

# Security Risks from Climate Change

New (Old) Conflicts in Latin America

Christian Hübner



Climate change has gained a firm hold on Latin America. Hurricanes, melting glaciers, droughts and flooding are the aspects that grab the media spotlight. The increasing risks to the electricity supply and the growing adaptation pressure in the megacities are slower to come to public attention. In addition, worsening conflicts over water and land use pose new security policy challenges.

---

In Latin America and in the countries of the Caribbean, climate change has become an ever-present challenge to politics and society. Hurricanes, melting glaciers, droughts and flooding are issues that grab the media spotlight. The socio-economic implications resulting from changes to production conditions in agriculture or increasing energy insecurity are slower to come to public attention.

In a time when conflicts are being reignited in trouble spots around the world, climate change is also becoming a security policy issue. It is generally not seen to be the root cause of crises, but to have an exacerbating effect. Fragile government structures are believed to provide the breeding ground for climate risks and conflicts that are already apparent today. On the one hand, this applies to countries that are undergoing the transition from authoritarian to democratic structures and on the other to those that only have limited legislative and administrative problem-solving powers. This frequently goes hand in hand with a relatively low level of economic development in combination with rapid population growth and a high rate of urbanisation.

There are numerous countries in Latin America and the Caribbean that match this picture in one aspect or another. However, seen from a democratic perspective and by comparison with other developing regions such as Africa, the structural framework provided by the states is relatively stable. There have consequently been no “hot” inter-state conflicts in the region over the last few years. Against this backdrop, it is therefore not so much fragilities at state level

that underlie climate risks or the climate conflict potential in the region, but rather a lack of political problem-solving expertise in recognising climate-related changes in good time and introducing appropriate countermeasures. Climate risks in Latin America mainly relate to the supply of water, power supply security, land use and urbanisation.

### **Water Security and Environmental Conflicts**

Climate change impacts the water supply most strongly. While Latin America possesses the most extensive natural water resources in a global comparison, the climate-related dry periods in the rural areas, heat waves in the cities and retreating glaciers in the Tropical Andes are already having a dramatic impact on water availability.

While Central America and the island states of the Caribbean have very few water sources of their own, the Andean states are still receiving large volumes of glacier water. However, global warming is exerting a constant negative impact on the situation. Since the 1970s, the glaciers in Bolivia, Ecuador, Peru, Argentina and Chile have shrunk by between 20 and 50 per cent.<sup>1</sup> The Cotacachi glacier in Ecuador has completely disappeared. The icecap of the Santa Isabel volcano in Colombia has shrunk by 44 per cent.<sup>2</sup> The supply of water in the non-Andean areas is also diminishing. In the Amazon Basin, more frequent droughts and incidents of extreme flooding are a strain on existing water supply structures. Generally, it is becoming apparent that the arid and desert-like coastal regions of Chile and





Submerged: A banana leaf as a feeble attempt in protection against the torrential rains on the outskirts of Colón city in Panama. Source: © Carlos Jasso, Reuters.

Peru on the Pacific are having to manage with even less water than in the past, while the areas receiving more abundant rain in the Amazon and La Plata Basins in Uruguay, in Paraguay, northern Argentina and southern Brazil are facing more extreme levels of precipitation.

The climate-related melting of the glaciers is having a particularly strong impact on existing environmental conflicts all around the Tropical Andes. Here, access to water and water quality are the main points of contention. Peru is currently probably the country most affected in this respect. Over 90 per cent of the water supplying Peru, which includes drinking water, service water and water used in the production of hydropower, originates from the glaciers in the Tropical Andes. However, these glaciers have already shrunk by more than 20 per cent. The Coropuna

glacier in southern Peru has lost as much as half its volume.<sup>3</sup> According to forecasts, it will have melted completely by 2025. This means dramatic changes for the people living in the Andes, most of whom are very poor. Not many of them will be able to rely on the traditional subsistence farming of the past. Local family farm structures will disappear. Consequently, the depopulation of the countryside will accelerate and urbanisation pressures on the cities in the region will increase. But the larger areas under cultivation closer to the coast are also feeling the loss of glacier water. 80 per cent of the water flowing from the Andes is used there for irrigation. It is highly likely that this type of water usage will increase considerably in price. This will result in substantial reductions in the profits from Peruvian exports of agricultural products and threaten the income security of the people employed in the sector.

