

Promoting Renewable Energy or Environmental Problems? Environmental Politics and Sustainability in Sino-Brazilian Relations

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Abstract: China is now Brazil's largest trade and investment partner, with Brazil's exports dominated by primary products such as iron ore, soy and crude oil. China and Brazil have also become major players in international environmental debates as emerging powers, reflecting their contribution to carbon emissions and their vulnerability to climate change and environmental disasters such as droughts, floods, deforestation, landslides and pollution. In environmental terms, Brazil's exports to China have led to changes in land use focused on export agriculture, the construction of infrastructure in vulnerable areas such as the Amazon region and a growing need for cheap, renewable energy to fuel transport, consumption and industrial development. In the context of these intensifying trade and economic connections between Brazil and China, this article examines the environmental dimensions of this relationship, focusing in particular on the contradictions created by renewable energy production. Paradoxically, given Brazil's key role in the international climate change debate, one of the most controversial aspects of the country's development agenda is the promotion of renewable energy as evidenced in the conflicts around hydro-electric power generation. The latter have provoked protests against the dams' social and environmental effects among local communities and international environmental groups. Little studied compared to the more well-known aspects of Sino-Latin American relations, such as infrastructure and trade, the article argues that Chinese involvement in hydropower in Brazil reinforces an increasingly unsustainable domestic development agenda, as reflected in the asymmetry between arguments about the general benefits of hydropower and the negative effects on local communities.

Keywords: Hydroelectric dams, Renewable energy, Brazil, China, Environmental politics

Introduction

In 2014, the Federal Republic of Brazil and the People's Republic of China celebrated the 40th anniversary of their diplomatic relations. Despite the distance, cooperation between China and Brazil has grown remarkably closer since the two countries first established diplomatic ties in 1974. President Jiang Zemin's visit to Brazil in November 1993 and the subsequent creation of a formal strategic partnership marked a milestone in Sino-Brazilian relations. Since the end of the Cold War, building strategic partnerships has been a key dimension of Chinese

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diplomacy. While China's strategic partnerships were originally limited to Brazil, Russia and the United States in the 1990s, this policy has now expanded considerably (Zhongping and Jing, 2014). Despite this, China's relationship with Brazil remains of great importance; since 2003 and under the leadership of the Partido dos Trabalhadores (Workers' Party, PT) government, Sino-Brazilian relations have intensified and deepened, developing into a fully-fledged strategic partnership. As Haibin notes,

Both countries share the identity of major developing states, leading regional players, and big potential roles in world affairs. Based on these common identities and forward-looking thinking, both countries developed a comprehensive cooperative path (2010: 185).

In economic terms, from 2009 onwards Chinese demand for Brazilian exports has increased dramatically, reaching US\$30 billion in 2010 (Fearnside and Figueiredo, 2015: 9). Furthermore, China has become Brazil's largest trading partner with trade dominated by primary products such as iron ore, soy products and crude oil, surpassing both the United States and the European Union (Haibin, 2010). Until the late 2010s, Chinese demand for natural resources pushed up the price of commodities to record-high levels that greatly benefitted the Brazilian economy. Within the context of intensifying economic and political relations between Brazil and China, this article examines the environmental dimensions of this relationship, while one arena in which Brazil and China have begun to deepen their comprehensive strategic partnership is in climate change and renewable energy production.

While Sino-Latin American relations offer opportunities for increased political cooperation and coordination and economic, technical and scientific collaboration, they also pose a number of complex challenges, including the social and environmental impacts of Chinese trade and investment patterns. As Ignacio Frechero notes, "a key point in the contemporary China-Latin America relations is to analyse both the opportunities and challenges that this rising power entails to the region" (2012: 141). As economic ties between Brazil and China have strengthened they have also become increasingly asymmetric given that Brazil's exports to China have consisted primarily of natural resources and agricultural products. Chinese investments have also become essential for environmentally and socially sensitive sectors such as hydroelectric power generation. China's strong demand for natural resources and energy is therefore changing the landscape of Latin American territories, threatening ecosystems and the sovereignty of local communities over their natural resources and land. These problems suggest that Chinese investment may not offer a legitimate

alternative to the extractivist model of development currently in place but rather reinforces the problems associated with reliance on the primary sector (Ibid., 2012: 147). The conflicts regarding renewable energy in Brazil illustrate that ‘energy resources can promote as well as limit sustainable and substantive development’ (Logan and McNeish, 2015: 291-2) while existing inequalities reinforce the positive and negative effects of natural resource exploitation.

This article analyses the environmental dimensions of Sino-Brazilian relations, arguing that the asymmetrical economic relationship between China and Brazil has reinforced the unsustainable nature of Brazil’s natural resources boom. As part of a strategy known as neo-extractivism, many Latin American countries have come to rely on natural resources exports, particularly under progressive governments, often justified by the argument that the export revenues will finance social development. As the first section argues, despite the promise of high revenues, the neo-extractivist model is mired with social, environmental and political contradictions. This article contributes to the debate on the neo-extractivist model’s sustainability by demonstrating that this debate should no longer be limited to traditional extractivist activities such as mining and oil production. Paradoxically, in the case of hydropower renewable energy production is based on water as a renewable source but simultaneously leads to irreversible damage to local communities and Amazonia as one of the world’s most significant natural environments. Secondly, in spite of their asymmetric relationship, Brazil and China as major developing powers have developed shared interests in international climate change policy, energy and mitigation through investments in renewable energy, resulting in increasing levels of Chinese investment in the sector, despite the economic downturn. Thirdly, while hydro-electric power is at the centre of both countries’ energy agenda, the conflicts surrounding the construction of hydro-electric dams underline the contradictions between the search for sustainable energy sources, economic development and the rights of affected communities, reflecting the contradictions of neo-extractivism elsewhere in the region. Although China’s economic relationship with Latin America has not caused these problems, the article concludes that the intensifying economic relationship between China and Brazil has reinforced the existing contradictions, as evident in the uneven distribution of the negative and positive effects of hydropower’s expansion in Brazil’s Amazon region.

