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Is Brazil on the Winning Side of Climate Change?

by Dr. Klaus Hermanns

Summary

On national and international level, Brazil is actively taking part in the discussion about possible global climate changes. According to the current climate modeling, negative impacts such as the extension of the savannahs and rising water shortages by the end of the century are forecast, above all for the Northeast of Brazil, as well as for the North including Amazonia. The Kyoto Protocol does not obligate Brazil to reduce the carbon dioxide emissions. In the current climate debate, Brazil is primarily considered to play a positive role as a global furnisher of bio fuel in the future. The Brazilian federal government especially is reluctant to recognize the ecological and social risks of a massive extension of the agricultural lands. Heated disputes, like that of biodiversity versus bio fuel or bio fuel versus security of food supply seem eminent. In the post-Kyoto process, the reduction of deforestation and hence of carbon emissions is gaining in importance. From the European point of view it is now crucial to establish, together with Brazil, standards for certified energy plant cultivation, in order to avoid the negative ecological and social effects in South America's largest country.

1. Climatic Changes Discussed in Brazil

The Intergovernmental Panel of Climate Change (IPCC) was already founded in 1988. Brazilian scientists have been collaborating in the IPCC's workgroups since the beginning. Brazil is directly related to the discussions on climatic changes, since the United Nations Framework Convention on Climate Change was decided by the Community of Nations at the Earth Summit in Rio de Janeiro in June 1992(VIOLA 2002). This led to the adoption of the Kyoto protocol in 1997.

It can certainly be said that the climate debate is taking place on a large scale in Brazilian society. All of its segments take part in the discussion which basically considers the impact and value of an increase in the bio fuel production. Brazil's contribution consists primarily of the production of carbon dioxide neutral bio fuels which are supposed to replace fossil fuels in the domestic market and also, via exportation, in other countries. The federal government under president Luiz Inácio Lula da Silva is the principal party interested in promoting these discussions. The press intensely reports on the economic potential of bio fuels; Lula himself unceasingly makes publicity for it. When recently Pope Benedict XVI visited Brazil,

President Lula explained to him, during the papal audience on May 9th, 2007, the biodiesel program for small-scale farmers, which is being carried out and which, amongst others, aims at poverty reduction.

Brazil – the Future Saudi Arabia of Agro-Energy

Brazil and the United States of America together account for 70 per cent of the world bio-ethanol production. Whereas in the USA corn is the basis of this production, in Brazil it's sugar cane. In 2006, 17.7 million cubic meters were produced from sugar cane, 15 percent of which were exported. 13.4 million cubic meters, or 80 percent of the total production, were used as fuel in Brazil, a figure that represents about 40 percent of the overall fuel consumption in Brazil in 2006 (UNICA 2007). Non-hydrated bio-alcohol is being added at 20 to 25 percent to normal fossil fuel or offered as pure hydrated bio-alcohol. (Modern flex engines can burn fossil fuel as well as pure bio-alcohol.) The program PROÁLCOOL, which was created under the military government in 1975 to place bio-ethanol at an advantage, was primarily implanted as a means of import substitution for expensive petroleum after the first oil price shock. After its downturn in the 1990s, the production of bio-ethanol has grown in the last years (Hermanns, 2006). The current acreage of sugar cane amounts to approximately 5.3 million hectares. Half of the harvest of 2006 was allocated to the production of sugar and of bio-ethanol respectively. In favorable locations of São Paulo, the production of bio-ethanol can reach up to 9,000 liters per hectare. The export of bio-ethanol grew by nine times in the years from 2001 to 2006. In 2006, export revenues of US$ 1.6 billion were achieved. In 2005, it only amounted to US$ 765.5 million (Torquato & Perez 2007).

