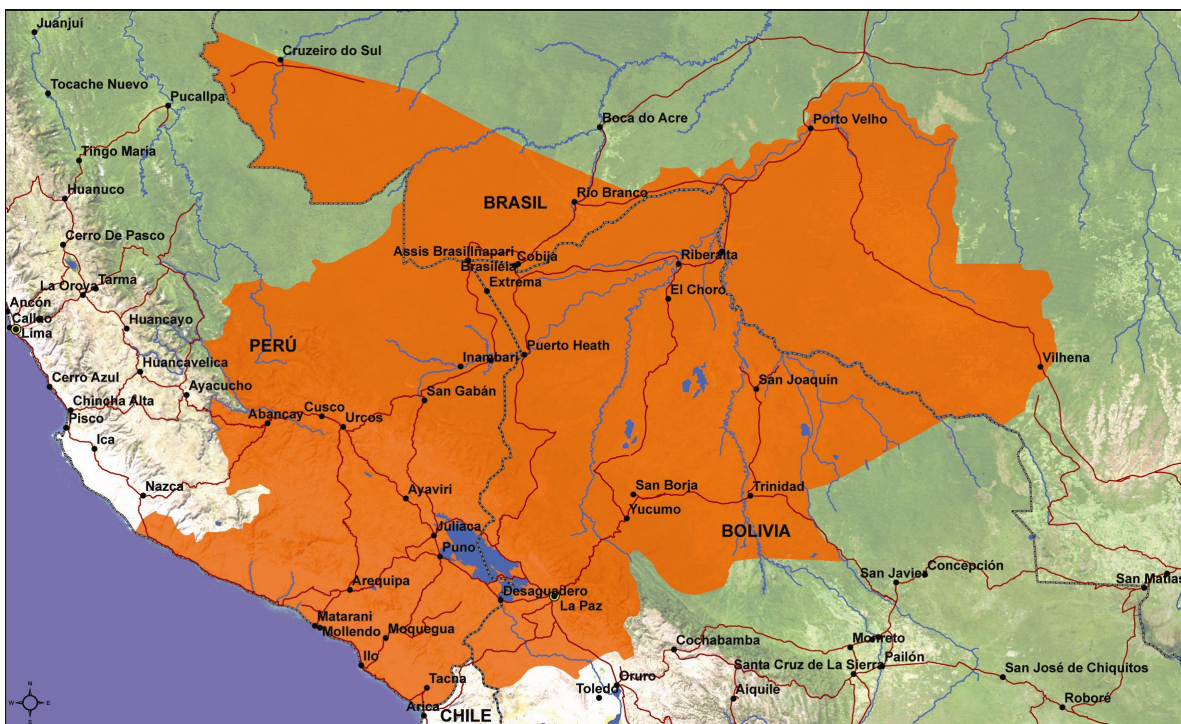


III.9. Peru - Brazil - Bolivia Hub

III.9.1. Hub's Location and Area of Influence

The Peru - Brazil - Bolivia Hub was defined by delimiting an area of influence that incorporates the connection of the main articulating nodes located near the tri-border area between Peru, Brazil, and Bolivia. This area of influence is relatively dynamic, since it also relates to the physical location of the projects included in the groups into which the Hub has been divided. The map below shows the current area of the Peru - Brazil - Bolivia Hub:

Map 63 - Location and Area of Influence of the Peru - Brazil - Bolivia Hub



This region comprises the departments of Tacna, Moquegua, Arequipa, Apurimac, Cusco, Madre de Dios, and Puno, in Peru; the departments of Pando, Beni and La Paz, in Bolivia, and the states of Acre and Rondônia, in Brazil.

If compared with the Hub's original area of influence, it can be observed that the Brazilian states of Amazonas and Mato Grosso were excluded, while the Bolivian department of La Paz was incorporated.

