future towards regional sustainability” at a Global Land Project workshop in Ilhabela in 2011.

Shonali Pachauri on “Estimating the inconvenience costs of traditional fuels to assess non-monetary drivers of household fuel choices in developing countries” at the International Association for Energy Economics Annual Conference in Rio de Janeiro in 2010.

Other examples of scientific exchange include:

- Over 65 Brazilians have participated in IIASA events since 2008.
- 34 publications have resulted from IIASA-Brazilian collaborations
- On average four Brazilian nationals have been employed by IIASA every year since 2011.
- Since 2008, eight Brazilians have gained international and interdisciplinary research experience from participating in IIASA’s Young Scientists Summer Program.
- Researchers, advisors, and diplomats from Brazil have visited IIASA 23 times, while IIASA scientists have visited Brazil over 60 times.

Appendices

The details behind the above facts can be found in the following appendices to the country sheet. The appendices are either attached or available on request from Sanja Drinkovic (drinkovs@iiasa.ac.at):

1. Employees with Brazilian nationality at IIASA (2006-2014)
2. Brazilian visitors to IIASA (2006-2014)
3. Conference participants from Brazil to IIASA (2006-2014)
4. Travel by IIASA scientists to Brazil (2006-2014)
5. Publications relevant to IIASA-Brazilian Collaborations (2008-2014)
Prospects for Future IIASA-Brazilian Activities

This Info Sheet summarizes recent research collaborations between IIASA and Brazil. Significant potential remains to further intensify the IIASA-Brazilian relationship through developing a range of new joint activities including:

- **Enhancing Brazilian expertise in applying system analysis to national problems:** Developing bespoke Brazilian versions of IIASA’s global models would allow researchers and policymakers to look at complex global problems and their impact on Brazil in a holistic and integrated way. For example, the Dutch government worked with IIASA to develop a Dutch version of the IIASA GAINS model. The new model helps ministries to identify cost-effective measures to improve air quality and reduce greenhouse gas emissions in the Netherlands at the same time as complying with the country’s obligations under international air quality agreements.

- **Conducting international assessments in areas of Brazilian strategic interest:** Brazil was a significant contributor to IIASA’s Global Energy Assessment which brought together over 500 specialists to transform the way society thinks about, uses, and delivers energy. IIASA is embarking on two new assessments, at the request of its member countries that will focus on issues of strategic interest to Brazil. These are holistic, integrative assessments of global water challenges and tropical deforestation.

- **New partnerships between IIASA and Brazilian institutions to win grants from international research funders:** IIASA’s high-quality research and international research network makes it highly competitive in its applications for international research funds. Between 2006 and 2014, IIASA almost doubled its income by winning research grants that amounted to €69 million. This was part of a total funding portfolio of €329 million of the external projects in which IIASA was and is involved.

- **Using international scientific cooperation to support diplomacy:** IIASA was established in 1972 to use scientific cooperation to build bridges across the Cold War divide and research growing global problems on a truly international scale. Today the soft power of science diplomacy continues to help IIASA’s member countries through using scientific cooperation to improve international relations, and through international teams jointly researching controversial issues to find consensus, free from the constraints of national self-interest (see box: Research to support science diplomacy: page 8). For example, IIASA has launched a new international project to analyze the prospects for economic integration between Europe and the countries of the former USSR.

- **Academic training opportunities for young Brazilian scientists:** There is significant potential to enhance participation by young Brazilian postdoctoral scholars in IIASA’s programs to develop their international and interdisciplinary research skills (see page 11: Capacity Building). For example, IIASA has recently become a partner in Brazil’s Science without Borders program, which aims to help place Brazilian postdoctoral scholars at IIASA, and to develop a sandwich-type doctorate opportunity, in which a Brazilian doctoral student may spend one year at IIASA developing part of the PhD thesis research in cooperation with an IIASA scientist.

Enhancing the IIASA-Brazil relationship offers benefits for Brazilian research, government policy, and international relations.
About IIASA

Founded in 1972, the International Institute for Applied Systems Analysis (IIASA) conducts policy-oriented research into problems of a global nature that are too large or too complex to be solved by a single country or academic discipline. IIASA's research areas are energy & climate change; food & water; and poverty & equity.

IIASA is at the center of a global research network of around 2,500 scholars and over 550 partner institutions in over 65 countries. It is funded and supported by its National Member Organizations which represent the scholarly community in the following countries:

Australia, Austria, Brazil, China, Egypt, Finland, Germany, India, Indonesia, Malaysia, Japan, Mexico, Netherlands, Norway, Pakistan, Republic of Korea, Russia, South Africa, Sweden, Ukraine, United Kingdom, United States of America, Vietnam.

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