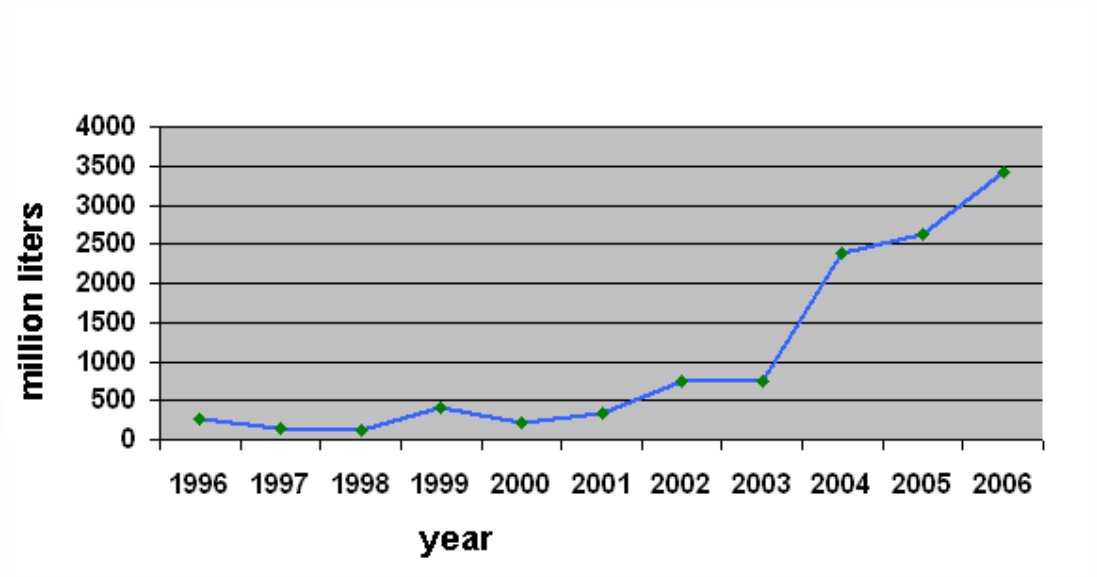

Fig.1: Brazilian export of bio-ethanol in the period from 1996 to 2006 (from Torquato & Perez 2007)

At the “Ethanol Summit 2007” on 4-5 July, 2007 in São Paulo, amongst others the Brazilian ex-president Fernando Henrique Cardoso will speak. In advance, he pointed out that Brazil, concerning the climate debate, should establish itself as a leader under the emerging countries. Due to the high portion of renewable energies within Brazil’s energy matrix he thinks Brazil predestinated for this role. Fernando Henrique Cardoso is, along with Al Gore, a member of the advisory council of the World Resources Institute (WRI). Therefore, the climate debate does not only bring Al Gore back to the political stage.

The federal law 11.097/05, which was published on 13 January 2005, regulates the integration of bio diesel in Brazil's energy matrix. The Brazilian bio diesel program (PNPB), which is defined within this law, envisions the admixture of two percent bio diesel to regular diesel fuel effective from 2008. The production of one billion liters bio diesel will be needed to accomplish the latter. In 2013, this amount is to be increased to up to five percent. Then, the production of bio diesel has to reach 2.4 billion liters. Within the framework of the program, the federal government set up the web portal http://www.biodiesel.gov.br .

In its national plan for agro-energy, the Brazilian Ministry for Agriculture talks about a potential area of 200 million hectares of land (MAPA 2006) that might be suited to serve for energy generation. This is equivalent to about one quarter of the whole surface of Brazil. Due to the increased demand of corn, especially because of the USA with its corn-based bio-ethanol production, the area cultivated with corn was extended by 13 percent in Brazil. Brazil already is the third biggest corn exporter worldwide. In the coming eight years, the area cultivated with sugar cane is supposed to be enlarged by three million hectares to increase the sugar cane production by about 50 percent. These areas shall mainly emerge in the biome Cerrado. Today, the production of sugar and bio-ethanol is concentrated with up to about 85 percent in the centre and the south of Brazil. Due to the extension of the areas used for sugar cane production over the past years in the state of São Paulo the prices for agriculturally used land increased here, according to research by the Institute for Agrarian Economy (IEA), on average by 113.4 percent between 2001 and 2006. For the crop of 2012-2013 there is to be created a production capacity sufficient for the processing of 610 million tons of sugar cane into about 36.6 million tons of sugar and 27.4 billion liters of bio-alcohol (MAPA 2006). Brazil's main hopes indeed are pinned on bio diesel, which allows the biggest area extension. Soy, sunflower, *ricinus*, peanut, cotton, corn, palm tree (dendê, babaçu or coconut), oilseed rapeseed and pine can serve as energy crops in this connection. The most productive are dendê-palm plantations with three to six tons of vegetable oil per hectare. Concerning ricinus, which is the recommended oil plant particularly for the semi-arid Northeast, a harvest of 0.5 to 0.9 tons of oil per hectare is expected. Regarding Amazonia, a potential area of five million hectares was determined for the use of the dendê-palm (MAPA 2006). The agriculture and industry associations jointly with the federal government press ahead with the agro-energy debate.