The area of influence defined for the Peru - Brazil - Bolivia Hub covers 1,146,871 km², accounting for 10.79% of the total area of the three countries that make up the Hub. Its main cities, ports, and border crossings are listed in the table below:

Table 152 - Area, Population, Main Cities, Border Crossings, and Maritime and River Ports within the Hub

Countries - Territorial Units	Area km²	Population 2008	Main Cities	Border Crossings	Maritime and River Ports
PERU	1,285,234	28,214,000			
Tacna	16,076	297,228	Tacna	La Concordia	
Moquegua	15,734	166,258	Moquegua		Ilo
Arequipa	63,345	1,186,009	Arequipa		Matarani
Apurimac	20,896	416,013	Abancay		
Cusco	72,104	1,205,668	Cusco		
Puno	71,999	1,305,545	Puno	Desaguadero	
Madre de Dios	85,183	112,760	Pto Maldonado	Iñapari	P. Maldonado
<i>Area of Influence</i>	<i>345,337</i>	<i>4,689,481</i>			
BRAZIL	8,514,877	189,612,814			
Acre	152,581	680,073	Rio Branco	Assis Brazil, Brasília	
Rondônia	237,576	1,493,566	Porto Velho	Guajará - Mirim	Porto Velho
<i>Area of Influence</i>	<i>390,158</i>	<i>2,173,639</i>			
BOLIVIA	1,098,581	10,027,643			
Pando	63,827	75,335	Cobija	Cobija	
Beni	213,564	430,049	Trinidad	Guayaramerín	
La Paz	133,985	2,756,989	La Paz, El Alto	Visviri	
<i>Area of Influence</i>	<i>411,376</i>	<i>3,262,373</i>			
Total Countries in the Hub	10,898,692	227,854,457			
Total Area of Influence	1,146,871	10,125,493			

III.9.2. Hub's Basic Characterization

Demography

The total population of the area of influence defined for the Peru - Brazil - Bolivia Hub was estimated at 10,125,493 inhabitants in 2008, accounting for a 4.44% of the total population of the three countries that make up the Hub. Furthermore, the Hub's area of influence reached an average population density of 8.83 inhabitants per km². This indicator ranges from a maximum 20.58 inhabitants per km² in the area of influence of the department of La Paz, in Bolivia, to a minimum 1.18 inhabitants per km² in the territory of the department of Pando, also in Bolivia. The territory of this Hub is the least densely populated among the IIRSA's Integration and Development Hubs described in this document.

Economic Aspects

The GDP for the Hub's area of influence was estimated at US\$ 20,231.2 million at constant 2000 market prices, based on the 2007 statistics calculated by ECLAC for each country and on the GDP share as estimated by each national statistics institute for the territorial units of each country that makes up the Hub. This amount accounts for 2.25% of the total GDP, for the same year, of the countries within the Hub. These indicators are also the lowest among the Integration and Development Hubs described in this document.

The GDP resulting from adding the GDPs of the three countries that make up the Hub at constant 2000 values has changed positively between 2000 and 2007 by 27.40%, i.e. an annual average growth rate of 3.52%. As to the economic activities in the countries of the region, the sectors that grew the most in the last seven years were the following: financial entities, insurance, real estate, etc.; agriculture, hunting, forestry, and fishing; mining and quarries; and transportation, storage, and communications, in this order.

Exports from the area of influence of the Peru - Brazil - Bolivia Hub amounted to approximately US\$ 6,845.7 million in 2008; this accounts for 2.90% of the annual figure of all the exports from the countries that make up the Peru - Brazil - Bolivia Hub (US\$ 235,941.6 million).

In terms of value, 96.62% of the exports from the countries that make up the Hub were extra-regional in 2008, while the exports to the countries of the Hub (i.e. intra-regional) represented 3.38% (US\$ 7,974.1 million), whereas in 2000 intra-regional exports were 1.99% of the total exports (US\$ 1,262.3 million/US\$ 63,424.9 million).

Crude oil is the most important among the five leading products exported from the countries in the Peru - Brazil - Bolivia Hub, accounting for about 6.01% of the total value exported by the three countries in 2008, followed by non-agglomerated iron ores and concentrates (4.68%). Soybeans, copper ore and gold rank third, fourth and fifth, respectively. In 2008, the sum of the five leading products exported from each country accounted for 29.13% of the total value of exports from the three countries that make up the Hub.

The transportation means used for international cargo shipments (exports and imports), in terms of the volume traded to and from the countries that make up the Hub, in 2007 were as follows: by sea, 89.62%; by railway, 1.61%; by road, 2.60%; by river, 1.79%; by air, 0.20%, and by "other means," 4.18%.