Neo-Extractivism and Its Social-Environmental Contradictions

The rise of China as a major player in the global capitalist economy has provided new opportunities for economic development and capitalist expansion through its continuous search for new market frontiers and commodities. High demand for natural resources among both industrialised and newly-industrialised countries has allowed natural resource exploitation to become both politically acceptable and a legitimate development strategy implemented over alternative concepts of development (O'Toole, 2014). China's economic diplomacy channels have opened up direct access to much needed natural resources essential for it to sustain its economic growth and achieve its goal of modernisation. As an important source of raw materials, food and natural resources, China has increasingly focused its attention on Latin America as it seeks to replace non-renewable resources that have already been depleted within its own borders. However, sustained economic growth, particularly within the areas of natural resource development, has inevitably created environmental pressures, as the Brazilian case illustrates.

Recognised as a highly bio-diverse country, Brazil contains ecological zones of both regional and global importance such as the Atlantic and Amazon rainforests, and the Pantanal tropical wetlands. On both a national and global level, Brazil like many other countries in Latin America, faces the challenge of reconciling development with sustainability. But Brazil's natural heritage is under serious threat from oil and gas extraction, mining, logging, soy production and expanding infrastructure such as hydroelectric dams. While natural resources offer an opportunity for economic growth and development, historically their presence has been a source of conflicting political, social and economic dynamics for Latin America (McNeish and Borchgrevink, 2015: 2). For most of the twentieth century, development based on extraction was blamed for widespread poverty, recurrent economic crises and political instability as well as environmental problems. As Schmink and Jouve-Martín explain,

Latin America's historical dependency on natural resources, both for local livelihoods and to supply an evolving global market, has made environmental issues central in policy debates and in widespread contests over the meaning and use of natural species and habitats, carried out against the region's persistent legacy of inequality (2011: 3).

Although the resource-dependent development path has gained momentum in the last decade, debates on the developmental, social and ecological implications of the intensification of

extractivist activities have continued in Brazil as well as the rest of the continent (Buchardt and Dietz, 2014). Throughout its history, the region has experienced widespread contestations over the distribution, access to and control over natural resources as social-environmental concerns have been subordinated to economic growth.

Following several decades of hyper-inflation and stagnation, the Brazilian economy turned a critical corner at the end of the twentieth century, beginning a new cycle of economic growth. Between 1994 and 1998, Brazilian governments introduced a stabilisation policy based on economic openness and privatisation, resuming its search for a new pattern of development. Since the beginning of the twenty-first century, Brazil has pursued a development strategy aimed at strengthening its global commercial insertion through the export of primary commodities (Saad-Filho, 2012: 134). Its economic success during this period was based on the primarisation and the diversification of its exports, including industrialised agriculture and the exploitation of natural resources, supported by a favourable global markets as well as the government's proactive pursuit of greater autonomy through a more active state role in the economy. Although originally initiated by the Fernando Henrique Cardoso governments (1995-2002), it was under president Luiz Inácio Lula da Silva (2003-2009) that the policy of South-South cooperation was most actively pursued, with Brazil viewing its relationship with China as an opportunity to advance its development agenda and position within the global power hierarchy (Christensen, 2012). Furthermore, Brazil's leaders hoped that the country would be elevated to first-world status as a result of the resource boom and high levels of economic growth. However, since the recent downturn in the global commodity markets as a result of China's slowing economy and the beginning of its "new normal" phase, Brazil's status elevation remains uncertain.

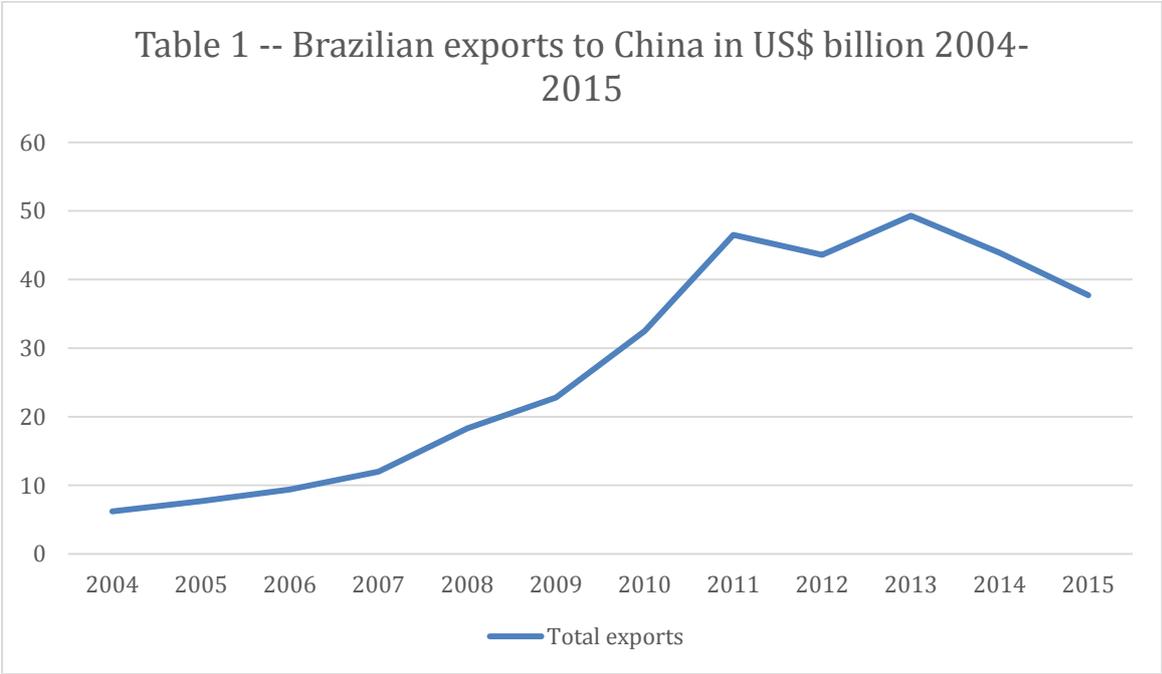
As a consequence of the global surge in demand for raw materials, neo-extractivism became the cornerstone of growth-oriented development policies in Latin America at the turn of the twenty-first century, despite growing evidence of its limited contribution to national development. As Brand explains,