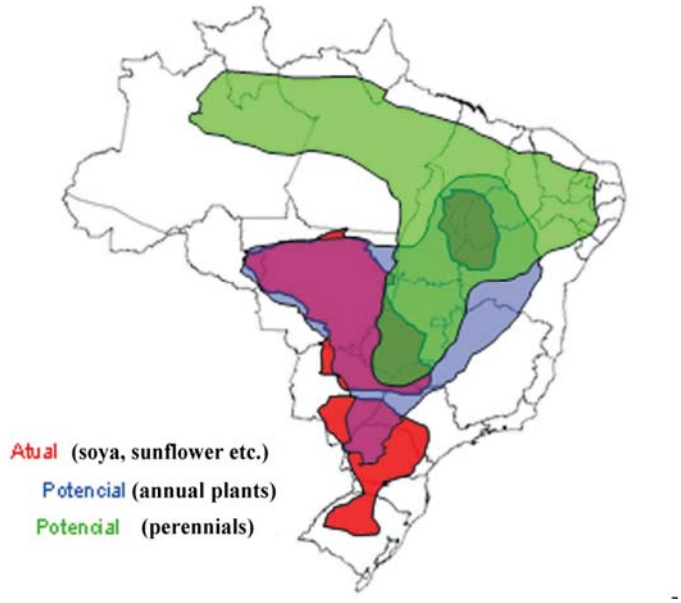

Fig. 2: Potential extension areas for oil plants in Brazil (from MAPA 2006)

Need for Social and Ecological Accounting of Biomass Fuels

The apprehension, that especially the Brazilian bio diesel support program for small-scale farmers could affect the production of staple foods above all in rural areas, does not exist without reason. The production of small-scale farming is responsible for up to 70 percent of Brazilian food supply. Therefore, the federal government is publicly criticized by the Movement of the Landless People MST as well as by the Comissão Pastoral da Terra CNBB (Cassol 2007, Pinto et al. 2007), for giving the wrong incentives to the small-scale farmers. Partly, these critics are motivated by statements made by Venezuelan president Hugo Chavéz at the first South American Energy Summit on April 16th and 17th, 2007. There, he discussed the jeopardy facing food supply, triggered by the enhancement of energy crop cultivation (Hofmeister 2007). In a joint report, the CEPAL and the FAO draw attention to the opportunities and risks of bio-energy in relation to food safety (CEPAL & FAO 2007). A voluntary code of conduct for the production and the usage of bio-energy is recommended and an enforced dialogue between all parties is encouraged. The dispersion of monocultures will have a significant impact upon the biodiversity of the big biomes Cerrado and Amazonia. Accordingly, the calling for a stronger control of the process, especially on the part of environmentalists, is increasing (Bourscheit 2007). The current discussion within the European Union about the certification of bio fuels is followed with interest and is already reacted upon by the federal government respectively. This year in April, the National Institute for Metrology, Standardization and Industry Quality (INMETRO), which is subordinate to the Brazilian Ministry for Development, Industry and Foreign Trade (MDIT), started to work on a body of rules and regulations for the certification of bio fuels. The criticism of human rights groups relating to slavery on sugar cane plantations as well as the ecological concern shall be allowed for this way. The discussion about Fair Trade will certainly be intensified on the international level under the participation of Brazilian actors in the future (Gonçalves 2007).

Carbon Dioxide Emissions and the Contribution of Brazil

Due to the current “fever” for the “green gold” of the agro-energy, the extension of the solar- and wind-energy, which will surely contribute ecologically in a more positive way than agro-energy, is unfortunately taken into even less consideration. The intended massive land-use disruption that will threaten the big ecosystems (biomes) Cerrado, Pantanal, Amazonia, Caatinga and the last remaining part of the Atlantic rain forest (Mata Atlântica). In the current discussion, the topic of saving energy and energy efficiency are underrepresented, whereas it is about investing in modern technologies.