By comparison, the 2000 the international cargo movement by volume to and from the same countries was as follows: by sea, 92.08%; by railway, 0.49%; by road, 3.05%; by river, 2.42%; by air, 0.25%, and by "other means," 1.71%.

The evolution seen in the traffic at these countries' border areas is worth mentioning. For example, at the Guajar - Mirim border crossing, between the state of Rondnia in Brazil and the department of Beni in Bolivia, exports by volume from Rondnia to Bolivia have evolved from 1,643.8 tons in 2000 to 7,242.2 tons in 2008 (accounting for 1.32% of the total exports by volume from the Brazilian state in 2008 and 41.30% of the total exports by volume from Brazil through this border crossing). If we consider the total exports from Brazil to Bolivia that used this border crossing, the figure rose from 17,060.4 tons in 2000 to 17,537.1 tons in 2008. In turn, imports from Bolivia to Rondnia through this border crossing fell from 81.2 tons in 200 (*vis--vis* the total imports to Brazil through this crossing, which amounted to 133.5 tons) to zero in 2008.

The main economic activities carried out in the territorial units that make up the Peru - Brazil - Bolivia Hub follow the production profiles indicated below:

- **Brazil - States of Acre and Rondnia:**

Acre: agricultural production (rice, corn, cassava, banana, and beans); cattle raising and dairies; forestry; tourism; Brazilian chestnut; rubber; aquaculture; wood; swine raising, and poultry.

Rondnia: Brazilian chestnut; wood and vegetable coal; cattle raising and dairies; agriculture (soy, corn, rice, and cassava); tungsten ore and gold; poultry; fruits and vegetables.

- **Peru - Departments of Arequipa, Moquegua, Tacna, Puno, Apurimac, Cusco, and Madre de Dios:**

Arequipa: Copper, gold and silver mining; fisheries and fish flour; agriculture (alfalfa, potato, rice, onion, and garlic); cattle raising and dairies.

Moquegua: Copper and silver mining; fisheries, fish flour and fish oil; agriculture (alfalfa, onion, potato, corn, and olive); camelid raising.

Tacna: Copper and silver mining; fisheries (tinned and frozen fish and shellfish); agriculture (alfalfa, onion, potato, and olive); poultry; swine and camelid raising.

Puno: Tin, gold and silver mining; agriculture (potato, fodder oats, alfalfa), bananas and oranges; cattle raising and dairies; camelid raising; alpaca textile industry.

Apurimac: Potatoes, onions, corn, and barley.

Cusco: Tourism; grains; cereals; cattle raising.

Madre de Dios: Rubber; wood; Brazilian chestnut; gold mining.

- **Bolivia - Departments of Beni, La Paz, and Pando:**

Beni: Cattle raising; leather; Brazilian chestnut; wood; agricultural production (cereals, fruits, and tubers).

La Paz: Zinc, tin, gold, antimony, and lead mining; textile, leather, cement, and wood industries; services; cattle and camelid raising; agriculture (tuber, fruit, coca, fodder, and vegetables).

Pando: Brazilian chestnut; wood; agricultural production (cereals, fruits, vegetables, tubers, and cattle raising).

Current Infrastructure

The Hub's integration infrastructure is in general not only limited but also deficient. This region has very isolated areas, with important natural barriers and very low population density, although such circumstances can be overcome because there is potential for development and reconditioning. It should be pointed out that in the last years progress has been made in important road works that improve the Hub's international connection and integrate isolated areas to sustainable development (the "Paving: Iñapari - Puerto Maldonado (Maldonado Port) - Inambari, Inambari - Juliaca/Inambari - Cusco" project, which connects Peru to Brazil and Bolivia).

