

# Amazon shipping, commodity flows and urban economic development: the case of Belém and Manaus\*

Wouter Jacobs  
Lee Pegler  
Manoel Reis  
Henrique Pereira

## Abstract

*This paper addresses the fraught relationships among commodity trade, urban economic development and the environment in the world's largest rainforest reserve, in a historical narrative fashion. The conceptual framework in which we position this narrative is provided by Hesse (2010), in the "site" and "situation" dimensions of the interaction between places or locales on the one hand, and material flows or global value chains on the other. It is argued that the assemblage of both site and situation is what shapes the wealth of cities. The case study of Manaus and Belém shows how the rapid urbanization of the Amazon rainforest is accompanied by the growth of shipping as "new" commodities are being extracted from the jungle interior.*

**Keywords:** urban development; shipping; Amazon; Manaus; Belém.

## Introduction

This chapter deals with the impact of freight movements on urban economic development in the Amazon basin. The mighty river Amazon has long served as the major expressway for both indigenous people and colonial trade. Cities such as Belém and Manaus thrived in the late nineteenth century on the basis of commodity trade, particularly rubber. When rubber trade for the global markets moved from Brazil to Southeast Asia in the first half of the twentieth century, these cities went into urban economic decline. Since the early 1980s, Amazonia underwent a process of rapid urbanization. More recently, Amazon shipping is on the rise again as 'new' commodities are being extracted from the jungle interior. These developments are accommodated by new private and public investments in port infrastructure, as well as Brazil's overall economic growth. But while

Manaus is experiencing an economic boom - largely due to its Free Trade Zone and its hub location the coastal city of Belém is running the risk of being bypassed by these new commodity flows which consequently affects the city's ability to upgrade its urban economic profile.

As such this chapter describes the economic fortunes of two Amazon cities in a historical narrative fashion. The conceptual framework in which we position this narrative is provided by Markus Hesse (2010) on the 'site' and 'situation' dimensions of the interaction between places or locales on the one hand, and material flows or value chains on the other. As Hesse (2010) argues, cities are the agglomerated outcomes of, and prosper due to, the assemblage of both site and situation. In other words, it is the relational interface between locational assets (including not only classical production factors, but also territorialized institutions or locally based routines and skills), the actual material flows or goods movement, and the management and governance of these flows that shape the fortunes of cities.

The dynamics and geography of assemblage has changed considerably since the 1980s as a result of the integration of world trade and disintegration of production systems (Feenstra 1998), generating a new spatial division of labor at a global scale (Fröbel et al.1980). The result of this process of accelerated globalization is that the movement of particular commodities and components have become both more spatially dispersed and spatially extended, while at the same time organized according to logistics principles of just-in-time, reliability and flexibility. This development is conceptualized by economic geographers as the emergence of Global Production Networks (Coe et al. 2004) and what transport economists call global supply chain systems (Robinson 2002).

At the same time, cities as gateways or hubs still need to spatially accommodate physical goods movement itself with all kinds of externalities taking place. Some of the goods movement is to supply the metropolitan region with the necessary consumer goods and production inputs, allowing local businesses to function, jobs to be filled and taxes to be raised. Goods movement, however, creates negative social costs in terms of congestion and pollution which might result in local political resistance. At the same time increasing land values in the urban core will systematically displace low valued distribution facilities (nearby the core) to the urban fringe and, as such, further drive up the costs of transport to service that same urban economic core. In other cases, however, the majority of the goods movement in the region is destined for distant hinterlands. In these cases, much of the negative externalities will reside locally with value capture taking place outside the region. Policymakers and politicians are then confronted with the dilemma to accommodate such freight flows at all or whether they should opt for more valued urban functions to be developed. A change in direction is not easily made as the government's powers are limited, while sunk costs in infrastructure, natural resource dependency and vested industrial interests might shape the development agenda into certain paths for decades to come (Martin and Sunley 2006).

In terms of policymaking, assemblage is then the objective of what Coe et al. (2004) refer to as strategic coupling, which can be understood as the capacity of actors to match critical local and regional assets (understood as 'site') with the demands of actors operating in global chains or flows. These assets do not only include infrastructure provision (e.g. a deepwater port or a fiber optics

network), but also the availability of a skilled labor force, of favorable government regulations and of a well-informed and equally equipped government agency (Hall and Jacobs 2010). Much in terms of strategic coupling or assemblage is dependent, however, on the economic value and social costs generated and on the agenda of the actors involved. These actors hold different degrees of power and operate under various contexts and at various spatial scales: from the local to the global. Such a perspective implies extending the notion of 'situation' beyond the mere physical connections of a location with the urban system at large by including a relational dimension. 'Situation' from a relational perspective thus includes the connectivities that exist through social networks, governance arrangements and corporate ties.

Against this background, the chapter raises the threefold question of how the Amazon cities of Belém and Manaus have been historically inserted in the global material flows of particular commodities, what explains their divergent development paths in the late twentieth century and how are they coping with new economic opportunities provided by Brazil's current commodity boom in terms of sustainable development. In this chapter we refer to Amazonia as the loosely defined, and not formally established, wider region that encompasses the Amazon rainforest. It includes several states under the federal structure of Brazil, of which the state of Amazonas (capital: Manaus) is the largest in terms rainforest reserve and the state of Para (capital: Belém) in terms of economic output.

This chapter is structured as follows. First we describe and explain the economic rise and fall of the cities of Belém and Manaus as result of the rubber boom of the early twentieth century. In the third section we provide an overview of the urbanization of Amazonia that followed during the second half the twentieth century, in particular describing the establishment of the Manaus Free Trade Zone. In the fourth section the ports in Amazonia are positioned within the overall Brazilian transportation system, highlighting how these transport activities and commodity chains are accommodated in space within the metropolitan regions of Manaus and Belém. In addition, we compare the urban economies of Manaus and Belém in terms of freight transportation activity using statistical data. In the fifth section, we address the question of assemblage in the two port cities in the context of Brazil's current commodity boom. In the conclusions we draw out implications for the future of sustainable development and for further research.

