

WORKSHOPS REPORT  
AUGUST 16, 2018 IN MANAUS  
SEPTEMBER 24, 2018 IN WASHINGTON, DC



*The Scientific, Social and  
Economic Dimensions of*

# **DEVELOPMENT IN THE AMAZON**



***“What happens to Amazonia affects the whole world”  
– Luiz Antonio Martinelli***







*The Scientific, Social and Economic Dimensions of*

# DEVELOPMENT IN THE AMAZON

In 2018, the Wilson Center's Brazil Institute, the São Paulo Research Foundation, and the National Institute of Amazon Research co-organized two workshops with the support of the Alcoa Foundation, one in one in Manaus, Brazil on August 16 and one in Washington, DC on September 24. The idea for the workshops grew out of a research project launched at the Wilson Center in 2014: called GOAmazon, it aimed to study the role of the Amazon in regulating regional and global climate patterns, and assess the impact of human activity on the hydrological equilibrium of the Amazon basin.

The main objectives of the workshops in Manaus and Washington, were to disseminate research on the Amazon biome and to discuss in an interdisciplinary way the scientific, social and economic factors of development in the Amazon. Presenters discussed cutting-edge research on the role of the Amazon in regulating regional and global climate, as well as the issues of sustainable development, biodiversity, and deforestation. The event explored aspects of the climate, ecosystem functioning, and related socioeconomic issues associated with the current project of Amazonian development. In addition, the workshops offered a space to discuss private sector initiatives and the role of non-governmental organizations in building a sustainable future for the Amazon region.

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# AGENDA

**Dimensões Científicas, Sociais e Econômicas  
do Desenvolvimento da Amazônia  
Bosque da Ciência – INPA | Manaus, Brazil  
August 16, 2018**

- 9:00**    **Opening Session:** Welcome remarks from the Presidents of INPA, FAPEAM, and FAPESP. Introduction by Paulo Sotero, Director of the Wilson Center’s Brazil Institute. Greetings via video from acclaimed biologist and sustainability scholar Thomas Lovejoy.
- 9:30**    **The Carbon Balance in the Amazon and Climate Change** | Luiz Martinelli (University of São Paulo)
- 10:15**    **The Amazon Atmosphere and its Impact on the Climate**  
| Paulo Artaxo (University of São Paulo)
- 11:15**    **Strategies for Reducing Deforestation in the Amazon** | Paulo Moutinho (IPAM – Amazon Environmental Research Institute)
- 12:00**    **The Socioeconomic Challenges of Development in the Amazon** | Tatiane Schor (UFAM—Federal University of Amazonas)
- 12:30    Lunch



- 14:00**   **Biodiversity and Sustainability in the Amazon** | Maria Teresa Piedade (INPA—National Institute for Amazon Research)
- 14:30**   **INPA and its Contribution to Scientific Discovery in the Amazon** | Paulo Maurício (INPA—National Institute for Amazon Research)
- 15:00**   **The Role of Innovation and New Technologies in the Amazon Development** | Carlos Bueno (FAS—Sustainable Amazon Foundation)
- 15:45**   **The Role of the Private Sector in Sustainable Development in the Amazon** | Fábio Abdala (ALCOA Foundation)
- 16:15**   **The Logistical Contributions of the Brazilian Military to Amazon Research** | Dovanil Ferraz Camargo (Amazon Military Command)