- The road network of the Peru - Brazil - Bolivia Hub's area of influence covers 80,736 km, accounting for 4.36% of all the national road networks in the countries involved in the Hub. Furthermore, 11.96% of the national road networks in the Hub's area of influence is paved. Road infrastructure is denser in the well-consolidated areas adjacent to the seacoast in the South of Peru, near La Paz, and in the border area between Peru and Bolivia, in Desaguadero. In most borders between the Hub's countries there are important natural barriers, such as the desert region of the Andean Altiplano, the Andes, the Amazon rainforest, and the Mamoré, Madeira, Acre, and Abuna rivers.
- Railway transport: The railway network in the area of influence of the Peru - Brazil - Bolivia Hub covers 2,261 km, 55.06% of which are active lines with varying quality of service, and almost 100% operate in the departments of Moquegua, Arequipa, Cusco, and Puno, in Peru (only 7 km of the 364 km of the Madeira-Mamoré railway are in operation, in Rondônia). There are railways that connect Peru and Chile, Chile and Bolivia, and Bolivia and Peru (there used to be a ferry service between Guaqui and Puno) within the Hub's area, although none of these three connections are currently in operation (the Hub's projects do not provide for any railway infrastructure, since the ones to run in the area have been included in the Central Interoceanic Hub).
- The Hub's port infrastructure is made up of the following main ports, listed according to their cargo movement: Puerto Maldonado (Maldonado Port) on the Madre de Dios river, in the Peruvian department of the same name; Matarani and Ilo, in the Peruvian departments of Arequipa and Moquegua, respectively, on the Pacific ocean; and Porto Velho on the Madeira river, in the state of Rondônia. All the ports listed have adequate facilities for the traffic, movement, and conditioning of import and export goods. Between 2001 and 2007, the total cargo movement in the Peruvian and Brazilian ports mentioned has grown by 44.23% (from 2,785,709 tons to 4,017,929 tons). (No data about Matarani has been reported for the selected years.)

- Airport infrastructure in the Hub is adequate, therefore all the area can be very well connected by air. IIRSA plans for this Hub the development of projects that involve works in three airports in the region (all of them in Peru).
- In the area of influence of the Peru - Brazil - Bolivia Hub, the electricity generation installed capacity reaches 2,605.8 MW, 48.95% of which covers the Peruvian departments; 37.43%, the two Brazilian states; and 13.62%, the Bolivian departments (in the departments of Beni and Pando, electricity generation derives from isolated systems). The installed capacity in the Hub's area covers only 2.38% of the installed capacity of the three countries that make up the Hub. There is no interconnection between the electric systems of the three countries. (One of the Hub's projects is the building of an electric transmission line from Puerto Maldonado to the border with Brazil.)

In the Hub's area of influence there is an oil pipeline from Bolivia to Chile (from Sica Sica, La Paz, to the Arica port, Region XV).

III.9.3. The Hub's Development Potential

The Hub's area of influence represents a market of more than 10.1 million inhabitants along its 1.14 million km², with a value added of about US\$ 20,231.2 million (where the contribution made by the areas of influence of the countries concerned is the best balanced one of all nine Hubs: 53.10% by the seven Peruvian departments, 32.12% by the two Brazilian states, and 14.78% by the three Bolivian departments).

It is worthy to note that the main products produced in the area of influence of this Hub match almost perfectly with the five main products exported by each of the five countries that make up the Hub only in the case of the Peruvian departments. Furthermore, this region has many sparsely populated areas, with little or no land occupation, quite isolated from the economically consolidated centers. Therefore, the strategy towards the region's sustainable development should aim at strengthening agricultural, forestry, and tourism activities in the different local regions as foundations for the regional economy. This approach involves joining local, national, and regional efforts in order to make agricultural production a more technological-oriented activity; improve the articulation between production areas and markets; identify and develop the areas best suited for agriculture, forestry and tourism; develop the business conditions required for the start-up of agro-industries; and ensure that economic development preserves natural resources, biodiversity, and the equitable integration of isolated communities.

The technological improvements introduced in the agricultural, mining, industrial, and service sectors, which have resulted in a substantial increase in productivity; the opening of new, large, and growing consumer markets; the incorporation in the near future of important road connections in the region, and the still relatively low land costs in the least developed areas give the Hub a competitive advantage for developing investments in the agricultural, forestry, and mining sectors.