But the sector where the largest environmental conflicts relating to water play out is mining. This industry makes extensive use of chemicals such as mercury and produces oil residues from machine utilisation; these contaminants are frequently dumped in nearby rivers and freshwater lakes. The water contamination exacerbates the problems created by climate-related water shortages, resulting in considerable social conflicts. Peru is a country rich in natural resources, which benefits greatly from its copper, silver and gold exports. However, the mining areas are often located in remote regions where the state is not strongly represented. There, an unregulated, informal mining industry has become established, which exploits resources without any control whatsoever. 90 per cent of the goldmines in the *Madre de Dios* region in northern Peru, close to the borders with Brazil and Bolivia, are thought to be illegal.<sup>4</sup> Local communities and agricultural businesses are frequently powerless against the

mine operators with the result that conflicts often boil over into violent confrontation. Furthermore, the illegal mines are often linked to the proliferating structures of the drugs trade in the Amazon Basin, which means that protests often do not even come to public attention. The informal mining sector represents a considerable security problem for the Peruvian government, which the recent reinforcement of local police forces or the short-term deployment of military units can do little to overcome.

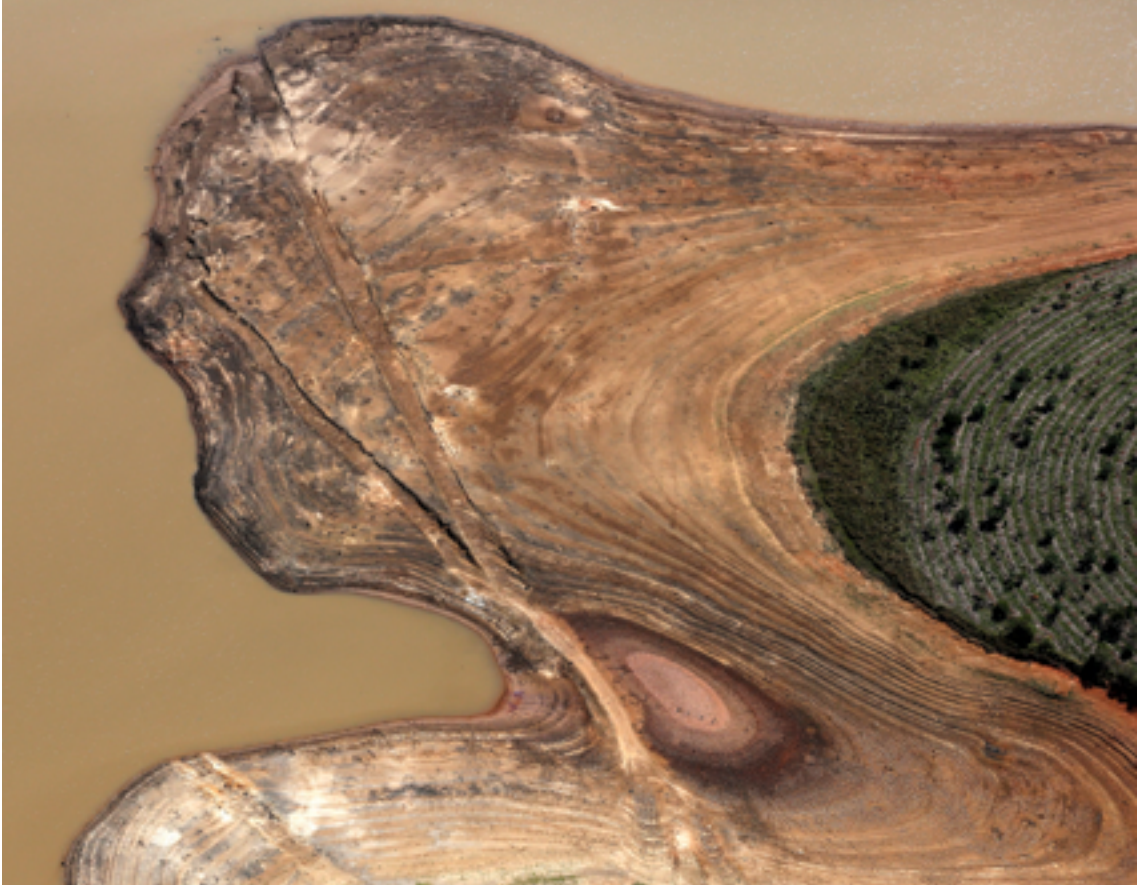
Against this backdrop, various institutional structures have been set up in Peru for countering such conflicts early on by raising public awareness, publishing environmental expert reports and holding hearings. In the Arequipa region in southern Peru, for instance, there is the *Autoridad Regional Ambiental*, i.e. regional environmental authority, which has been equipped with extra capacities and responsibilities for con-

