

## Overview on a Range of Threats

Liana Anderson



Courtesy of Liana Anderson/Photo by Douglas Morton

Biologist Liana Anderson surveys a forest burn in the Mato Grosso, southern Brazilian Amazon.

*Brazilian biologist Liana Anderson's primary research has been in the Amazon Basin, where she has seen the effects of climate change close up. She is completing her doctoral research at the Environmental Change Institute, Oxford University.*

*Anderson surveys the most critical areas of concern, including agriculture, public health, and the importance of containing deforestation, which accounts for Brazil's largest source of damaging greenhouse gas emissions.*

**B**razil is a vast country, taking up nearly half of South America and claiming much of its eastern coastline. Although renewable energy accounts for 47 percent of the energy produced in Brazil, much higher than the global average. Brazil still emits a large share of the total global greenhouse gas emissions. The chief reason is rapid slash-and-burn deforestation in the Amazon Basin. The Amazon, the world's largest tropical forest, spreads over nine countries, but most of it lies within Brazil. Rainforests are enormous carbon storage sinks. When they are cleared and burned, carbon dioxide and other greenhouse gases are released into the atmosphere. These have been found to contribute to climate change and global warming.

According to the United Nations Framework



Anama Lake near Manaus, Brazil, after drought affected levels of the Amazon River, caused the water level to drop several feet, and harmed the fishing industry in 2005.

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launched in 2008 the National Plan for Climate Change, which envisions diminishing the deforestation of the Amazon by 70 percent, in relation to the estimates from 1996-2005, by 2017. This initiative is a major strategy to mitigate global climate change by preserving the forest. It has also opened possibilities for funding and political cooperation. At the U.N. Climate Change Conference in Bali (December 2007), the nations agreed to include payments for Reduced Emissions from Deforestation and Degradation within the framework of the Kyoto Protocol.

Convention on Climate Change (UNFCCC), when emissions from land-use change and forestry estimations (LUCF) are included, Brazil's emissions amount to 12.3 percent of the total of the 151 non-Annex I Parties to the UNFCCC, primarily developing countries, that have no emissions reduction targets according to the Kyoto Protocol.

It is estimated that Brazil releases about 1 billion tons of carbon dioxide (CO<sub>2</sub>) into the atmosphere per year; about 75 percent of this is from deforestation, the Brazilian Ministry of Science and Technology reports. Recent estimates suggest that the Amazon Basin has a total biomass of 86 petagrams of carbon, equivalent to the last 11 years of CO<sub>2</sub> emissions. Deforestation is estimated to have reduced the Amazon forest by 15 percent in the past three decades, driven by infrastructure expansion in the forest frontier and increasing global demand for soya, beef, timber, etc. Climate change also is predicted to increase the probability of droughts in this region. The University of Oxford, in collaboration with NASA (U.S. National Aeronautics and Space Administration) and Brazilian scientists, demonstrated the close link between droughts and the increase in forest fires, potentially doubling the total amount of carbon emitted to the atmosphere. (Saatchi, Houghton, Dos Santos Alvala, Soares, and Yu, 2007.)

To tackle Brazil's largest source of greenhouse gas emissions, deforestation, the Brazilian government

However, the Amazon forest is not the only ecosystem facing the threats of climate change. The continental extension of Brazil demands a multidimensional approach to adaptation and mitigation. Brazilian and American scientists, testing different scenarios of global warming, estimate widespread species loss for the Cerrado biome (Brazilian savannah), with loss of more than 50 percent of potential distributional area for many species. Northeast Brazil, the poorest region in the country, is threatened. The Water Availability and Vulnerability of Ecosystems and Society program, a collaboration between Brazil and Germany, recommends careful planning in long-term resource-use plans, as river flow and crop production are specifically sensitive to climate change. They also predict water scarcity for Ceará State by 2025.

Climate change is likely to affect agriculture in southern Brazil, the most important region for crops such as potato, wheat, rice, maize, and soybean. Although simulations for increased atmospheric CO<sub>2</sub> concentration show beneficial effects for those crops, the effects of increased air temperature and uncertainties in rainfall pattern due to climate change are predicted to greatly reduce the agricultural productivity in this region. This will affect crop management and will require adaptation strategies from producers and the government. Investments in technologies will be decisive in mitigation of climate



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A boat transports people from flooded homes in Trizidela do Vale, Brazil, along the Mearim River. Although flooding is common here, waters now rise higher and stay longer.

was estimated at 62 million dollars.

In response to the extensive range of threats to Brazil that may result from climate change, many actions have already been taken by the government and the scientific community. Strengthened networks of multinational scientific collaboration have greatly advanced the knowledge of many ecosystems and their interactions with the environment and human populations.

change impacts on the food supply. In contrast, small farmers in the Amazon are more susceptible to the extended droughts, floods, and increased wildfires associated with changing climate patterns. An immediate improvement of infrastructure, information, and communication networks is essential to alleviate the effects of climatological changes in this remote region.

Public health is also a great concern. It is accepted that environmental changes will modify vector-borne disease transmission patterns and their area of occurrence. Recent studies in Brazil showed a significant increase in cases of leishmaniasis, a potentially fatal parasitic disease spread by sand flies, during El Niño years. With the expected increase of El Niño frequency and intensity in this century due to climate change, the number of leishmaniasis cases is likely to rise in many Brazilian regions. The cost of leishmaniasis medical care during the 1997/98 El Niño in Bahia State (Northeast region)

In 2008, State of São Paulo Research Foundation launched the Global Climate Change program, investing more than 7 million dollars in scientific projects.

Reaching Brazil's ultimate goal of greenhouse gas emissions reduction and mitigating the effects of climate change requires multinational, interdisciplinary research by the scientific community, political action, the involvement of

*The Amazon forest is not the only ecosystem facing the threats of climate change. The continental extension of Brazil demands a challenging multidimensional approach to tackle climate change effects and to develop adaptation and mitigation solutions.*

the citizens, extensive dissemination of information, and an effective interface of regional and international policy for enforcement and consolidation. Immediate responses are essential to face the worldwide common threat, climate change. ■

*References cited are listed in Additional Resources.*

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