# AGENDA

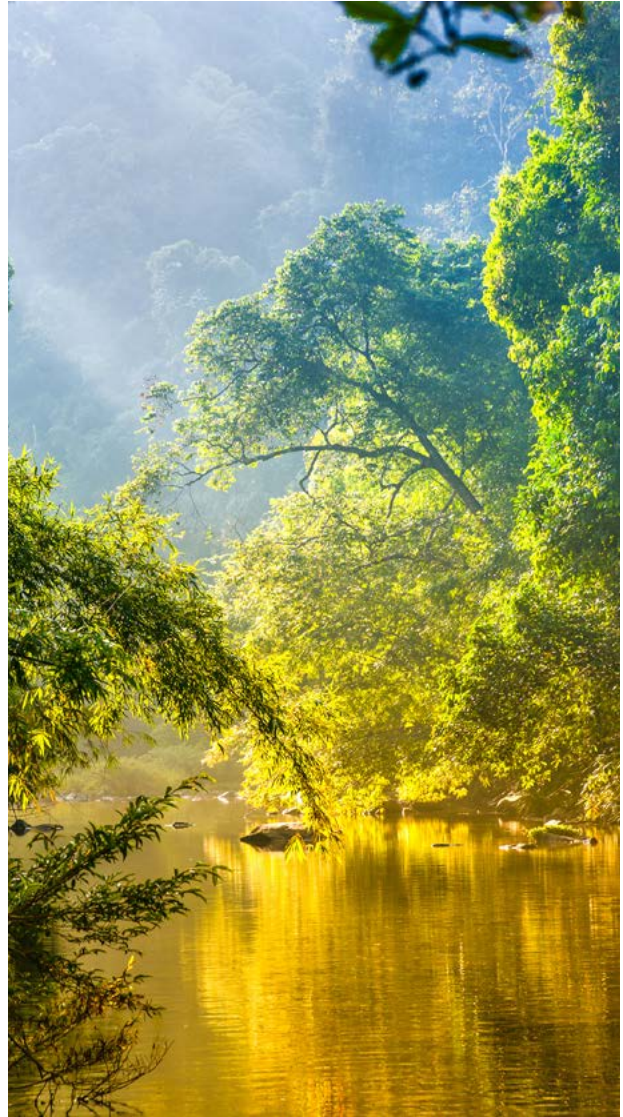
**Scientific, Social, and Economic Dimensions  
of Development in the Amazon**  
Wilson Center | Washington, DC  
September 24, 2018

- 9:00**    **Welcome Session:** Paulo Sotero, Director, Brazil Institute; Paulo Artaxo, São Paulo Research Foundation (FAPESP); Rita Mesquita, Senior Researcher, National Institute of Amazon Research (INPA); and Welcome video with Thomas Lovejoy, UN Foundation and George Mason University.
- 9:15**    **The Close Links Between the Biology of Amazonia and the Climate** | Paulo Artaxo, Professor, University of São Paulo (USP)
- 10:00**    **Remote Sensing of Amazon Deforestation** | Douglas Morton, Earth Scientist, NASA Goddard Space Flight Center
- 11:00**    **The Ecosystem and Physiological Control of the Carbon Balance in Amazonia** | Celso von Randow, Researcher, National Institute for Space Research (INPE)
- 11:45**    **The Current and Future Climate in Amazonia and its Impact** | José Marengo, Senior Researcher, National Center for Monitoring and Early Warning of Natural Disasters (CEMADEM)
- 12:30**    Lunch

- 13:30 Economic Incentives for Halting Deforestation in the Amazon |**  
Gustavo Fonseca, Director of Programs, Global Environment Facility
- 14:15 The Role of Research Institutions in Fostering Development in the Amazon |** Rita Mesquita, Senior Researcher, National Institute of Amazon Research (INPA)
- 15:00 Discussion Session and Closing Remarks**

*“From the very beginning, land use has been at the heart of our discussions because human activity across the Amazon frontier is an incredibly important driver of change.”*

*-- Douglas Morton*



# SUMMARY

**of the Presentations  
in Manaus and  
Washington, DC**

The Amazon forest serves as the lungs of the earth, playing a crucial role in regulating the world's climate. After decades of deforestation and pollution, leading scientists have warned that the region is approaching a tipping point. Yet at the same time, growing understanding of the impact of human activities, stemming from decades of scientific research, offers new possibilities to push forward with sustainable development in the Amazon; strong partnership between academia, government, civil society, and the private sector will prove critical to this effort.