Some 80 percent of the global, anthropogenically inducted emissions of carbon dioxide are composed of the combustion of fossil energy sources. The other 20 percent are caused by slashing and burning of the rainforest. Brazil has the widest area of rainforest and has been, at the same time, record holder in slashing and burning it for years. Indeed, the deforestation has decreased significantly in the last two years, from the record year 2004 with 27,429 square kilometers over 18,793 square kilometers (in 2005) to 14,000 square kilometers in 2006 (INPE 2007a). The originally published number of 13,100 square kilometers was corrected to 14,000 square kilometers. Despite the criticism concerning the significantly smaller data basis of satellite images during the current identification of the deforestation rate, the trend of a decreasing deforestation seems to prove true. The reducing of the destruction of the tropical rainforests constitutes an important contribution of Brazil to the climate protection. A decrease of 430 million tons of carbon dioxide release (CO_2) is expected for the past two years (IICA 2007). However, 200 million tons of carbon dioxide still must have been demitted

in 2006 because of the slashing and burning in Amazonia. According to the energy and environment database (EEDRB) of the International Agency of Atomic Energy (IAEA) Brazil

released 351.46 million tons of carbon dioxide (related to energy) in 2003. So far, the positive contributions of the decrease of the deforestation and hence the release of CO_2 are not taken into consideration in the Framework Convention on Climate Change, although the Brazilian federal government introduced this topic in the COP-11 and COP-12 conferences. Nevertheless, this topic will play a very important role for the negotiations after 2012, which is put on the agenda by Brazil as well as by the other countries in the tropical regions.

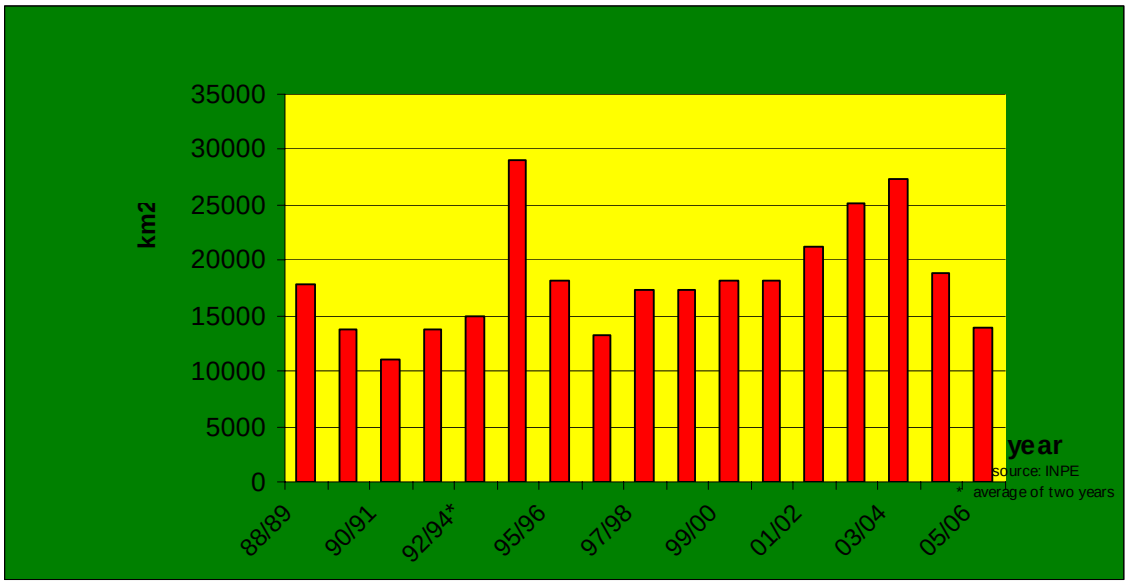

Fig. 3: Deforestation rates in the Brazilian part of Amazonia (*Source: INPE*)

Comparing the CO_2-production related to the Gross National Product, Germany looks better. Brazil produced 0.55 kilogram CO_2 for US$ 95 of the GNP in 2003. In the same period, Germany produced 0.45 kilogram CO_2 for US$ 95 of the GNP. However, the German carbon dioxide release per capita is about five times higher than the Brazilian. According to the OECD, the CO_2 emissions (without the effect of slashing and burning) in Brazil are to increase by 70 percent to 551 million tons in the year 2030 (OECD 2007). For comparison, in 1990, Brazil had only 193 million tons of carbon dioxide emissions.