III.9.4. The Hub's Groups

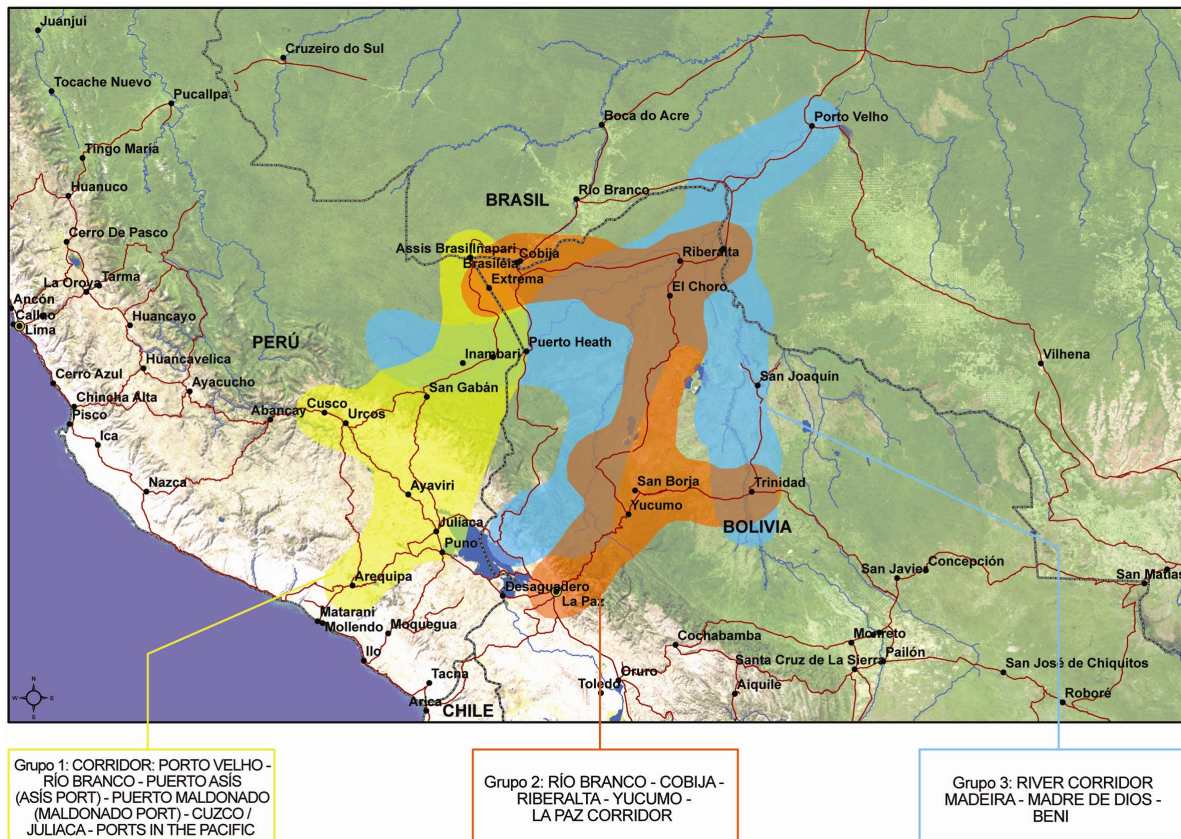
Delegations from the three countries that make up the Peru - Brazil - Bolivia Hub have agreed by consensus to maintain the following three project groups for the Hub:

Table 153 - Groups Identified in the Peru - Brazil - Bolivia Hub

Groups	Countries Involved
Group 1: Corridor: Porto Velho - Rio Branco - Puerto Asís (Asís Port) - Puerto Maldonado (Maldonado Port) - Cusco/Juliaca - Ports in the Pacific	Peru - Brazil
Group 2: Rio Branco - Cobija - Riberalta - Yucumo - La Paz Corridor	Brazil - Bolivia
Group 3: River Corridor Madeira - Madre de Dios - Beni	Peru - Brazil - Bolivia

The map below shows the geographic location and area of influence of each group:

Map 64 - Peru - Brazil - Bolivia Hub's Groups



III.9.5. Project Groups and Strategic Functions

Group 1: Corridor Porto Velho - Rio Branco - Puerto Asís (Asís Port) - Puerto Maldonado (Maldonado Port) - Cusco/Juliaca - Ports in the Pacific

STRATEGIC FUNCTION

- Open up new possibilities for the socio-economic development of the macro-region in the South of Peru and the states of Acre and Rondônia, in Brazil, through their joint linkage; and facilitate access of these Brazilian states as well as of the Peruvian sierras and Amazonia to international markets, particularly of the Pacific Basin, thus promoting the regional integration process.