## The Amazon Rubber Boom 1870-1920

The first and most pronounced urban and economic development phase of the Amazon Basin has been, without doubt, the Rubber Boom period at the end of the nineteenth century. During this period per capita incomes climbed by 800 per cent, the regional population grew by almost 400 per cent and the Amazon outback became formally integrated within both the national political system and the international market economy (Braham and Coomes 1994). The port city of Belém, and

anus at a later stage, witnessed an unprecedented urban economic boom with both cities rivaling each other with development projects of urban grandeur as is still exemplified by their well-known opera houses.

The Rubber Boom started with the enormous rise of demand for the product in North America and Europe during the close of the nineteenth century. The Amazon provided this 'new' commodity in plenty, but its extraction from a remote jungle interior was far from without costs. Its remote and poorly accessible location in combination with its harsh terrain and lack of enforcement of the rule of law increased the price of the commodity enormously. Transshipment costs were in general high, though barging along the Amazon River provided some relative relief. Interesting in this context is that the Brazilian government granted long term concessions to foreign companies to expand and operate the port facilities: British Manaus Harbour Limited in Manaus and the US Port of Para company in Belém. What was more, the rubber supply from the Amazon was of the 'wild' sort, therefore not rationally cultivated and subject to supply elasticity in global markets. This supply elasticity in combination with increased demands from the global market led to a further increase in price and contributed to the regional-frontier boom economy.

The Amazon rubber boom has been relatively well documented, as have the factors explaining its decline (Coomes and Braham 1994). The first and foremost reason is the rise of competitive plantation rubber from former British colonies in Ceylon and Malaysia which guaranteed more reliable supplies and which was also far easier to ship. Yet, as Braham and Coomes (1994) insist, explanations of this historical bubble-bursting should also be grounded in a more post-structuralist narrative, one which also highlights the endogenous failures of the Amazon rubber industry to counter its global challenge. For example, the urban economies of the Amazon suffered what economic geographers would call 'lock-in'. Both labor and capital were benefitting from the high returns of rubber extraction. Likewise, the state benefitted enormously through taxation on imports and exports and with the revenues largely reinvested in facilitating the rubber extraction activities further in the jungle interior. Yet while the cities of Belém and Manaus were competing with each other on the basis of conspicuous consumption and real estate projects, they failed to economically diversify. Investments in extraction and transshipment facilities proved to be highly specific to rubber extraction and therefore unsuitable for other uses, while technological spillovers to other industries were minimal. After the collapse of rubber prices, most of the mobile capital was removed from the region, "leaving decaying urban splendor as a haunting reminder of the earlier boom" (Braham and Coomes 1994: 101). Nonetheless, the federally supported colonisation program of the Amazon interior continued, largely in an uncontrolled manner, pushing further modernity into the jungle outback and often at the expense of indigenous people and their way of life. As such, the Rubber Boom period "created a legacy of urban-oriented bias that continues to shape Amazonian development" (Braham and Coomes, 1994:105).

## Modern Urbanization of the Amazon: Manaus vs. Belém

The Amazon Basin has historically been dominated by two cities: Belém and Manaus. While both cities prospered during the rubber boom (and underwent a similar decline afterwards), they experienced diverging development paths since the 1970s. Although both cities are by far the largest urban centers in Amazonia, the last decades can be characterized by an overall urbanization of the region. In 1960 only 37.5 per cent of the population in Amazonia lived in cities. By 1991 the urban population in Amazonia had already increased to 57.8 per cent (Bowder and Godfrey 1997). Although both Belém and Manaus experienced an absolute growth in population over the last decades, the relative share of Belém in the region's total population dropped considerably while Manaus' share almost doubled. In fact, of the top 10 cities in the Amazon, Belém actually experienced the lowest growth. What is more, since the late 1990s, Manaus surpassed Belém as the most populous city in the Amazon basin (see Table 1).

Table 1 – Ten largest urban centres (population) in the North Region, 1970-2010

Rank	City and State	1970	1991	2010	Growth 1970-2010
1	Manaus, Amazonas	286.083 6,8%*	1.005.634 9,8%*	1.802.014 11,4%*	530%
2	Belém, Pará	611.497 14,6%*	1.309.517 12,8%*	1.393.399 8,8%*	128%
3	Porto Velho, Rondônia	48.839	229.410	428.527	777%
4	Macapá, Amapá	55.915	153.556	398.204	612%
5	Rio Branco, Acre	36.095	167.457	336.083	831%
Total Population North Region		4.188.313	10.257.260	15.864.454	297%

\* as percentage of total population of the North Region.

Source: compiled by the authors from IBGE, derived from Bowder and Godfrey, 1997.

The fortunes of the city of Manaus were to change in 1967 when the federal government approved the development of a Free Trade Zone (FTZ) under Federal Law number 288 (enacted 28 February 1967). In the beginning the FTZ functioned mainly as a tax free zone for imported foreign luxury goods for the Brazilian elite from the southeast. Later on the FTZ managed to attract more substantial industrial activity, most notably the oil and gas refinery plant REMAN (owned by Petrobras), and later on the assembly plants and value added packaging facilities for global consumer electronics companies such as Samsung and LG, for global soft drink brands such as Pepsi Co and Coca-Cola, and automotive brands such as Harley Davidson and Honda. Most of the input materials and components are imported from abroad, in particular from countries in Asia (Japan, Korea, Taiwan, and China). Over the last years the number of firms within the FTZ has fluctuated from around 450-550 firms, creating as many as 100,000 jobs directly in Manaus and around 20,000 in the rest of the 61 municipalities of the western Amazonas state (Brazilian Ministry of External Relations 2006).