Brazil may voluntarily participate in the Clean Development Mechanism of the Framework Convention on Climate Change and also offer projects for the compensation of carbon dioxide emissions of the industrialized nations with the commitment of reduction. According to the Brazilian federal government, 221 Brazilian projects are registered by now. India and China are ahead with 623 and 446 projects, respectively. According to calculations of the Brazilian Government (MAPA 2006), an annual participation in the Clean Development Mechanism (CDM) business of about US$ 400 million is expected. Hereof, US$160 million are intended to benefit the agro-business.

2. Consequences of the Climate Change for Brazil

With 8.5 million square kilometers, Brazil reaches almost continental dimensions and has a diverse geography with various ecosystems (biomes). Concerning the surface, Brazil is slightly bigger than the United States of America (not including Alaska). In the past years, the first tornado touched-down in Catarina in the South of Brazil in 2004, extreme droughts in the

South in 2004, 2005 and 2006, in the Southeast in 2001 and in Amazonia in 2005 have raised suspicions that these might be the first indications of global climate change (Marengo 2006).

The potential consequences for the semi-arid Northeast with the biome of Caatinga and for Amazonia are in focus of scientific discussions (INPE 2007b). About 50 million people live in the Northeast of the country. According to the magnitude of the El-Niño-effect (ENSO), the region is sporadically affected by periods of drought. Disastrous droughts like in the years 1877 to 1879 with over 100,000 fatalities are still in the mind of the population. The last big drought was noted in 1997 until 1998, with emergency supply for millions of people. Scientists are alarmed because of the natural sensitivity of the region. In the climate modeling of the Instituto Nacional de Pesquisas Espaçais (INPE), the pessimistic scenario acts on the assumption of an average warming between two and four degrees and a decrease in rainfall of 10 to 15 percent. The optimistic scenario assumes an average warming from one to three degrees and a rainfall decrease of 10 to 15 percent (MARENGO 2006 and 2007). Despite strong emigration during the last decades to the Southeast and central West of the country, the Northeast still is populous. The president Lula and his family are witnesses of this migration history. Accordingly, a new wave of migration, of “environment refugees” in this case, is believed to be triggered by more severe desertification. Further consequences of the water scarcity are seen in the endangerment of agriculture production as well as of energy generation along the river São Francisco. As a decelerated consequence of the drought from 1997 to 1998, it came to grave energy restrictions in 2001, because the water resources of the dams were exhausted. Similar scenarios are more likely to happen in the future.

A wide expansion of the savannahs in the Amazon region will occur until the end of the century. It is expected that about 18 percent of the tropical rain forest will turn into dry steppes. In the so far sparsely populated Amazon region less people are affected, but massive changes in the biodiversity as well as an increase of the natural forest fires are to be expected. Indicators for this are the droughts between 1997 and 1998, where about 13,000 additional square kilometers burned up because of the dryness caused by the El-Niño-effect (Nobre, et al. 2007).

Further large biomes like the dry savannahs of the Cerrado, the marshes of the Pantanal and the remaining parts of the tropical costal forests (Mata Atlântica) will be affected by the expected climate changes. The attention also needs to be drawn to the over 8,500 kilometers long coastline since these areas might be affected as well with a rising sea level. About 70 percent of the Brazilian population live in the coastal zone. The scientific task will be to refine the risk predictions with a geographical reference, in order to provide an improved basis for public planning.

3. Reactions on the Stern-Review and the last IPCC-Reports

The Stern Review, first published in October 2006 (later published as paperback in 2007) received little consideration in Brazil, especially because of the two parallel ballots for presidential elections. Websites of some environment NGOs published notes primarily about the cost of climate change. The Stern Review only received more attention after the emergence of the three IPCC-reports in February, April and May of 2007 (AR4). In the senate

conference on 3 April 2007 the Senator Aloizio Mercadante from the Labor Party (PT) from the state of São Paulo arrogated the creation of an international environment fund as an answer to the climate challenges, which should be financed by a tax of one percent on all imports worldwide.