**Table 1: Impacts and Risks Associated with Climate Change in Latin America**

Impacts	Risks	Climate factors
Agriculture	Declining yields and quality, lower sales and rising prices	Extreme temperatures, extreme and changed rainfall patterns, CO <sub>2</sub> concentration
Water	Supply of water in arid areas and areas depending on glacier water, flooding and extreme rainfall in cities	Rising temperatures, longer dry periods, shrinking glaciers
Biodiversity and forests	Changes in land use, deforestation, coral bleaching, loss of biodiversity and ecosystem services	Logging, CO <sub>2</sub> concentration, rising temperatures, ocean acidification
Health	Spread of diseases	Rising and more extreme temperatures, more extreme rainfall
Tourism	Loss of infrastructure, rising sea levels, extreme weather events in coastal regions	Rising sea levels, extreme temperatures, extreme rainfall and flooding
Poverty	Loss of income for particularly vulnerable groups (specifically in agriculture), increasing income gaps	Extreme temperatures, extended dry periods, extreme rainfall

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of the Intergovernmental Panel on Climate Change (IPCC), Chapter 27, Central and South America, in: Barros, V.R. et al. (eds.), *Climate Change 2014: Impacts, Adaption, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the IPCC*, Cambridge, 2014.





Drought: This aerial view shows the Atibainha dam, part of the Cantareira Reservoir, during the worst drought in 80 years and the lowest water level on record in the year 2014. Source: © Nacho Doce, Reuters.

flict resolution and prevention. However, these institutions are set up inadequately in terms of funding and available expertise, as was illustrated in the case of the protest that erupted in 2015 at the *Tia Maria* copper mine owned by the Mexican mining company Southern Copper Corporation. The mine is located south of Arequipa in Tambo Valley, an area where the land is used by industrial agriculture operations for the cultivation of rice and sugarcane as well as olives on a smaller scale. The local farmers complain about the contamination of local water reserves by the mine operators. This is not a new conflict; the first protests, which took the form of road blocks set up by farmers between the city of Arequipa and Tambo Valley, took place back in 2011. In April 2015, the situation escalated when a face-off between local farmers and armed police left

three farmers and one policeman dead. Subsequent attempts to resolve the dispute at the political level took the issue into the Peruvian Congress; however, because of the clashing interests of mining supporters and opponents, Congress did not succeed in devising a solution. As the protests continued, Peruvian President Humalla decided at short notice to declare a state of emergency in the area and sent in the military to back up the local police.

### Electricity Supply under Threat

The correlations between climate change and the use of hydropower feature increasingly in deliberations on energy policy. Global research indicates that climate change will considerably reduce the hydroelectric output from dams

over the long term.<sup>5</sup> For Latin America, which obtains over 60 per cent of its entire electricity from hydropower, much of which is dependent on glacier water, this presents a serious threat to its electricity supply security.

Today, the great majority of dams are located in the Amazon Basin. In the Brazilian part alone, there are over 400 hydroelectric power plants. Roughly one-third of these are directly dependent on water from the glaciers in the Tropical Andes. Among the largest dams in the world is the Itaipú Dam on the Paraná River on the border between Paraguay and Brazil. Operating at full capacity, the hydropower plant supplies approximately 15 per cent of Brazil's power and approximately 70 per cent of Paraguay's power. Another of Latin America's major facilities is the Guri Dam in the Orinoco Valley, which supplies over 70 per cent of Venezuela's power.

The decreasing power output from dams is due on the one hand to the ever-faster melting of the glaciers, which are swelling the rivers in the short term to such an extent that the dam installations cannot cope with the volumes of water. On the other hand, the glaciers will supply less water in the long term, which will reduce the power production capacity of the dams. In Argentina, studies predict a 32 per cent reduction in the power production capacity of the Camahue River in Cuiyo Province in the northwest of Patagonia.<sup>6</sup> Just considering the contribution of this one river for Argentina as a whole, this means that eight per cent of the country's current power production will have to be replaced from alternative sources in the future.<sup>7</sup> Energy supply risks linked to drier conditions are also already becoming evident today. The city of São Paulo has suffered extreme drought over recent years. The volume of water in the nearby reservoirs of the Cantareira system, which links five reservoirs and supplies around nine million São Paulo inhabitants, dropped below five per cent full capacity in 2015. The situation is even more serious when you consider that this is also the city's source of drinking water. Furthermore, the enduring drought has required the temporary suspension of the use of river links to prevent the operation of nearby