While Manaus acts as the major logistics hub in the region and its Polo Industrial de Manaus (PIM) accommodates most of the free trade zone's industrial activity, the Manaus Free Trade Zone actually extends far beyond its metropolitan boundaries. In fact, the federal government's declaration of Free Trade Zone status covers the entire northwestern Amazon region and includes the states of Amazonas, Roraima, Rondonia, Acre and Amapa. The FTZ provides all kinds of fiscal benefits as regulated under the 1967 Federal Law 288. This law earmarked certain fiscal incentives until the year 2013. This fiscal program was renewed in 2003 by Federal Law 2826 (29 September 2003) and extends the fiscal concession for firms operating in the Manaus FTZ until 2023. While the fiscal arrangements provided by the federal government at first mainly dealt with imports to the FTZ, they later on also included special arrangements for exports. In addition to these federal fiscal schemes, the Manaus FTZ also benefits from State Government tax exemptions (mainly for the shipment of components manufactured elsewhere in Brazil and destined for the Manaus FTZ) and municipal exemption from the city of Manaus itself (e.g. 10-year exemptions from real estate and property taxes).

Under these fiscal regulations, Manaus enjoyed favorable regime vis-à-vis its direct rival at that time Belém. So 'assemblage', in terms of regulatory fiscal arrangements by the federal government, favored Manaus over Belém. In terms of the reasons why Manaus was chosen for this government investment/subsidy scheme, a recent marketing brochure by the Brazilian Ministry of External Relations rather surprisingly frankly mentioned: "The ZFM [the Manaus Free trade Zone] was originally created with the objective of making an economic base in the Western Amazon feasible, promoting the region's productive integration and serving as a support to guarantee national sovereignty in the region [*italics emphasized*]." (Brazilian Ministry of External Relations 2006: 6).

Thus, it appears that in the late 1960s the government launched this FTZ program out of geostrategic interest in order to keep the region economically viable and integrated within the national economy as a means of guaranteeing territorial claims and political control. To some

extent this can be considered a continuation of national policy during the time of the Rubber Boom, in which the Amazonian countries actively competed for dominion over the area by providing land concession to traders, setting up military outposts and investing in infrastructure (Barham and Coomes 1994). In this modern version, however, the Manaus FTZ resembles more of a 'growth pole' developed in many other industrialized countries around the world in which resources and wealth were transferred from the core to the periphery (Brenner 2004). This federally planned concentration of urban economic development in Manaus also helped to prevent the uncontrolled settlement of the rainforest, although the poor quality of the soil and poor road accessibility likely did more to prevent large scale cultivation of rainforest in comparison to Para state.

The management of the Free Trade Zone is in the hands of SUFRAMA, a federal agency in charge of the FTZ policy and its business model. The State governments (and their capital cities) are represented within the SUFRAMA administration and receive financial support from it for projects carried out in line with their State strategic development plans. These plans are designed to coordinate federally initiated regional development policy and objectives with lower tiers of government. The municipalities on the other hand are required to implement these State development plans locally, mainly through land use planning. Thus, there is a clear hierarchy of planning powers and public funding.

Initially, the success of the FTZ until the 1980s could be considered a result of the protectionist national trade policies of the federal government. During that time the federal government created all kinds of unfavorable trade conditions for imports, luring major international firms to set up production facilities for imported materials and components in a Free Trade Zone designed to service the large Brazilian market. Yet in the early 1990s the federal government started to open up for international trade and removed all kinds of tariff barriers, allowing foreign direct investments to concentrate at locations in the major urban regions of the southeast, whereas global traders were now free to locate their production facilities outside Brazil while still servicing the same market. Indeed, as the New York Times (17 December 1990, online content) reported at that time, one of the FTZ's major employers, electronics company Sharp, decided to hive off two major production lines as a result of these new opportunities provided by international trade. As the director of SUFRAMA put it:

In the nineties when the economic opening occurred, the PIM had an industrial policy that focused on nationalization at any cost and high absorption of labor. The opening meant that companies in the Hub had to face competition from products from all over the world, the same as theirs but at a lower price and with superior quality. We had to change our industrial policy. (Brazilian Ministry of External Relations 2006: 8)

This 'change in industrial policy' in practice meant the layoff 38 per cent of the total labor force during the 1990s, especially in higher income ranges, the replacement of labour by improved machinery and most importantly a new labour regime. Indeed, during this period the number of lower paid and less contractually attached workers did in fact increase by 35 per cent (Oliveira

et al. 2010). Thus, as the favorable 'assemblage' of Manaus was coming under pressure from the new national trade regime, the existing FTZ-system in place in Manaus in combination with its 'flexed' labor regime allowed it to continue to tap into global outsourcing trends, as identified in places such as Tianjin (Wang and Olivier 2006) and Dubai (Jacobs and Hall 2007). Indeed, while the Manaus FTZ primarily functioned as an import hub for the domestic market until the 1990s, its share of exports now currently exceeds 20 per cent. Its main export destinations are other Latin American countries and the United States.