In all important national newspapers, as well as on television, the IPCC-reports were mentioned. Obviously within the framework of the current climate discussion, the department "Climate Change and Environment Quality" was established within the federal Ministry for Environment on April 25th this year during the formation of the newly-elected federal government, with Thelma Krug as State Secretary.

In the federal parliament, the sub-commission of the environment committee, called "Climate Change" was established on 22 March 2007 and is managed by the delegate Antonio Carlos Mendes Thame (PSDB, State of São Paulo). At the same time, a mixed special commission with the same subject matter under the control of the delegate Eduardo Gomes (PSDB, State of Tocantins) in which also senators of the senate participate was installed. Interesting to mention that the vice president of this special commission is Senator Fernando Collor (PTB, State of Alagoas), who, as then-president of Brazil, opened the Earth Summit in Rio de Janeiro in 1992 and was displaced because of a corruption scandal shortly after. The environment discussion now offers a new political stage for him.

4. Political Perceptions and Actors in the Brazilian Climate Debate

The UN Framework Convention on Climate Change was ratified by the Brazilian National Congress on 3 February 1994. The complementary protocol of Kyoto was signed on 29 April 1998 and ratified with the publication on 21 June 2002. The Kyoto protocol became effective on 16 February 2005 as the so far only obligatory international agreement to reduce the destructive greenhouse gases. Brazil, as an emerging nation, is not bound to reduce carbon dioxide emissions. Nevertheless, Brazil can contribute voluntarily.

Since 1999, the inter-ministerial working group "Global Climate Change" exists and is lead-managed by the Ministry for Science and Technology. Representatives of the government as well as of the civil society participate regularly in conferences of the Framework Convention on Climate Change. The "Brazilian Forum for Climate Change" (FBMC) was established on 20 June 2000 via decree as a platform for the federal ministry, state-run companies like Petrobrás, research institutions, private economy and the civil society. The objective of this forum is to mobilize these groups regarding climate protection issues as well as, on the basis of article 2 of the Kyoto Protocol for the UN Framework Convention on Climate Change, project suggestions in the framework of Clean Development Mechanism (CDM). On 19 April 2007, the FBMC held a conference, where amongst others a national action plan about the handling of the climate change was discussed. Furthermore, the current reports of the IPCC were reconsidered at meetings of the National Council of Environment (CONAMA) on 16 April 2007 and of the National Council of Biodiversity (CONABIO) on 24-25 April 2007 led by the Ministry for Environment.

The local authorities must not be forgotten as they are important actors in the climate debate. Brazilian local authorities cooperate in international climate networks like the "Cities for Climate Protection (CPP)" campaign. As representatives of Brazil, the mayors of the megacities São Paulo and Rio de Janeiro, as well as the mayor of Curitiba as an associated member, participated in the second "Large Cities Climate Summit C40" in New York from

14-17 May 2007. This event was co-financed by the William J. Clinton Foundation, the foundation of the former US president.

The Brazilian society lively takes part in the public debate about possible climate changes and participates very competently on the above mentioned political panels.

Among the Brazilian NGO's, Vitae Civilis should also be mentioned as it also plays a part in the coordination of the international NGO-network Climate Action Network (CAN). As further Brazilian NGOs, the Instituto Socioambiental (ISA) and networks like “Amigos da Terra” and the “Brazilian Forum of NGO's and Social Movements for a Sustainable Development and Environment” are to be noted. Moreover, international environment organizations with its national sub-organizations like Greenpeace and the World Wildlife Fund (WWF) are taking part through publicity-effective campaigns.

The private economy is involved in the nationwide environment forums. The industry alliances currently offer events on climate change. On the occasion of the Ibero-American congress for sustainable development in São Paulo, the Brazilian Council of Entrepreneurs for a Sustainable Development (CEBDS) and the companies Petrobrás, Alcoa and Votorantim made, together with Greenpeace and the WWF, an environmental agreement on 24 April 2007 to enforce climate protection. Among other things, Petrobrás obliged itself to eliminate emission of 18.5 million tons of carbon dioxide in the time span from 2007 to 2011. The CEBDS was founded in 1997 and it unites enterprises which contribute about 40 percent of the Brazilian gross national product. On the international level, the CEBDS is represented in the World Business Council for Sustainable Development (WBCSD).