Towards this end, the Wilson Center's Brazil Institute, the São Paulo Research Foundation (FAPESP), and the National Institute for Amazon Research (INPA) hosted two workshops in 2018 with the support of the Alcoa Foundation: one in Manaus, Brazil and one in Washington, DC. Through bringing together a diverse group of stakeholders, the workshops aimed to contribute toward a more systemic understanding of the Amazon region, its role in the world, and its potential as a resource for sustainable growth.

This idea that the Amazon is a complex system was woven throughout the presentations in Manaus and Washington. Donavil Ferraz Camargo, of the Amazon Military Command, stressed that the region is one of great diversity: "there are many different Amazonias within Amazonia." Paulo Artaxo, a professor of physics and member of the steering committee for the FAPESP Research Program



on Global Climate Change, argued the Amazon “doesn’t work in a linear way or have only one type of impact.” Luiz Martinelli concurred, noting that the Amazon biome is the result of a number of processes acting in concert, from photosynthesis to biodiversity to human land use. It is critical to comprehend not only the individual processes, but also how they work together as a system—and how human activity has altered this system over the past century.

Human activity remains a key challenge for the Amazon. According to the Brazilian government, the deforestation rate hit its highest rate in a decade between August 2017 and July 2018, with 3,050 square miles of rainforest cleared. Douglas Morton, a NASA Earth scientist at the Goddard Space Flight Center, explained



how remote sensing and satellite technology have, in recent decades, allowed researchers and government agencies to learn more about the causes and impacts of deforestation, from tracking forest fires and illegal logging to creating 3-dimensional maps to assess the total biomass in a given area. Morton noted that this research has shown that “the legacy of [human] activity is long-lasting and important, whether we’re talking about carbon, or biodiversity, or land value.”

Deforestation and other human-driven changes in the Amazon, such as the construction of roads and the increase in pollution, have reduced the forest’s capacity to act as a net carbon sink through increasing tree mortality. As Martinelli said, photosynthesis is one of the most powerful methods of turning inorganic carbon—the carbon in the air—into organic carbon—the carbon that builds tissues



or supports metabolic functions. The effect of climate change in Amazonia thus becomes a self-reinforcing cycle: higher temperatures and more frequent extreme weather events (e.g., droughts or flooding) increase tree mortality, which in turn means the forest emits more CO<sub>2</sub>.

The costs of this negative cycle extend far beyond the trees, with significant social and economic implications. Camargo noted that Amazonia already contributes over 7 percent of Brazil's gross domestic product, even though it receives just 3 percent of federal spending for research and development. The region has enormous economic potential—but as IPAM senior research Paulo Moutinho stressed, much of this potential depends on the continued existence of the forest. The forest is responsible for 50 percent of rainfall across Amazonia, and supports rainfall patterns across Brazil: this water is critical to Brazilian agricultural production, as well as the wellbeing of local communities. “The social impact of the droughts in Amazonia in 2005 and 2010 was huge,” Artaxo said. “Towns were completely isolated, without water or food. After all, the rivers are the region's roads.” Speakers noted that the region's biodiversity is also a significant and largely untapped resource. Thus economic development and environmental conservation, rather than being in opposition, are fundamentally intertwined in the Amazon.

As a result, Moutinho and other speakers argued that policymakers need to take the true economic value of the Amazon forest into consideration when creating development policies. Artaxo contended that “the value of the ecosystem services performed by the Amazon Rainforest is equivalent to \$14 trillion dollars,” basing his figure in part on current international carbon pricing norms: “That's a lot of value.” Reducing human-driven forest loss will not be easy, but it is possible. Through incorporating a systems-based approach to the Amazon, grounded

in scientific understanding, policymakers gain the ability to promote development and economic growth while preserving the forest's critical role.