## Amazon ports in the Brazilian transportation system

With over 7,400 kilometres of Atlantic coastline, the Brazilian port system is extensive and is characterized by a variety of commodity specializations, with only a limited degree of containerization. This variety in specialization is largely caused by the urban economic and industrial variation of the country. The Brazilian port system can be categorized into four distinct ranges, or what Notteboom (2009) has referred to as multi-port gateway regions. Starting from north to south these are (see Figure 1):

- 1) Amazon Basin (Belém, Macapá, Santarém, Vila do Conde and reaching as far inland as Manaus and Porto Velho);
- 2) Northeast (Itaqui, Pecém, Recife, Suape, Salvador, Aratu and in the near future Ilhéus);
- 3) Southeast (servicing the Belo Horizonte, Rio de Janeiro, Sao Paulo, Curitiba mega-city region through primary ports such as Santos, Sepetiba, Sao Sebastião, Paranaguá, Vitória);
- 4) The Far South; Santa Catarina/ Rio Grande do Sul (Itajaí, Imbituba, São Francisco do sul, Porto Alegre, Rio Grande).

The largest container ports in Brazil are, not surprisingly, located in the most urbanized economic core regions in the southeast and in the far south. In general, containerization is still not very developed in Brazilian ports and is very much dominated by Santos (37 per cent of Brazil's total container traffic in 2008), the port of Brazil's economic powerhouse Sao Paulo. Despite Brazil's overall economic growth since the mid-1990s, the low level of containerized traffic in Brazil contributes to its underdeveloped transportation and logistics system. These act as an enormous constraint in terms of further economic development and in terms of international trade. The World Bank ranks Brazil only 41st on their international benchmark Global Logistics Performance Index (World Bank 2010), mainly due to outdated equipment and inefficient land-use planning in addition to excessive bureaucratic red tape (e.g. for clearing containers through customs). In terms of containerized transport, the role of the Amazon Basin still remains limited even though the port of Manaus is capable of handling Panamax vessels as well as transoceanic carriers and cruise ships. Admittedly, any statements about containerized transport are constrained by lack of reliable data, but according to the Government State of Amazonas (2009), the port of Manaus handled around 350,000 TEU in 2008 which would rank





it in the top ten. However this is not verified by data provided by the American Association of Port Authorities (AAPA).

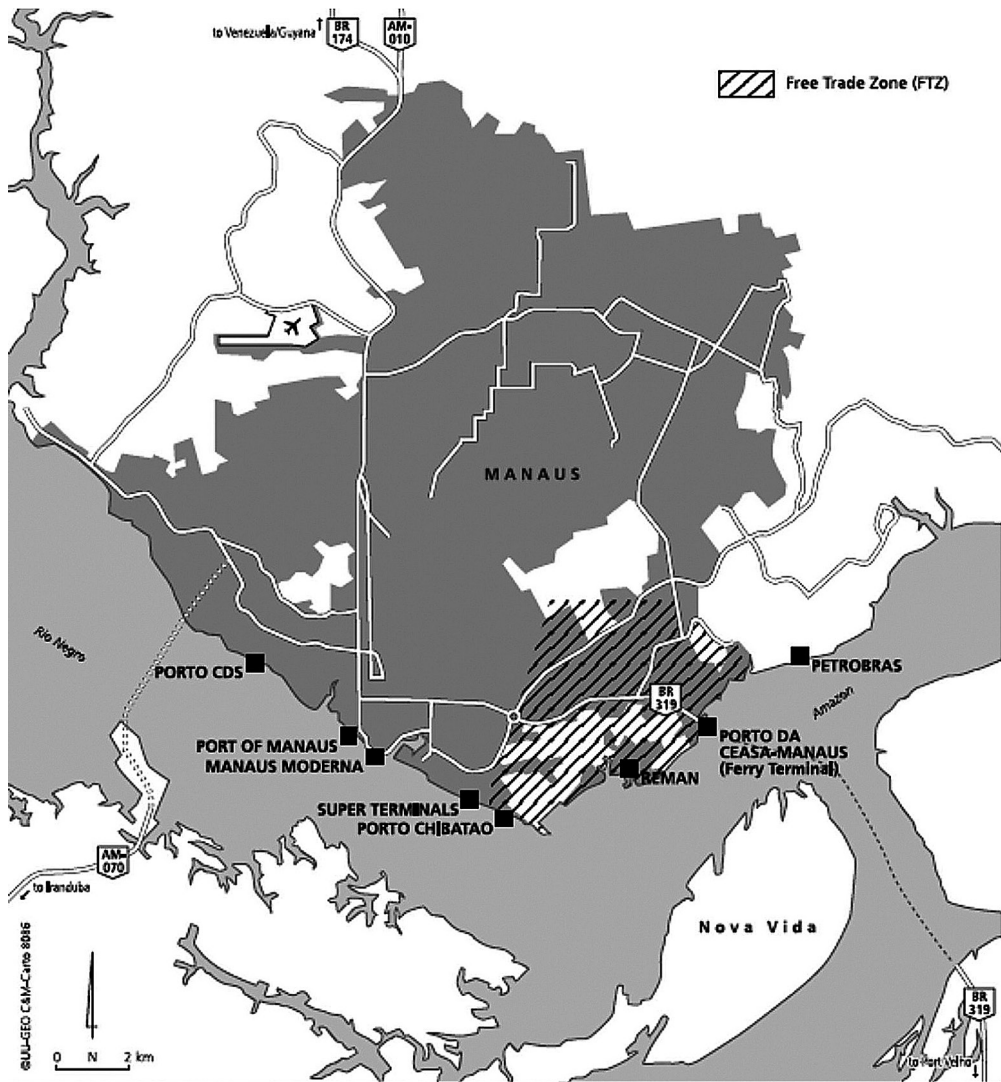
In terms of total cargo throughputs (measured in million metric tons) we observe a different hierarchy. The top ports are now dominated by specialized mining ports such as Itaqui, Sepetiba and Tubarao owned by Brazilian mining giant Vale. The port of Belém is the country's tenth busiest port in terms of total cargo throughputs, largely due to dry bulk traffic. However, much of the traffic might siphon away to the new facilities of Vale in Ponta da Madeira (see more below). The other top ports are in the liquid bulk sector. These include the oil ports Sao Sebastião, Angra dos Reis and Aratu. The port of Manaus, although located 900 nautical miles inland, ranks eighth in terms of liquid bulk traffic (mainly as a result of the location of the REMAN oil refinery) and tenth in terms of general cargo for a combined total of around 12 million metric tons of traffic in 2008 (AAPA, 2010).