Extractivism is not just the activity of resource extraction but a development model, which organizes – on the basis of the exploitation and marketing of resources for export – the political, socio-economic and cultural relations within the respective country or region: the economy and class structures, gender relations, the state and public discourse (2013: 3).

Furthermore, while extractivism previously referred to activities that involved extracting, such as in mining, oil and gas, the term is now often used to refer to the accelerated pace of natural resource exploitation at an industrial level and the construction of mega-projects and infrastructure intended to make full use of natural resources (UNHRC, 2015). Latin America's progressive governments have both intensified natural resource extraction and created a new type of extractivism that bears a "progressive stamp" (Gudynas, 2010: 3). Under the framework of neo-extractivism, regulation of the appropriation of resources and export duties and taxes has increased, contracts renegotiated and surplus revenue redirected to social programmes such as the state assistance programme for the poor, Bolsa Família. However, even under its contemporary guise where the state plays a much more active role, neo-extractivism does not substantially change the current structure of accumulation and move away from a productivist appropriation of nature. Although it was hoped that the rise of the left and centre-left in Latin America would lead to a transition away from extractivist activities towards a more sustainable type of development, these governments have in fact continued to maintain classic extractivism, albeit with a progressive twist (Gudynas, 2010). As Gudynas (2010: 4) notes, the progressive governments of the region have replaced the old extractivist discourse that pointed toward exports or the world market with one that points to globalization and competition. This change in discourse has been reflected in Brazil, where under the Partido dos Trabalhadores government, the country has also radically reoriented its agricultural production towards monoculture exports and is rapidly becoming a mining powerhouse, opening up new sites and processors. However, the recent slowdown in the global economy has underlined the problematic nature of neo-extractivist development strategies given changes in global prices and demand, sharpening the social, environmental and political problems associated with the model as the structure of Brazil's exports illustrates.

Brazil's increasing reliance on a small number of agricultural and natural resource exports has exposed the country's vulnerability to fluctuating global commodity prices and, in particular, the changing fortunes of the Chinese economy. Between 2004 and 2011 Brazil's economic boom was built on the diversification of export products, with a specific emphasis on natural resources and manufactured goods. As Table 1 shows, exports to China increased exponentially from the mid-2000s, peaking in 2013 and declining after that, reflecting lower demand for Brazil's exports. Despite the decline in demand, China has continued to serve as Brazil's largest export destination, followed by the EU, South America and the US. While the

volume of Brazilian exports signals the economic significance of trade with China, the nature of these exports reveals an asymmetric relationship. The growing importance of China as Brazil’s largest trading partner has coincided with a shift away from manufactured exports towards agricultural products and natural resources (Wilkinson and Wesz Junior, 2013: 250). Pereira and de Castro Neves (2011: 4) observe that Sino-Brazilian relations have therefore come to resemble the classic unequal North-South trading relationship rather than an equal partnership between emerging powers as the “South-South” label suggests. To illustrate this dynamic, three major export products have dominated Sino-Brazilian trade since the mid-2000s: soy (32% of the country’s exports to China in 2015), iron ore (23%) and petroleum (14%) (Ministério de Desenvolvimento/SECEX, 2016). Conversely, Brazil’s imports from China have centred primarily on consumer goods such as electronics and cars in addition to capital and manufactured goods. Although Brazil continues to be a major industrial producer and exporter, this asymmetrical relationship has increased the political significance of the agricultural and natural resource sectors compared to industry while also heightening social-environmental contestation.



Source: Ministério de Desenvolvimento/Secretaria de Comércio Exterior (2016). “Intercâmbio comercial brasileiro: China”.