hydropower plants being jeopardised; this affected, for instance, the Tietê-Paraná waterway in the federal state of São Paulo, which is of considerable economic importance for the transportation of agricultural products,<sup>8</sup> Venezuela is currently experiencing a particularly extreme water shortage situation. An unusually intense and long-lasting dry period ascribed to the *El Niño* weather phenomenon is causing extreme power shortages, which are in turn further exacerbating the already disastrous economic situation in the country. To maintain the capability of supplying power in spite of the problems, the Venezuelan government took a number of decisions, one of which was to require shopping centers to generate their own electricity for four hours during workdays and another to introduce a four-day working week.<sup>9</sup> One can also assume that the *El Niño* effect will intensify further in future as a result of climate change.

### **The Belo Monte Dam is attracting criticism and opposition from local – particularly indigenous – groups as well as from international civil society initiatives.**

---

Despite the consequences of climate change, developing hydropower still plays a major role in many regions of South America in view of rising demand for energy. However, climate change is not the only factor jeopardising these plans. One of the largest dams in the world is currently under construction in the northeast of Brazil. The Belo Monte Dam will divert the flow of the Xingu River – an Amazon tributary – and create a reservoir the size of Lake Constance in the Amazon. During the course of its implementation, the dam project has triggered a comprehensive debate within society about major building projects and the intrusion into the living spaces of indigenous groups. The some 20,000 people living within this area will probably need to be resettled. Furthermore, the intrusion will have a detrimental

effect on biodiversity. Against this backdrop, the entire project is attracting criticism and opposition from local – particularly indigenous – groups as well as from international civil society initiatives.

Reductions in the production capacities of the dams in Latin America are already raising questions about how to address the problem in the long term. The entire energy supply infrastructure in Chile is currently undergoing fundamental restructuring, with domestic renewable energies expected to play an important role. Costa Rica and Uruguay are expanding renewable energies such as wind energy, photovoltaics and geothermal heat to a considerable degree, attracting a great deal of media attention. Mexico's government recently approved a comprehensive liberalisation of the energy sector, envisaging not only the privatisation of state enterprises but also the development of a renewable energy sector. In addition, Mexico, Brazil and Argentina are investing massively in the exploitation of previously unattainable / unconventional fuels such as marine shale gas and shale oil. This development is, however, curbed by the current low oil price. But one can safely assume that countries such as Brazil and Mexico will consider fossil fuels such as gas and oil as alternatives to hydropower for electricity generation. This could result in one of the most CO<sub>2</sub>-neutral power generation systems in the world turning into a CO<sub>2</sub>-intensive one.

### **Expansion of Agriculture**

Climate change is having a particularly strong impact on agriculture in the Latin American countries. Lengthy droughts, heat waves and torrential rainfall are affecting crop production and cattle rearing. Technological innovations, improved agricultural management, the expansion of land under cultivation, as well as more intensive land use plus genetically modified plants have so far been able to counter this effect and even raise outputs substantially in recent years. The extent to which agriculture will be able to continue adapting to new weather conditions will therefore depend mainly on further changes in temperature. If temperatures continue to rise,

as is to be expected, Brazil and Argentina, which produce the bulk of agricultural products such as soya, maize, sugarcane, wheat, coffee beans and beef in Latin America today, will face considerable economic risks. The impact could even be global. Latin America currently supplies some 16 per cent of all food globally. Regional production slumps in Latin American agriculture could therefore exacerbate the tense situation of rising global demand for food even further. One issue that has not yet been investigated properly is the effect of sugarcane and wheat cultivation to produce ethanol. Since the oil crises of the 1970s and 1980s, the transport sector in Brazil has been adding considerable volumes of ethanol produced from biomass to its fuels. If these biomass yields were to diminish, climate change would have a negative effect on energy supply security in the transport sector in addition to its negative impact on energy generation by hydro-power plants.

**Climate change accelerates manmade deforestation further through more frequent heatwaves, which cause the virtual desertification of entire swathes of land.**

---

The expansion of agricultural production in recent years has mainly been achieved by clearing forest in the Brazilian part of the Amazon Basin. In cooperation with the logging industry, unique forests are being felled for this purpose on a continuous basis. In Brazil, this is mainly done to facilitate the expansion of the large cattle farms, which are particularly vulnerable to climate change; the area they cover is now larger than that used to produce crops. Climate change accelerates manmade deforestation further through more frequent heatwaves, which cause the virtual desertification of entire swathes of land. At the same time, the climate is losing a natural global CO<sub>2</sub> regulator due to the decimation of the Amazon rainforest.