Due to lack of road and rail infrastructure, barge shipping remains the most important mode of transport in this remote region. There are in fact many smaller river ports in the Amazon that serve remote communities. Manaus, in particular, serves as the main hub and final market for regional agricultural produce, most notably for fish, bananas, cassava and timber (Neto et al. 2007). In Manaus (see Figure 2), the port consists of floating piers where the Rio Negro and the Rio Solimões converge into the Amazon. There are three main port operators active. First is the public Port Authority of Manaus which has floating piers upstream and owns 94,923 m<sup>2</sup> of land (Government of the State of Amazonas, 2009). It also exploits the cruise terminal. Further downstream is the site of the private operator Super Terminals that owns 9,000 m<sup>2</sup> of warehouse space. Third is the private terminal of Porto Chibatao, which operates 17,600 m<sup>2</sup> of warehouse space in addition to 70,000 m<sup>2</sup> of container yards. Both private operators are directly located south of the Manaus FTZ. A fourth company, Aurora EADI, manages 9,000 m<sup>2</sup> warehouse space and 23,000 m<sup>2</sup> of container yards (a bonded area) within the Manaus Industrial Hub itself (Figure 2). Most of the goods handled are destined for, and depart from, the Manaus industrial hub PIM by barge towards Belém, Santarem or Porto Velho from where it can be trucked towards to the southeast mega-city region. This particular modal split is because Manaus does not have a direct road link with the main urban centres in the Brazilian southeast. Its road connections are with Porto Velho (where it connects with roads to the Southeast) in the southwest Amazon (BR-319) and Venezuela in the north (BR-174). Most of these are unpaved dirt roads that are unreliable under conditions of excessive rainfall.

The other main cabotage routes are with Brazil's main container and general cargo ports of Pecém, Suape, Salvador, Sepetiba, Paranaguá, Santos and Rio Grande (Government of State of Amazonas 2009). Long-haul connections from Manaus are mainly with the port of Manzanillo (Panama), which serves as the import feeder hub of components delivered by transoceanic services from Asia via the Panama Canal. In addition, the international airport Eduardo Gomes is the country's third largest cargo airport with three cargo terminals. A major private port development project (Porto das Lajes) was put on hold in 2010, due to environmentalist concerns over the project's impact on the 'Meeting of the Water' (where the black water of the Rio Negro and the brown water of Rio Solimões converge), considered to be one of Manaus' main tourist attractions.

As a result of public outrage, the federal agency of natural heritage (IPHAN) declared the 'Meeting of the Water' a national monument, effectively suspending the development license granted by the state of Amazonas.

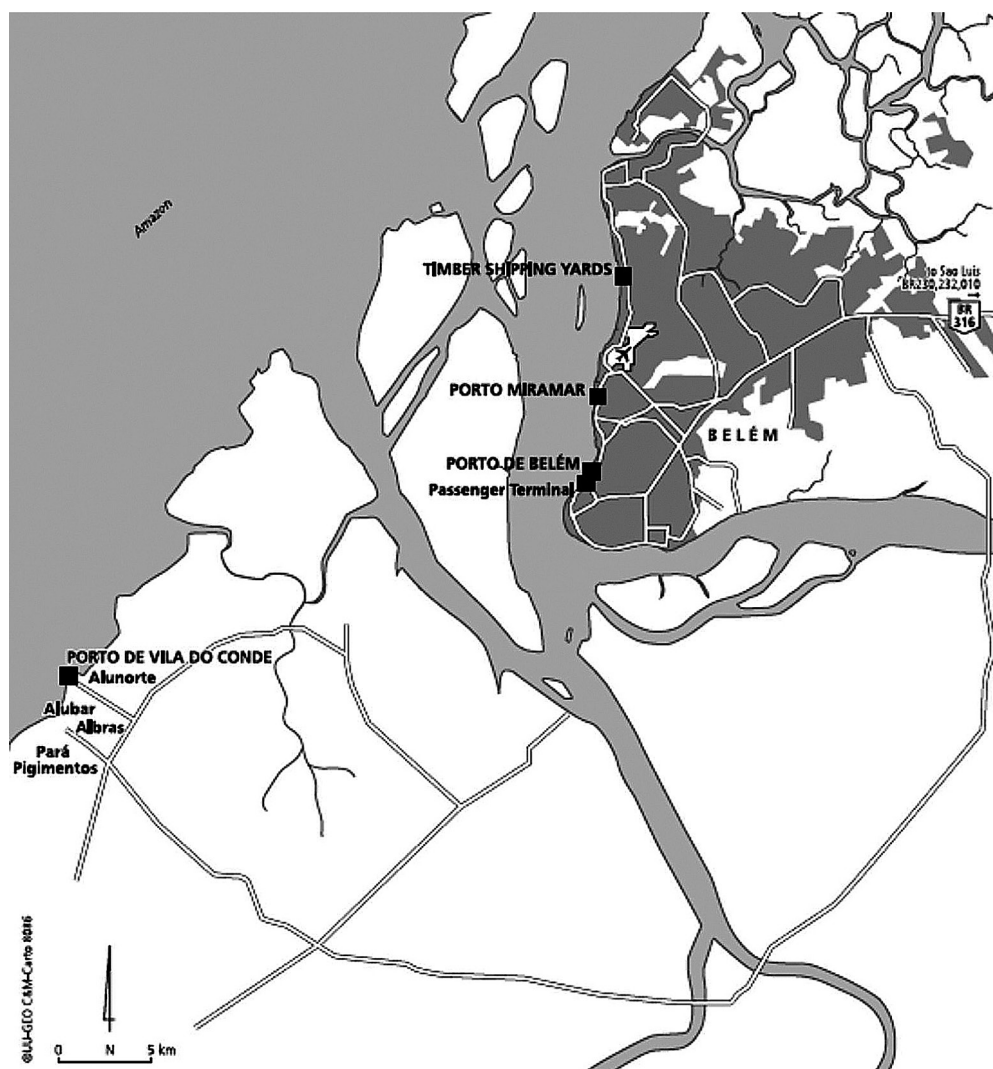
Figure 2 – The Manaus metropolitan region and the location of its ports and FTZ