Each of Brazil's major export products has become associated with an array of social, environmental and even political problems. Firstly, in 2009 Brazil became the world's second largest soy exporter after the US, with 56% of soy exports destined for China for that year (Nature Conservancy, 2011: 7-9). Soy production has contributed to unsustainable changes in land use – a major cause of climate change – resulting from the expansion of soy production, often facilitated by Chinese investment (Wilkinson and Wesz Junior, 2013: 255), as well as road and storage construction in vulnerable areas. Secondly, Brazil's mining production quadrupled between 2005 and 2011 before declining again in response to falling global demand. In 2014, three-quarters of Brazilian total mining exports consisted of iron ore, a sector dominated by the former state-owned company Companhia Vale do Doce (IBRAM, 2015: 14; IBRAM, 2016: 1). The remote locations of most iron ore operations have necessitated road and railroad construction in environmentally sensitive areas to transport the goods to the nearest ports. The environmental implications of iron ore mining in Brazil became global news in November 2015 when a mining dam burst in the state of Minas Gerais, creating one of the country's largest environmental disasters. Thirdly, Brazil's oil exports increased by 36% between 2013 and 2014, with the US as the country's largest export destination and China its second-largest market (EIA, 2015: 4). Dominated by the part state-owned company Petrobras, the Brazilian oil sector has become highly politicized as a result of the corruption scandal in which many of Brazil's prominent politicians have been involved. The corruption investigation, titled Operação Lava Jato (Operation Car Wash), has contributed to one of the country's worst political crises. Consequently, the prominent role of these three major export products not only illustrates their economic significance for Brazil but also that the country's political and environmental fortunes have become intricately linked with natural resources.

Despite the range of social, environmental and economic problems, as well as the left's critical stance on extractivist enclave economies in the past, neo-extractivism has become “a part of South America's own contemporary version of development, which maintains the myth of progress under a new hybridization of culture and politics” (Gudynas, 2010: 13). Engaging with a modernization discourse based on continual progress through scientific and technological innovation – particularly with respect to consumption potential – for Latin American government's neo-extractivism presents an opportunity to bring about long-term structural improvements through substantial investment in infrastructure and education (Unmüßig, 2012). Yet alongside this model of growth based on extractivism and

redistribution, problems traditionally associated with the curse of natural resource development remain, such as authoritarianism and disputes over the profits of nature. Acosta argues that large-scale natural resource extraction has led to the “emergence of paternalist states, whose influencing capacity is tied to their political capacity to negotiate a greater or lesser share of the rents from mining or the oil industry” (2013: 75). Moreover, the large revenues associated with extraction often unleash high levels of violence and repression in the extractive enclaves as multinational companies and governments seek to guarantee the supply of natural resources through the opening up of remote frontiers and networks of connectivity. The networks that support neo-extractivism are essential to ensuring the continual flow of personnel, equipment and in particular energy, and are supported by the Initiative for the Integration of Regional Infrastructure in South-America, the latter being set up to ensure greater commercial and social integration (Gudynas, 2010; Hochstetler, 2013: 42-3).

As the concept of neo-extractivism overtakes sustainable development as the new leading strategy in political discourse, lingering and persistent problems associated with previous agendas prevail. As Brand argues,

The dominant paradigm of economic and social development becomes problematic given the impossibility of the business-as-usual scenario and the globalization of resource-intensive Western production and consumption patterns. Also, the neoclassical argument that prices for products do not reflect the “true” environmental costs is often used (2012: 29).

Therefore, while Brazil’s outward commitment to green energy and sustainable development should theoretically mean adhering to its principles of equity, participation and environmental valuation, its mega hydroelectric dam projects appear to directly contradict these key principles (Bratman, 2015). Moreover, the concept of green economy appears to be – like the concept of sustainable development – “an oxymoron which intends to bundle different, partly contradictory, interests and strategies, and gives them a certain legitimacy and coherence” (Brand, 2012: 29). While a development model based on natural resources and agriculture continues to be attractive for Latin American governments, despite falling prices and intensifying political problems, Chinese trade and investment have contributed to deepening Latin America’s unsustainable reliance on primary products.

Having depleted the resources of its Asian neighbours, the Amazon basin has become China’s main supplier of natural materials. According to Ratliff (2012: 217), “above all, China wants to invest in production, domestic transportation, and the international shipment

to China of Latin America's natural resources and commodities"; a strategy translated into multi-billion dollar investment plans in infrastructure development in Brazil's most ecologically sensitive regions. Although the Amazonian region has a long history of exploration and exploitation dating back to the 1600s, its industrialisation is increasingly facing opposition as the world's attention concentrates on climate change and the ecological crisis. The intensification of raw material extraction and natural elements, including minerals, energy carriers, forest and agricultural goods has profound social, environmental and territorial consequences for Brazil. The ecological effects include soil depletion, deforestation, decline in biodiversity and freshwater contamination. Moreover, the strengthening of Brazilian agribusiness has impacted profoundly on domestic politics and resulted in the weakening of environmental regulation, policies and safeguards (Hochstetler, 2013: 42; Ray et al., 2015). While the expropriation of extensive lands from local communities for activities such as mining, timber extraction, infrastructure projects and agricultural production has always been associated with the industrialisation of the Amazon, Chinese investment and finance in these areas has created new opportunities for further expropriation.

Brazil and China's relationship is not only constructed on economic interests but also represents a concrete expression of South-South development cooperation, although this relationship is not without its difficulties, particularly when it comes to their asymmetrical trading relationship. In particular, the Brazilian government has focused its efforts on attracting Chinese capital for large-scale investment in infrastructural projects such as ports, airports, highways, railways and energy as well as oil exploration. China has become one of the largest exporters of capital over the last two decades. Cordeiro Pires (2015) argues that Chinese investments are based on two rationales: firstly, to guarantee the continuous supply of raw materials and food needed to sustain the country's economic growth; and secondly, to promote business opportunities for Chinese companies that produce durable consumer goods, are involved in information and technology or provide energy. Generally, Chinese investments in raw materials and food tend to be in developing countries while efforts to promote Chinese companies focus on developed countries where China is not only looking for access to markets but also "an environment that favors the development of research and technical innovation centers" (Cordeiro Pires, 2015: 253; Ratliff, 2012). With Brazil's vast natural resources, including agricultural land, raw materials, and hydroelectric capacity, as well as its ability to offer China a manufacturing base to supply national and regional markets

particularly given the extraction and production of commodities (Cordeiro Pires, 2015; Fearnside and Figueiredo, 2015), China's increasing interest in Brazil is unsurprising. These shared interests now include climate change, energy security and renewable energy, which explains China's motivation to invest in renewable energy projects in Latin America.