A number of civil society organizations are working closely with industry and local communities to implement sustainable development programs in the Amazon. Carlos Roberto Bueno, of the Fundação Amazonas Sustentável, described the NGO's commitment to stimulating an integrated "ecosystem of innovation and development of businesses that values the forest and improves the lives of its inhabitants." Paulo Maurício of INPA noted the potential for the sustainable use of Amazonian biodiversity, including aquaculture, farming alternative crops, and biotech. Maria Teresa Piedad of INPA concurred, noting that there is significant space for development that takes advantage of the Amazon's rich diversity, from biotechnology to ecotourism, as well as more sustainably managed development and extractive projects in the region.

Sustainable development will need to consider the concerns of all stakeholders to be successful, from multinational companies to local communities. Rita Mesquita, a senior researcher at the National Institute of Amazon Research stated that "it's very important that we establish and strengthen our connections to everybody and anyone that is interested in discussing alternative ways to deal with the Amazon...we know the solution is going to be interdisciplinary." Local communities often possess a wealth of knowledge of how to extract economic value from the land in a sustainable way. Yet the Amazon has a surprisingly high cost of living, said Tatiane Schor, a professor at UFAM. It is often more expensive to eat locally grown foods, due in part to the *gourmetização* of Amazon products such as açaí, which have become internationally desirable. Many of the speakers argued that sustainable development will need to address these and other local socioeconomic challenges.



There are a number of examples from the work of nongovernmental organizations and from industry that offer lessons for sustainable, inclusive development in the Amazon. In some cases, the lessons are drawn from negative experiences. Piedad, who leads a research group on wetland ecology and sustainable use, spoke at length on the adverse ramifications of the Balbina hydroelectric dam built in the 1980s in Presidente Figueiredo, Amazonas. Her research has shown that the dam altered the ecology of the surrounding forest: flooded vegetation acidified the water and released greenhouse gases as it decomposed, killing local species and reducing the area's biodiversity. The creation of the reservoir also flooded two indigenous reserves, displacing those communities. Moreover, the dam itself is inefficient, increasing the costs of these impacts relative to the energy produced.

Yet there are also projects that demonstrate the potential for positive sustainable development in the region. Fabio Abdala, of the Alcoa Foundation, described his organization's efforts to pioneer a more sustainable model of mining at the Alcoa bauxite mine in Juruti, Pará. Abdala argued that companies must commit to responsible development that benefits local communities: he noted that in the case of the Juruti project, 87 percent of the workforce is from Pará, and 44 percent are from Juruti itself. He also described the Alcoa Foundation's work to support local infrastructure and public investment, from building community centers to providing job training. More notably, the Sustainable Juruti Project also includes a plan to rehabilitate the forest in mined areas, with three distinct phases over 15 years. The first stage, which occurs over the first eighteen months, covers the earth with fast-growing native species, followed by additional slower-growth plants in the second and third phase to restore land degraded during the mining process. Latin America and the Caribbean currently account for over 20 percent of the world's degraded lands, making projects that work to



***“What we do during this decade will be critical for the future of Amazonia.”***

***— Paulo Artaxo***

restore vegetation critical to the region’s economic and environmental future. Abdala noted that companies can also take smaller steps, such as committing to protect biodiversity corridors, to help reduce environmental costs.

Weaving through all the presentations in Manaus and Washington was a need for greater collaboration between researchers, industry, government, and local communities. Rather than standing in opposition, economic development and environmental stewardship go hand-in-hand in the Amazon. Through greater understanding of the Amazonian system and dialogue with all stakeholders, policymakers can protect the forest while fostering economic growth. As Moutinho stated, “Not having this forest...means not having an economic asset of paramount importance.”

*The Workshops in Manaus and  
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and hosted by*




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One Woodrow Wilson Plaza  
1300 Pennsylvania Avenue, N.W.  
Washington, DC 20004-3027

 [www.wilsoncenter.org/program/  
brazil-institute](http://www.wilsoncenter.org/program/brazil-institute)

 [brazil@wilsoncenter.org](mailto:brazil@wilsoncenter.org)

 [facebook.com/brazilinstitute](https://facebook.com/brazilinstitute)

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 202.691.4147