Source: the authors, 2011.

Private port operator Porto Chibatao also operates a terminal in Porto Velho and warehouse space in Belém (22,600 m<sup>2</sup>). All the ports in Para State including Belém are controlled by the state port authority Companhia Docas do Pará. The public port of Belém is located west of the city centre, adjacent to the passenger terminal and the food market (see Figure 3). Further north is the location of the Porto Miramar terminal, dedicated to a petrochemical refinery. North of the airport there are a number of timber yards where logs from the jungle interior are collected and processed. The main access route from the ports and the city is the BR-316 highway running to Sao Luis and

Figure 3 – The Belém metropolitan region and the location of its ports



(Source: the authors, 2011.)

eventually connecting with the BR-230 (Trans-Amazonian highway) and the BR-232 (to Suape and Recife). Southwest of Belém on the other side of the waterway is the location of the port of Vila do Conde. It is also the location of a large aluminium mine and smelter owned by Alunorte as well as other aluminium companies (Alubar and Albras).

## Urban economics of freight transport in Manaus and Belém

In order to compare the economies of Manaus and Belém in terms of freight related activity, we make use of the location quotient (LQ). The LQ is an index that measures the relative concentration of economic activity within a location compared with the national or regional share of that same activity in the overall economy. As such, the LQ allows us to assess the degree of economic specialization of a location as compared to the national average. An LQ >1 implies a relative specialization of a location (within a particular industry) compared with the national share whereas an LQ <1 implies a relative under-representation. Formally:

Whereby:

$$LQ = \frac{\frac{E_{ij}}{E_j}}{\frac{E_i}{E_{total}}}$$

$E_{ij}$  = total employment in transport sector  $j$  in city  $i$

$E_j$  = total employment in transport sector  $j$  in Brazil

$E_i$  = total employment in city  $i$

$E_{total}$  = total employment in Brazil

For this calculation we use data from the Brazilian national statistics agency IBGE for two reference years, 1996 and 2006. We have selected the following activities organized around industry codes [CNAE, the Brazilian industry classification system equivalent to the North American Industry Classification System (NAICS)]: freight transport by road, freight transport by water, freight transport by air and support activities for transport. Transport by rail is not included as both Belém and Manaus are not connected by rail infrastructure. We then list both the number of firms and the number of employees per activity for Manaus and Belém as well as the total of Brazil (see Table 2). We have also included the totals of all services in general as these are the totals on which we base our index.

Table 2 – Employment and number of firms in freight transport for Manaus and Belém 1996-2006

Brazil and municipalities	Brazilian National classification of economic activities (CNAE)	Variable vs Year					
		Number of local firms		Growth (%)	Total number of jobs		Growth (%)
		1996	2006	1996-2006	1996	2006	1996-2006
Brazil	General total of all services	3.475.735	6.144.50	77	23.604.292	41.388.183	75
	Freight transport by road	73.927	181.339	145	1.022.927	1.368.014	34
	Freight water transport	1.026	1.801	76	18.993	23.705	25
	Freight air transport	1.279	1.523	19	42.276	40.444	-4
	Support activities for transport	28.054	59.105	111	199.208	401.991	102
	<b>Total Transport</b>	<b>104.286</b>	<b>243.768</b>	<b>134</b>	<b>1.283.404</b>	<b>1.834.154</b>	<b>43</b>
Manaus – AM	General total of all services	15.215	28.974	90	173.902	422.030	143
	Freight transport by road	295	729	147	8.992	19.549	117
	Freight water transport	107	176	64	1.369	2.810	105
	Freight air transport	27	54	100	727	738	2
	Support activities for transport	212	474	124	2.497	5.702	128
	<b>Total Transport</b>	<b>641</b>	<b>1.432</b>	<b>123</b>	<b>13.585</b>	<b>28.799</b>	<b>112</b>
Belém – PA	General total of all services	15.358	23.280	52	252.574	340.814	35
	Freight transport by road	202	276	37	7.545	6.797	-10
	Freight water transport	86	120	40	1.771	2.094	18
	Freight air transport	23	38	65	636	361	-43
	Support activities for transport	202	319	58	1.916	2.582	35
	<b>Total Transport</b>	<b>513</b>	<b>753</b>	<b>47</b>	<b>11.868</b>	<b>11.834</b>	<b>0</b>

Source: compiled by the authors from IBGE, 2011.

What becomes immediately clear is the absolute and relative growth for most transport activities during this period. For Brazil as a whole, the number of firms active in freight transport grew by 134 per cent, whereas the number of people employed grew by 43 per cent. This growth is strongest within road transport and supportive services. Compared with services in general, it is notable that the number of firms grew more (143 per cent for transportation vs. 77 per cent for services in general) than the number of people employed (43 per cent vs. 75 per cent). This might imply that the average size of transportation firms declined in combination with the spawning of startup companies, most likely within road trucking.