Climate Change and Environmental Cooperation between Brazil and China

The announcement of the Ten-Year Action Plan for Cooperation in 2012 by President Dilma Rousseff and President Wen Jiabao strengthened their political ties, thereby deepening bilateral relations and cooperation between China and Brazil. Since 2012, the strategic partnership between the two countries has "evolved towards the "global" level" and Sino-Brazilian relations have made considerable progress in the areas of politics, trade and science and technology (Cordeiro Pires, 2015: 243). International political cooperation between China and Brazil has focused on shared objectives such as strengthening the global power of developing countries in multilateral institutions and emerging powers' right to pursue economic development (Dauvergne and Farias, 2012: 906-8). In fact, their relationship is not purely economic but also has political and geo-strategic dimensions (Altemani de Oliveira, 2010; Cardoso, 2012: 40), based on a shared desire to enhance the global economic position of major developing countries and their role in multilateral institutions. For Brazil, strengthening the position of developing countries within multilateral institutions continues to be an important foreign policy principle (Guilhon Albuquerque, 2003: 268). Particularly during the Lula governments (2003-2009), but less so during the Dilma Rousseff administrations (2010 onwards), Brazil has focused on building South-South relations through 'multilateralism, bilateral relations, and informal mechanisms of cooperation' (Almeida, 2009: 175). Similarly, for China a core foreign policy goal involves 'promoting South-South cooperation, bringing about a more just and equitable multilateral trading regime and ensuring a bigger say and greater role in decision-making for developing countries in international trade and financial affairs' (Hu cited in Ratliff, 2012: 216; Cheng, 2006: 505, 510). In terms of the international environmental and climate change agenda, both countries have also begun to coordinate their position in international climate change talks, particularly since 2009.

As two of the world's leading emerging powers, Brazil and China are now coordinating their moves in the international arena through forums such as the G20, G77, BRICS and the BASIC (Brazil, India, South Africa and China) group. As Cordeiro Pires comments, with China now the world's largest producer of greenhouse gases, "China, the "grey giant," when

standing next to Brazilian the “green giant,” has greater leverage compared to when standing alone” (2015: 246). Both countries have therefore become major players in international climate change talks as emerging powers; however this is also a recognition of their vulnerability to climate change and environmental disasters such as droughts, floods, deforestation, landslides and pollution. They not only share concerns about climate change vulnerability, their policies are also driven by energy security requirements and the need to reconcile environmental policy with economic development priorities. Since COP15 in Copenhagen in 2009, the major developing countries have increasingly coordinated their position in international climate change negotiations through the BASIC group (Harris, 2011: 11), initially rejecting binding carbon emissions targets for the emerging powers to a greater (India and China) or lesser (Brazil and South Africa) extent (Hochstetler and Milkoreit, 2014). Since 2009 both Brazil and China have gradually shifted their position towards a greater acceptance of the responsibility of major developing countries for carbon emissions, leading to voluntary commitments in the run-up to COP21 to cut carbon emissions by 2025 and 2030, as expressed in bilateral agreements with the US (White House, 2015a, 2015b) and their Intended Nationally Determined Commitments (INDCs) submitted ahead of the negotiations.

Up to the mid-2000s, Brazil’s perspective on international environmental policy also emphasised the national interest, defined as the right to economic development, including the exploitation of natural resources. This view translated into an emphasis on national sovereignty over natural resources and on developing countries’ common but differentiated responsibilities regarding the climate change agenda. In recent decades this perspective has shifted, particularly following the Earth Summit in Rio in 1992. Brazil’s involvement in developing the Clean Development Mechanism (CDM) in the 1990s signalled a commitment to climate change mitigation, thereby explaining the country’s focus on supporting financial and technical compensation for climate change policies and adaptation in developing countries (Johnson, 2001: 182). In 2009 the Brazilian government committed itself to a unilateral and voluntary reduction of carbon emissions and began shifting its position in climate change talks away from the traditional emphasis on developing countries’ differentiated responsibilities. The country has also made significant progress in combating deforestation and has become a model for renewable energy use in the National Climate Change Plan, all of which have informed Brazil’s decision to shift to a more proactive commitment to global environmental action in order to develop a leadership role in this area (Riethof, 2016a). In recent international climate change talks – for example Copenhagen,

Durban and Paris – Brazil has demonstrated more flexibility concerning the common but differentiated responsibilities principle while continuing to resist calls to add major developing countries to Annex 1. These strategies reflect the country's ambition to take a leading role in global climate change policy and to serve as a model of green development and renewable energy in the developing world.