The climate-related expansion of areas under cultivation also has the potential of exacerbating existing violent disputes over land. The Brazilian part of the Amazon Basin is a well-known case in point. The background involves unclear land ownership, social inequalities and the weakness or even absence of state institutions in rural areas. These conflicts involve international agricultural corporations, regional big landowners, agricultural labourers and indigenous groups. In a typical scenario, people occupy fertile land that belongs to a big landowner or an agricultural corporation, which has been left unused. These parcels of land frequently serve for speculation purposes and are thus left fallow. In many

cases, such instances of land occupation then lead to local unrest when the owners attempt to regain possession of their land, occasionally with the use of force. There have been occasions where such occupied pieces of land in fact legally passed into the possession of agricultural labourers as a result of legal proceedings. To add to the problems, the expansion of land under cultivation takes place in remote areas of the Amazon, intruding into the living space of indigenous groups. In 2015, the Brazilian *Comissão Pastoral da Terra* (CPT) counted 49 deaths as a result of disputes over land use. Most of these occurred in the federal states of Rondônia (21) and Pará (19).<sup>10</sup> Such deaths are thought to have totalled



High and dry: Intense droughts afflict Latin America's flora and fauna and pose frequently new challenges to the population in coping with everyday life. Source: © Nacho Doce, Reuters.



over 1,100 since 1985. As few as twelve cases have been dealt with in a court of law to date.<sup>11</sup> Climate change will increase the pressure on land use even more. This could well lead to an increase in the number of trouble spots in rural areas.

### **Pressures from Increasing Urbanisation**

Today, close to 80 per cent of people in Latin America live in cities. The largest by far are Mexico City and São Paulo with a population exceeding 20 million each. For decades, megacities have been struggling to cope with the challenges of urbanisation, namely environmental problems, illegal settlements, poor transport infrastructure, crime as well as inadequate water supply and sewage systems. Climate change is exacerbating these problems by encouraging the migration to the cities because of deteriorating conditions in the rural subsistence economy. This massively increases the pressure on the responsible city authorities and the politicians to take measures to mitigate the risks.

Climate change also has a direct impact on life in the city. Flooding due to extreme rainfall, for instance, and lengthy heat waves are on the increase in virtually all major cities in Latin America and the Caribbean countries. The coastal cities in Central America and in the Caribbean are also faced with the prospects of more extreme storms and rising sea levels. Given this outlook, the inhabitants of smaller islands off the north-eastern coast of Panama, such as Carti Sugdub, already have to ask themselves today whether they should stay or leave. In São Paulo, there are more frequent occurrences of dangerous landslides from the slopes close to the city's suburbs. In Mexico City, water supply security is worsening to a dramatic extent. In the Chilean capital Santiago de Chile, over four million households were recently without power and water due to flooding. The economic costs for restoring buildings and transport infrastructure damaged through the effects of climate change are already running into several billions of euros. The health risks from contaminated water and from the spread of diseases such as dengue fever and malaria and the proliferation of disease car-

riers such as rats and mosquitos are also on the increase. In the cities themselves, the changes mainly affect the poorer sections of the population, who live mostly in informal settlements, the slums and favelas.

While cities are particularly vulnerable to the impacts of climate change, they do have great adaptation capability. In recent years, numerous cities – including the capitals Mexico City, Lima, Santiago de Chile, Buenos Aires, Bogotá and São Paulo – have launched legislative initiatives, set up authorities and institutions and developed strategies and plans to respond to the worsening climate risks. They are also joining international networks of cities committed to mitigating climate change, such as the C40 Cities Climate Leadership Group. This development illustrates the growing political sensitivity to climate risks among local government officials.

The concrete form that adaptation measures will take at the local level depends on the institutional responsibilities. Mexico City, for instance, has some very progressive climate protection legislation, which provides for an information pool on local impacts of climate change and simultaneously provides a framework for close interaction between the different authorities involved in disaster management in the area of potential climate risks. However, Mexico City only includes eight million of the city's 20 million inhabitants in these measures. The rest come under the responsibility of the federal state of Mexico, which has hardly made any political progress in developing adaptation measures of its own so far. Such institutional barriers can be seen in many Latin American cities and increase the climate risks in the cities.