However, we do see some notable differences between the different subsectors and between Manaus and Belém. For example, the strongest growth among transportation activities is in road transport. In Belém the number of people employed in road transportation actually declined by 10 per cent. Yet in general for Belém, we see a stabilization of the share of transportation activity within the overall urban economy. For Manaus and Brazil as a whole, on the other hand, we see a strong absolute and relative growth in both the number of employees and the number of firms in the transport sector. When we compare the location quotients of Belém and Manaus for the period we observe a distinctive pattern (Table 3).

Table 3 – Location Quotients in freight transport for Manaus and Belém 1996-2006

Location Quotient	Firms		Employment	
	1996	2006	1996	2006
Manaus	1,40	1,24	1,43	1,54
Belém	1,11	0,81	0,86	0,78

Source: compiled by the authors from IBGE, 2011.

What becomes clear is that in 1996 both Manaus and Belém were relatively specialized in terms of transportation firms as compared to the national average. This specialization is stronger for Manaus than for Belém. In terms of number of firms we see that in 2006 the LQs declined for both Belém and Manaus. In the case of Belém, transportation is under-represented compared to the national average in 2006. When we look at employment in transportation activity we see that Belém was below the national share in 1996 and that its share further declined in 2006. In contrast, for Manaus the share of people employed in transportation activity, compared to the national share, actually increased in the period 1996-2006. In addition, the rise of the LQ in employment as compared to a decline of number of firms in Manaus might suggest that the average firm size has increased over the years - that is, fewer firms employ more people in transportation activity (contrasting with national trends).

## Towards a new urban assemblage?

Brazil is currently experiencing a new commodity boom, most notably through increased global demands for resources such as oil and gas, soybeans and new agricultural produce (e.g. açai fruits). To what extent are the cities of Manaus and Belém experiencing a new urban assemblage? Based upon contemporary policies and infrastructure investments, the path of development set in motion is likely to favor Manaus more than Belém. While Manaus is benefitting as the central hub location for commodity flows crossing the Amazon, Belém faces serious competition from nearby infrastructure developments and runs the risk of being bypassed altogether. In 2006, the federal government adopted the National Logistics and Transportation Plan (PLNT) in order to facilitate economic growth through infrastructural investment programs and institutional reforms.

Under the government's PNL Belém is planned to be connected to the major north-south rail link spanning Belém and the Port of Rio Grande in the extreme south of Brazil. The rail link is already operating between the Carajás railway and Palmas, the capital city of the State of Tocantins. This will enable the connection of Belém to iron ore mines in the state of Pará as well as with the major soybean plantations in the southern states of Piauí and Maranhão. Despite the planned rail link, Belém currently fails to attract infrastructure investments from the private sector. In addition, the port faces locational constraints for expansion at its current location, and its envisaged rail head is not likely to be at the current port location, but southwest of the city at Porto Vila do Conde. Furthermore, Belém is facing competition from new locations being developed in the wider region. In Ponta da Madeira (near Sao Luis), mining giant Vale is currently upgrading existing terminal facilities and is planning to make Ponta da Madeira its largest export centre by the year 2015. Its existing rail link with the mines in the Para state are being upgraded to carry as many 330 car trains at a cost of 4.5 billion reals or approximately 2.8 billion US\$ (The Economist, 21-5-2011, p.53-54, 2011). Thus, much of the growth in exports of iron ore will be accommodated in Ponta da Madeira instead of Belém.

Another major threat for Belém comes from investments in the ports of Suape, near Recife, and Pecém, near Fortaleza. In both port locations the national oil and gas company Petrobras is currently building major oil refineries. New rail links from both ports are also under construction through the Transnordestina railway, linking them with the major north-south rail trunk as well as with the Carajás iron ore mine and soybean plantations in the south of the states of Piauí and Maranhão. What is more, both ports are engaged with major international private sector players in transportation and logistics. The international leading carrier Maersk Line has dedicated facilities in Pecém through its APM Terminals division. The Port of Rotterdam Authority (port manager of Europe's biggest and busiest port) has the management contract to further develop the port-industrial complex of Suape. The latter port is currently being dredged and expanded to facilitate bigger ships. In addition, international car-maker Fiat is developing an automotive factory nearby the port of Suape. On the other hand, mining giant Vale has planned to develop a



knowledge centre for sustainable development. In other words, Vale is investing in human capital in Belém and not in hardware.

In contrast to Belém, Manaus has geography and politics on its side. Its dominant location as the Amazon's inland trade entrepot safeguards Manaus from pressures as experienced by Belém along the coast where competition is more fierce. In 2010 oil and gas giant Petrobras completed the Uruçu- -Manaus pipeline linking Manaus with the major gas fields 660 km upstream, allowing it to tap into the current commodity bonanza. Moreover, Manaus was selected as one of the host cities of the FIFA 2014 World Cup football, which guarantees federal financial support for infrastructure upgrades including the airport, cruise terminal and the construction of a first bridge over the Amazon. Manaus is also likely to benefit from government plans to improve connections with locations on the Pacific Coast. For example, recently Perú has completed the construction of the Initiative for the Integration of Regional Infrastructure in South America (IIRSA) South road, named Carretera Interoceánica (Bonaz and Urrunaga 2008), connecting the Brazilian city of Assis Brazil (State of Acre) with the Ports of Ilo and Matarani in the south coast of Perú. IIRSA is a transnational development program of the governments in South America to stimulate the integration of infrastructure systems. This will potentially boost the hub status of Manaus and Porto Velho (connected through the Madeira River) due to its connections with the Atlantic and Pacific oceans and with the southeast of Brazil. Another project under study is the Manta-Manaus corridor, linking Manaus with the port of Manta in Ecuador. Interestingly, global terminal operator HPH was granted a concession in Manta, but has pulled out for a second time. At the time of writing, this plan seems more politically driven rather than based upon sound economical analysis.