In China's case the principle of common but differentiated responsibilities has also driven the government's national and international climate change policy. While accepting the multilateral climate change framework of the UNFCCC (UN Framework Convention on Climate Change), China has consistently rejected binding emissions targets for developing countries, insisting on the principle that developed countries should bear primary responsibility due to their historic contribution to climate change (Harris, 2011: 2). Similar to Brazil, China's economic development priorities, including energy security, appear to override concerns about sustainability and climate change (Ibid.: 8-10). However, China's position as a major contributor to carbon emissions and concerns about growing domestic consumption levels has increased international pressure on the country to address climate change (Rong, 2010: 4583-4). This international pressure and the country's vulnerability to the negative effects of climate change have resulted in voluntary commitments to carbon emissions reductions and a bilateral climate change agreement with the US in the run-up to COP21 in 2015 (Jayaram, 2015: 223). Moreover, according to Moore (2011: 149, 152), development and environmental priorities do not automatically clash, as "China's policy on climate change is best understood as a collection of policies calculated to pursue other interests, but which have co-benefits for the reduction of greenhouse gas emissions". Jayaram (2015: 225) argues that the area where China has made most progress is renewable energy, which Moore (2011: 152-3) explains as resulting from Chinese concerns about energy security and the country's dependence on energy imports. Consequently, "the key point about China's policies to promote energy efficiency and renewable energy, usually seen as part of its climate change policy, is that they accomplish broader [development and security] goals" (Moore, 2011: 153). For China the responsibility of developed countries for climate change also translates into the latter's obligation to provide technical and financial support for developing countries for climate change mitigation and adaptation (Balme, 2011: 49). This combined commitment to renewable energy and energy security helps explain China's drive to invest in hydro-electric power generation in Brazil.

Sino-Brazilian Relations and the Struggle for Renewable Energy: The Case of Hydropower

Renewable energy has become increasingly important as world leaders seek to reduce the rate of climate change whilst simultaneously increasing energy supplies through the use of renewable natural resources. Since the energy shortages in 2001, Brazil has shown a renewed interest in energy-generation and in the search for additional and diversified energy sources. This energy deficiency provided the Brazilian government with “a window of opportunity to pursue energy development projects despite their environmental and social costs” (Carvalho, 2006: 248). Furthermore, increasing domestic oil production and mining as well as Brazil’s expanding agricultural sector have placed growing pressure on energy resources as demand outstrips capacity. The extractive boom and prioritisation of mining, hydrocarbons and soy production in Brazil has also contributed to the speeding up of energy infrastructure projects. In 2014, Brazil was the eighth-largest consumer of energy in the world, with total primary energy consumption almost doubling in the last decade because of its sustained economic growth (EIA, 2015). The high proportion of renewable energy use in Brazil has also allowed the government to argue that the country can meet its climate change commitments by increasing renewable energy use alongside reducing deforestation.

Under the Clean Development Mechanism, Brazil has become one of the main destinations for funds to build large hydroelectric dams to deliver renewable energy with low greenhouse gas emissions. Designed to assist developing countries achieve sustainable development while enabling developed countries to achieve their emissions reduction targets set under the Kyoto Protocol, Brazil has embraced CDM as a means of pursuing its energy-generation plans while maintaining its international commitment to reduce global carbon emissions. Although the Amazon River has been considered as a potential source to generate energy since the late 1960s, under the banner of green energy, the Brazilian government has expanded considerably its plans for hydroelectric dams as it tries to meet its rapidly rising energy demands. Brazil’s 2011-2020 energy expansion plan called for 48 additional large dams to be built in the next decade, 30 of which would be in the legal Amazon region. This would be the equivalent of an average rate of one dam every four months (Fearnside, 2012). While Brazil’s hydropower potential is the third largest in the world behind China and Russia, the relatively flat Brazilian Amazon is less suited to hydropower given that this form of energy production requires an elevation gradient. Therefore, the hydroelectric plants will require large and shallow reserves (Finer and Jenkins, 2012). The large distances between the

main producers and consumers – the wealthier states in the southeast of Brazil – have meant that the expansion of renewable energy production also requires the construction of transmission networks, affecting local communities and the environment.

As a result of Brazil's potential for hydropower expansion, a key aspect of Brazil's development policy involves reducing its dependence on energy imports and utilising its untapped hydropower of around 180,000MW. In order to satisfy demand, Brazil needs to add around 6,000MW each year for the next decade to its installed generating capacity of 121,000MW (Economist, 2013). Carvalho argues that despite the environmental and social costs associated with hydroelectric dams and Brazil's tumultuous political context, large-scale energy development continues to dominate the policy process because of the potential gains, both economic and strategic, associated with energy development as well as Brazil's patrimonial politics that "affords the dominant coalitions much better access to key decision makers and resources (financial and personnel)" and allows them to pursue agendas over long periods of time (2011: 247). In addition to these factors, the emergence of the green energy model has provided Brazil with a legitimate means of pursuing its energy-generation plans by incorporating, under the guise of green energy, its hydropower potential into its development strategy. Moreover, this pursuit for "green energy" has been supported on a global level by multilateral institutions such as the World Bank which has significantly increased its funding for dam construction and now considers hydroelectric energy to be a critical part of its clean energy matrix (Bratman, 2015) Yet, the green economy, the current global economic model developed in response to the tensions between environmental protection and economic development, remains based on raw extraction (Gudynas, 2010). Furthermore, the green economy has provided another way to turn nature into a source of profit by creating a new market for green technologies, goods and services.