In 2007, the Catholic Conference of Brazilian Bishops (CNBB) dedicated its yearly Easter campaign of fraternalism to Amazonia and its special environmental problems. Since 2002, the CNBB has a special commission for Amazonia. The Catholic Church plays an important role as a credible institution and as opinion leader in Brazilian society.

Concerning science and climate research respectively, the National Institute of Space Research (INPE) of Brazil as part of the Ministry for Science and Technology and the Institute of Engineering Science (COPPE) of the Federal University of Rio de Janeiro have to be mentioned. The interdisciplinary and international research project “Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)” was founded in the 1990s. The Brazilian climate research enjoys a good reputation and is networked on an international level.

Remarks:

This article reflects the personal opinions of the author.

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Abbreviations

AR4	Fourth Assessment Report des International Panel of Climate Change
CAN	Climate Action Network
CCP	Cities for Climate Protection
CDM	Clean Development Mechanism
CEBDS	Brazilian Entrepreneurs Council for Sustainable Development (Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável)
CEPAL	Economic Commission for Latin America and the Carribean (Comisión Económica para América Latina y el Caribe)
CNBB	Catholic Bishop Conference of Brazil (Conferência Nacional dos Bispos do Brasil)
CONABIO	National Biodiversity Council(Conselho Nacional de Biodiversidade)
CONAMA	National Environment Council (Conselho Nacional do Meio Ambiente)
COP	Conference of the Parties
COPPE	Institute for Engineering Science of the Federal University of Rio de Janeiro (Coordenação dos Programas de Pós-graduação de Engenharia da Universidade Federal do Rio de Janeiro)

EEDRB	Energy and Environment Data Reference Bank
ENSO	El Niño/Southern Oscillation
FBDS	Brazilian Foundation for Sustainable Development (Fundação Brasileira para o Desenvolvimento Sustentável)
FBMC	Brazilian Forum for Climate Change (Fórum Brasileiro de Mudança de Clima)
FMA	World Environment Fund (Fundo Mundial Ambiental)
FMBOS	Brazilian Forum of NGOs and Social Movements for Sustainable Development and Environment (Fórum Brasileiro de ONGs e Movimentos Sociais para o Desenvolvimento Sustentável e Meio Ambiente)
IAEA	International Atomic Energy Agency
IEA	Institute for Agricultural Economics (Instituto de Economia Agrícola)
INMETRO	National Institute for Metrology, Standards and Industry Quality (Instituto Nacional de Metrologia, Normalização e Qualidade Industrial)
INPE	National Institute for Space Research (Instituto Nacional de Pesquisas Espaciais)
IPCC	International Panel of Climate Change
ISA	Instituto Socioambiental
LBA	Large Scale Biosphere-Atmosphere Experiment in Amazonia
MAPA	Brazilian Ministry for Agriculture (Ministério da Agricultura, Pecuária e Abastecimento)
MCT	Brazilian Ministry for Science and Technology (Ministério da Ciência e Tecnologia)
MDIT	Brazilian Ministry for Development, Industry and Foreign Trade (Ministério do Desenvolvimento, Indústria e Comércio Exterior)
MMA	Brazilian Ministry for Environment (Ministério do Meio Ambiente)
MST	Movement of the Landless People (Movimento dos Trabalhadores Rurais sem Terra)
NGO	Non-Governmental Organization
PNPB	National Bio Diesel Program (Programa Nacional de Produção e Uso de Biodiesel)
PROÁLCOOL	Programa Nacional do Álcool from 1975
PSDB	Social-Democratic Party of Brazil (Partido da Social Democracia Brasileira)
PT	Labor Party (Partido dos Trabalhadores)
PTB	Brazilian Labor Party (Partido Trabalhista Brasileiro)
WBCSD	World Business Council for Sustainable Development
WRI	World Resources Institute
WWF	World Wildlife Fund for Nature