### **Outlook**

In Latin America, the impacts of climate change in all their manifestations have already become reality. Where its relevance to security policy is concerned, there are indications that risks in the areas of electricity supply and urbanisation, which are already elevated, are set to increase further. Climate change also exacerbates violent



Megacity: Aerial view of São Paulo's skyline. About twelve million people live in South America's biggest city, the metropolitan area Grande São Paulo has even more than 20 million inhabitants. Source: © Paulo Whitaker, Reuters.

regional disputes over water and land. When looking at the big picture, it is striking that climate risks and climate conflicts do not appear to pit countries against each other. Instead, they remain within national borders, affecting areas where state control is frequently only present in a rudimentary form. A lack of local government structures and competences prevents climate adaptation strategies from being devised. Major cities, on the other hand, are capable of preparing for the impacts of climate change, and most of them are already taking appropriate measures. Particularly in the context of climate security,

crucial prerequisites for dealing with the proliferation of security policy risks in Latin America must include the establishment and further development of local government structures in the form of administrative institutions, climate-sensitive policies and effective structures of the rule of law.

---

**Dr. Christian Hübner** is Head of the Regional Programme Energy Security and Climate Change in Latin America of the Konrad-Adenauer-Stiftung.



- 1 Economic Commission for Latin America and the Caribbean (ECLAC) 2014: The economics of climate change in Latin America and the Caribbean: Paradoxes and challenges – Overview for 2014, Vereinte Nationen, Nov 2014, pp. 33 ff., in: <http://www.cepal.org/en/publications/37056-economics-climate-change-latin-america-and-caribbean-paradoxes-and-challenges> [23 Feb 2016].
- 2 Ibid.
- 3 USAID 2012: Follow the Water: Emerging Issues of Climate Change and Conflict in Peru, CMM Discussion Paper No. 5, p. 24, in: [http://fess-global.org/Publications/Other/FollowWater-Emerging\\_Issue\\_of\\_Climate\\_Change%20\\_Conflic\\_Peru.pdf](http://fess-global.org/Publications/Other/FollowWater-Emerging_Issue_of_Climate_Change%20_Conflic_Peru.pdf) [23 Feb 2016].
- 4 PRI 2015: Joining the dots of Informality and Climate Change: A Discussion Paper for Practitioners, p. 26, in: [http://kas.de/wf/doc/kas\\_44291-1522-2-30.pdf](http://kas.de/wf/doc/kas_44291-1522-2-30.pdf) [23 Feb 2016].
- 5 Cf. El cambio climático reducirá un 70% la electricidad producida por los pantanos, in: La Vanguardia, 4 Jan 2016, in: <http://lavanguardia.com/natural/20160104/301191336176/cambio-climatico-obliga-disminuir-produccion-electricidad.html> [22 Apr 2016].
- 6 Lumerman, Pablo / Psathakis, Jimena / Ortiz, Maria 2011: Climate Change Impacts on Socio-Environmental Conflicts: Diagnosis and Challenges of the Argentinean Situation, in: The Initiative for Peacebuilding – Early Warning Analysis to Action (IfP-EW) Cluster: Climate Change and Conflict, p. 17, in: <http://partnersglobal.org/network/argentina/Climate%20Change%20Impacts%20on%20Socio-environmental%20Conflicts-%20Diagnosis%20and%20Challenges%20of%20the%20Argentinean%20Situation.pdf/view> [22 Apr 2016].
- 7 Ibid.
- 8 Cf. MercoPress 2016: Brazil Reopens Crucial Waterway for Transporting Soy; Water Was Used to Generate Power, 11 Feb 2016, in: <http://en.mercopress.com/2016/02/11/brazil-reopens-crucial-waterway-for-transporting-soy-water-was-used-to-generate-power> [15 Feb 2016].
- 9 Cf. Konrad-Adenauer-Stiftung 2016: Der Letzte macht das Licht aus: Dramatische Wasser- und Stromkrise in Venezuela, in: KAS-Länderberichte, Mar 2016, <http://kas.de/venezuela/de/publications/44513> [22 Apr 2016].
- 10 Pontes, Felipe 2016: Número de mortes por conflitos no campo em 2015 é o maior em 12 anos, Agência Brasil, 7 Jan 2016, in: <http://agenciabrasil.ebc.com.br/direitos-humanos/noticia/2016-01/numero-de-mortes-por-conflitos-no-campo-em-2015-e-o-maior-em-12> [15 Feb 2016].
- 11 Ibid.