It is within this discourse of clean energy strategies that Brazil has positioned itself as a global leader in hydroelectric energy, with the increasingly important role of Chinese investment in infrastructure, production and technology. Although there are no comprehensive statistics available detailing Chinese investments in Brazil (Ratliff, 2012: 217), the available information indicates that it has become China's second-largest investment destination in Latin America after Venezuela since the mid-2000s. The bulk of Chinese investment in Latin America has targeted the energy sector – particularly the oil industry but also renewables – and infrastructure, such as roads, railroads and ports (Gallagher and Myers, 2014). In 2012, 60% (US\$ 2.6 billion) out of a total of US\$ 4.3 billion worth of Chinese

investments in Brazil was destined for the energy sector, including renewable energy and oil. In the same year, the Chinese company State Grid invested US\$492 million in electricity transmission networks to link the large Amazonian hydro-electric dams to the national grid. As part of an international consortium State Grid also bid successfully to construct transmission lines for the Teles Pires hydro-electric complex in the states of Pará and Mato Grosso, with the consortium now controlling “the rights to more than 10,000 kilometers of transmission lines in the country” (Cote, 2014: 19). Chinese investment was not restricted to hydro-power as Astroenergy invested US\$350 million in solar energy production in the northeastern state of Ceará (CBEC, 2014: 10-14). In 2013 China’s investment in the energy sector comprised 43.9% of total investment, centring on oil and electric energy (Ibid.: 14). The China National Petroleum Corporation and the China National Offshore Oil Corporation bid as part of an international consortium for the exploitation of the pre-salt Libra oil field in October 2013. Echoing the June 2013 mass demonstrations in major Brazilian cities, the Libra auction sparked protests in Rio de Janeiro organised by trade unions and social movements as well as legal challenges to the selling off of the country’s oil reserves (Braathen, 2015).

Even though oil is more important than electricity for bilateral trade, financial and technological investment in Brazil’s renewables sector matches China’s own energy policy, which has focused on reducing dependency on energy imports while diversifying energy sources (Koch-Weser, 2015: 26). Chinese demand for electricity-intensive materials such as aluminium are contributing to this surge in demand for electricity and are also a key driver behind Brazil’s hydroelectric expansion plans in Amazonia. The severe droughts that Brazil suffered in 2014 and 2015 have also highlighted the vulnerability of the renewable energy sector to climate change, underscoring the need for further investment in dams and transmission networks. For these reasons, and despite the global economic downturn, Chinese investment in Latin America increased substantially in 2015, with investments in Brazil in oil, soy processing, infrastructure and hydropower (Myers, Gallagher and Yuan, 2016: 2). In 2015, following a visit of the Chinese Prime Minister Li Keqiang to Brazil, China Three Gorges Corporation bought two hydroelectric plants in Brazil as part of a US\$ 53 billion investment package. These initiatives will likely lead to continued Chinese funding for Brazil’s renewable energy projects, one of the most controversial aspects of the country’s development agenda as evident from the large number of conflicts around hydro-electric power generation. While hydropower is widely accepted as a cleaner source of energy than fossil fuels, it comes at the cost of endangering biodiversity and indigenous livelihoods.

Renewable energy promises benefits such as a sustained supply of energy for economic and social development as well as reducing dependence on energy imports and fossil fuels. Chinese investment in the renewable energy sector in Brazil has increased in recent years, reflecting both countries' shared interest in enhancing their energy security by diversifying energy sources. However, dam construction projects are fraught with conflicts about their social environmental sustainability, as expressed in the domestic and international protests against dams such as Belo Monte, Rio Madeira, Teles Pires and São Luiz do Tapajós in the Amazonian region. Following President Lula da Silva's announcement of the Growth Acceleration Programme in 2007, the Rio Madeira Complex was listed as a high priority infrastructural project. Despite the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) originally opposing the approval of the preliminary license, the Madeira dam project was later agreed after the Ministry of the Environment caved under presidential pressure. As a sign of the government's displeasure at opposition to its hydroelectric dam projects, the head of the licensing department was immediately replaced and the IBAMA divided into two agencies, essentially paralysing many of its activities (Fearnside, 2014). Worryingly, this highlights how susceptible the system is to political pressure and has led to a number of precedents that fundamentally weaken the safeguard process for future dams.

Despite questions about consultation procedures and the social and environmental sustainability of large dam projects, the Brazilian government has highlighted the Rio Madeira hydro-electric complex in the state of Mato Grosso and the Belo Monte and São Luiz do Tapajós dams in the state of Pará as a cornerstone of Brazil's economic strategy since 2007 (Ministério de Minas e Energia, 2015: 84-88). After years of delays and under political pressure, the licensing for hydroelectric dams has been accelerated despite significant opposition. The Belo Monte Dam was finally approved by Congress and the Senate in July 2005 but challenges to the project's legality continue, as human rights violations and lacking consultation procedures have provoked significant protests by a wide-ranging domestic and international coalition of indigenous communities, the national Movimento dos Atingidos por Barragens (MAB, or Movement of People Affected by Dams), socio-environmentalist and human organisations (Fearnside, 2006: 20-23; Instituto Socioambiental, undated). Critics of hydro-electric dams, such as the NGO Instituto Socioambiental, have pointed out that the project is a prelude to further dam construction in the region, spreading the impact to other

communities living in the area (Instituto Socioambiental, 2015; Fearnside 2006). At the same time, the construction process has created a frontier culture in the region, with people moving to the nearby city of Altamira in the hope of obtaining construction and related jobs. According to Assis da Costa Oliveira (2015: 140-1), the construction process has created an increasingly explosive social situation with rising incidences of sexual harassment, violence, homicide and human trafficking. Due to the dam's impact on river levels, local communities have experienced more extreme water level fluctuations than usual as well as flooding, leading to displacement and the destruction of livelihoods. These effects indicate that dam construction is likely to have longer-term, and possibly irreversible, implications for the region which have not been resolved by mitigation strategies proposed by the government and the construction consortiums.