In terms of the environment, however, the infrastructure upgrading in the Amazon has a great risk of being accompanied by increased deforestation. According to Laurence et al. (2001), transportation projects are the primary source of deforestation in the Brazilian Amazon as they fragment fragile ecosystems and are often accompanied by illegal logging, fires, mining and hunting. Approximately 80 per cent of the deforested area in the Amazon is within 30kms of official roads and highways (Barreto et al. 2005). So, while Manaus and Amazonas state still have the lowest levels of deforestation in the entire Amazon, the upgrading of the BR-319 Manaus-Porto Velho highway will link Amazonas state with the so-called 'arc of deforestation' in Rondonia state (Fearnside and Graça 2006) and in its wake the further large-scale cultivation of the planet's largest rainforest.

## Conclusions

The Amazon River has for centuries been the lifeblood of this remote region. The cities of Manaus and Belém prospered, despite their harsh location, as a result of the Rubber Boom. In reference to Hesse (2010), 'situation' changed as the rubber commodity chains were rerouted to southeast Asia, and the cities failed to economically diversify. Political and geostrategic considerations

however favored to develop Manaus into a free trade zone since the late 1960s. Thus despite the unfavorable 'site' of Manaus in the interior as compared to the coastal location of Belém, its status as Brazil's free trade zone guaranteed a superior 'situation' that ultimately supported the economic development of Manaus. Currently, Brazil undergoes enormous economic growth, also largely driven by high international commodity prices. The current growth is accompanied by enormous investments (public and private) in infrastructure as well as institutional reforms to stimulate foreign investments in ports and to stimulate more efficient port governance models.

In this contemporary context it appears that Manaus is more successful in the assemblage of site and situation, thanks in part to its federally supported tax-free zone. Moreover, Manaus and the State of Amazonas take full advantage of its status as federally supported FTZ and as Amazon rainforest capital in international marketing in order to attract foreign direct investments. Paradoxically, it is exactly their 'site' within the Amazon jungle interior which provides Manaus and the State of Amazonas a unique selling point for international business by guaranteeing them 'green cards' for sustainable operations. The Manaus FTZ is indeed enjoying upgrading towards new value-added chains such as LCD screens and mobile phone devices, while ensuring local R&D expenditures. On the other hand, the FTZ status makes Manaus rather dependent on fiscal incentives from the federal government. More importantly, despite government claims that the concentration of growth in Manaus has preserved 96 per cent of nearby rainforest reserves, one can still question whether promoting growth in such a remote location is indeed sustainable. History teaches that infrastructure upgrading in the Amazon often goes hand in hand with deforestation and large scale land cultivation.

Assemblage in Belém seems to be more restricted, at least in terms of transportation activity and infrastructure development. Despite being located near major iron ore mines and soybean plantations in Para state and government plans for investment in rail connections, the port of Belém lacks space for expansion and is currently missing out on private (foreign) investments as experienced in locations in the northeast. The lack of port-industrial infrastructure investments in Belém might, on the other hand, be a blessing in disguise as it will allow it to move beyond the lock-in experienced by many port-industrial cities. In terms of future research, more empirically informed analysis 'on the ground' is needed on two issues. First, research will need to focus on the chains and flows of specific commodities that move through Belém or Manaus and from there on to the global market.

One of these commodities currently being planned for further study by the authors (under the GOLLs- Governance of Labour and Logistics for Sustainability- project) is the açai fruit (Pegler, 2011). Native to the Amazon, açai fruit has currently and successfully been introduced into fruit juices and dairy products in export markets (e.g. dairy products giant FrieslandCampina from the Netherlands has become a major buyer of açai fruit in the development of new product lines), while still maintaining small scale production and the 'just' inclusion of local labor. Further analysis of the global supply chain of açai fruit, from its cultivation in the Amazon to its consumption should focus, in particular, on a critical understanding of the sustainability of the chain (in terms of labor

conditions and the environment), the locations of value creation, capture and governance within these chains and the role that logistics processes play. The second line of research needs to deal with developing an empirical understanding of what we would call 'the politics of assemblage', that is the strategic coupling by particular actors of the factors of 'site' and 'situation'. In such a perspective we need to empirically study the strategic-relational aspects of assemblage within these two cities and how actors operating at various scales secure their interests. Interesting in this context of territorial governance is that in the state of Para, at the moment of writing, parliamentary initiatives are taken up to split the political and administrative structure of the state into three. Ostensibly this is because of the problems of effective government control over a vast state territory from a single capital in Belém (The Economist, 3-12-2011, p.49/50.). A different interpretation could be that resource dependent interests, iron ore and soy bean, are pushing for administrative-territorial reform exactly in order to secure their economic fortunes.

Within this context, Amazonia is a region that deserves further understanding as it is one of the world's most precious natural resources. While infrastructure upgrading provides economic opportunities, Amazonia is also an area under great pressure from unsustainable development and capitalist exploitation. To us, the best way to help its preservation is to constantly assess its development and critically engage in research that supports true sustainable development.

**Wouter Jacobs**

Urban and Regional Research Center Utrecht (URU), Utrecht University, The Netherlands  
w.jacobs@geo.uu.nl

**Lee Pegler**

Institute of Social Studies The Hague (ISS), Erasmus University Rotterdam, The Netherlands  
pegler@iss.nl

**Manoel Reis**

School of Business Administration (EAESP), Fundação Getulio Vargas (FGV), Sao Paulo, Brazil  
manoel.reis@fgv.br

**Henrique Pereira**

Universidade Federal do Amazonas (UFAM), Manaus, Brazil  
hsp2@argo.com.br

## Note

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