Apart from the direct and indirect effects of dam construction on local communities and the environment, measures to mitigate and compensate for these impacts also appear to have failed to address the concerns of those affected by dams. These issues underline the anti-dam coalition's argument that their substantive concerns have not been addressed or resolved as a result of inadequate consultation processes (Riethof, 2016b; Instituto Socioambiental, 2015: 48-53). According to the MAB although the dam had started operating in 2016 several local – in many cases forcibly displaced – communities still had no access to a functioning sewerage system while indigenous rights continued to be violated (MAB, 2016a). A 2015 report by the NGO Instituto Socioambiental details the local impacts of the Belo Monte dam, focusing in particular on the effects of displacement, pressure on public services provision, and safety concerns among urban and rural communities (Instituto Socioambiental, 2015). The report demonstrates that some of the promised improvements funded by the Norte Energia consortium which owns the dam project have not delivered the desired outcomes. In the case of indigenous communities, a significant proportion of the investment to mitigate the negative impacts of the dam was spent purchasing boats, engines and petrol, leading the report to conclude that this money had created clientelistic relations between the consortium and the communities. The report also found increased consumption of processed foods while child malnutrition had risen by 127% between 2010 and 2012 (Ibid., 2015: 19, 21). Members of local fishing communities mentioned how during the construction process explosions, chemicals as well as the physical destruction of nature affected the fish stocks. Their forced displacement meant that these communities no longer had access to their traditional fishing grounds without having access to alternative livelihoods (Ibid., 2015: 18). Local groups,

particularly women's movements in Amazonia, have also protested in urban areas such as Altamira and Belém against the rising cost of electricity (MAB, 2016b), indicating that hydro-power expansion has focused on powering development in wealthier parts of Brazil rather than increasing local access to electric power.

The Belo Monte protests led by indigenous and other local communities, environmentalists, labour and human rights activists have not been targeted exclusively at Chinese involvement but more generally at the neglect of the affected communities' rights, including appropriate compensation and consultation. However, in 2015 and in the midst of protests and debates about whether the Belo Monte Dam should receive an operating license given the violations of indigenous rights (Instituto Socioambiental, 2015), State Grid won a contract to construct and maintain a transmission line connecting the dam to the national grid (Xinhua, 2015). The company's involvement in Belo Monte became controversial when the construction consortium attempted to negotiate a partial authorisation to start construction in early 2015, before the dam's operating license had been approved. The Brazilian media also reported that the company intended to hire 10,000 Chinese workers, which would not have been permissible according to Brazilian labour legislation (Borges, 2015). The Belo Monte case illustrates the uneven impact of dam construction, framed in government discourses as producing development for Brazil as a whole. Mirroring Latin American debates about neo-extractivism's generalised benefits versus the local costs, we can find a similar dynamic in struggles against hydroelectric dams, with the added dimension of dams producing renewable energy. Whereas local communities have often suffered the negative effects, they have not necessarily benefited or received adequate compensation for their losses.

Conclusion

This article has explored how economic and political relations between Brazil and China have shaped the distribution of the positive and negative impacts of Brazil's recent commodity boom. The environmental dimensions of Sino-Brazilian relations have been little studied thus far, and when they have they have generally focused on the environmental effects of soy trade and road construction, such as deforestation, transport and land use changes. With the bulk of Chinese investment now destined for the energy sector – both fossil fuels and renewables – this article argues that the social and environmental effects of the asymmetrical relationship between Brazil and China is not only found in the export and infrastructure sectors but also increasingly in renewable energy projects. The latter, particularly hydro-electric power, has

supported China and Brazil's search for alternative energy sources and their efforts to reduce carbon emissions associated with the export sector. However, large dam projects and linked construction processes, such as transmission networks and facilities for workers, have infringed on the rights of the local population. As a result of dam projects, local communities have faced problems such as flooding, pollution, land invasions and the influx of large numbers of people attracted by the dams' employment prospects. Meanwhile, reports on projects such as Belo Monte (Instituto Socioambiental, 2015) have detailed how basic services such as health, sanitation, education and energy for the affected communities continue to fall short of the wider benefits of hydropower for the Brazilian economy. The conflicts and controversies surrounding hydro-electric dams therefore illustrate the paradoxical relationship between environmental protection, the expansion of renewable energy, and the socio-economic development agenda in Latin America.

Although the expansion of hydroelectric power has been based on the exploitation of the supposedly renewable natural resource of water rather than the extraction of minerals and hydrocarbons, the construction and operation of hydroelectric dams has become associated with irreversible damage to the environment and communities living in the vicinity of the megadams. The debate on the sustainability of Latin America's neo-extractivist model is therefore highly relevant to the debates about the renewable energy sector. Under Latin America's progressive governments, neo-extractivist development strategies, reinforced by the global commodity boom lasting up to the late 2000s, allowed politicians to argue that there was a trade-off between the wider benefits of natural resource revenues, often reinvested in social programmes, and the localised interests of affected communities. In addition, together with the reduction of deforestation rates in Brazil, the expansion of hydropower has also supported Brazil's climate change agenda, juxtaposing the arguments about the environmental benefits and damage caused by the dams. Despite the politicisation of natural resources and Brazil's prominent position in international climate change debates, the country's economy remains highly reliant on nature and the exploitation of natural resources as the trends in trade and investment with China demonstrate. While the socio-environmental controversies surrounding Brazil's energy sector cannot be attributed solely to the intensifying political and economic connections with China, this relationship has reinforced the unsustainable dimensions of Brazil's export boom as well as the uneven distribution of its costs and benefits.

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