Map 65 - Peru - Brazil - Bolivia Hub - Group 1

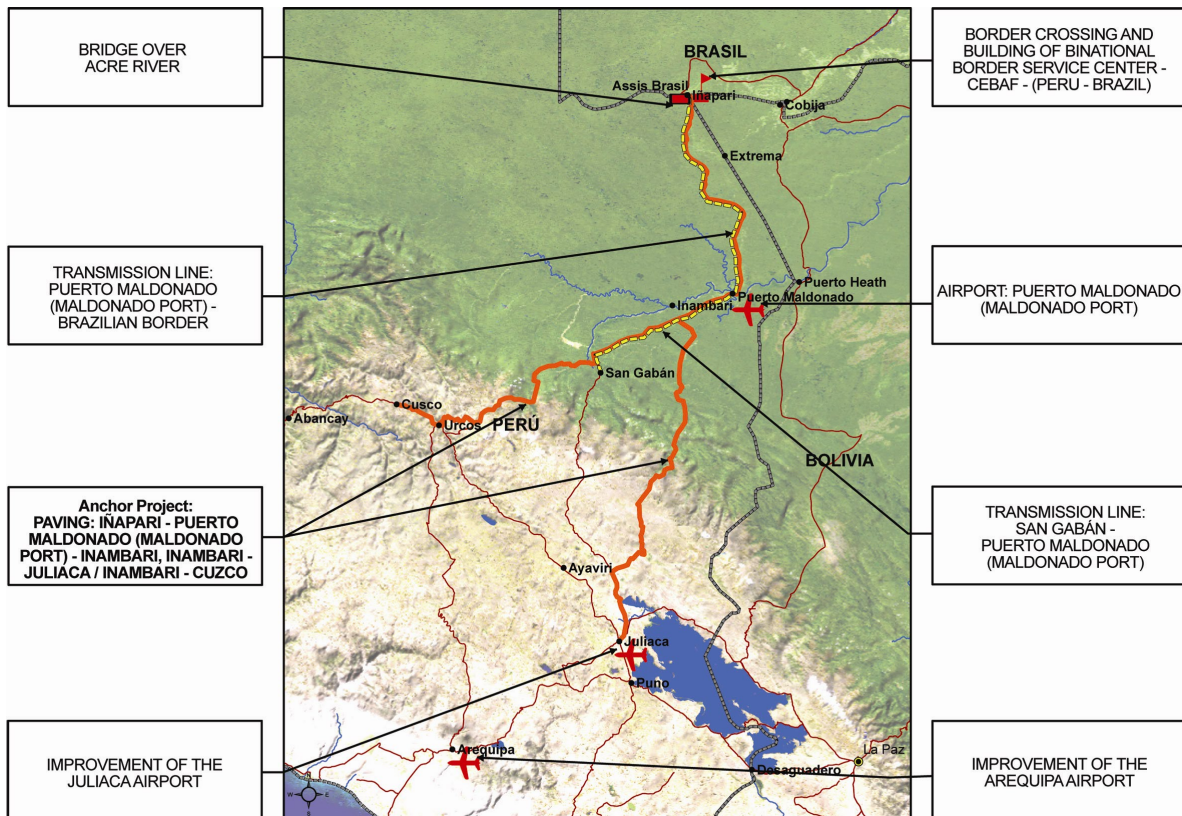


Table 154 - Peru - Brazil - Bolivia Hub - Group 1: Related Investments

Peru - Brazil - Bolivia Hub: Group 1	Estimated Investment (US\$ million)
Paving: Iñapari - Puerto Maldonado (Maldonado Port) - Inambari, Inambari - Juliaca/Inambari - Cusco	1,392.6
Border Crossing and Building of Binational Border Service Center - CEBAF - Peru - Brazil	0.0
Bridge over Acre River	12.0
Airport: Puerto Maldonado (Maldonado Port)	36.9
Transmission Line: Puerto Maldonado (Maldonado Port) - Brazilian Border	0.0
Transmission Line: San Gabán - Puerto Maldonado (Maldonado Port)	0.0
Improvement of the Juliaca Airport	34.8
Improvement of the Arequipa Airport	50.3
TOTAL	1,526.6

Group 2: Rio Branco - Cobija - Riberalta - Yucumo - La Paz Corridor

STRATEGIC FUNCTION

- Provide new possibilities for the socio-economic development in the MAP region through its connection to the Central Bolivian Hub.

Map 66 - Peru - Brazil - Bolivia Hub - Group 2

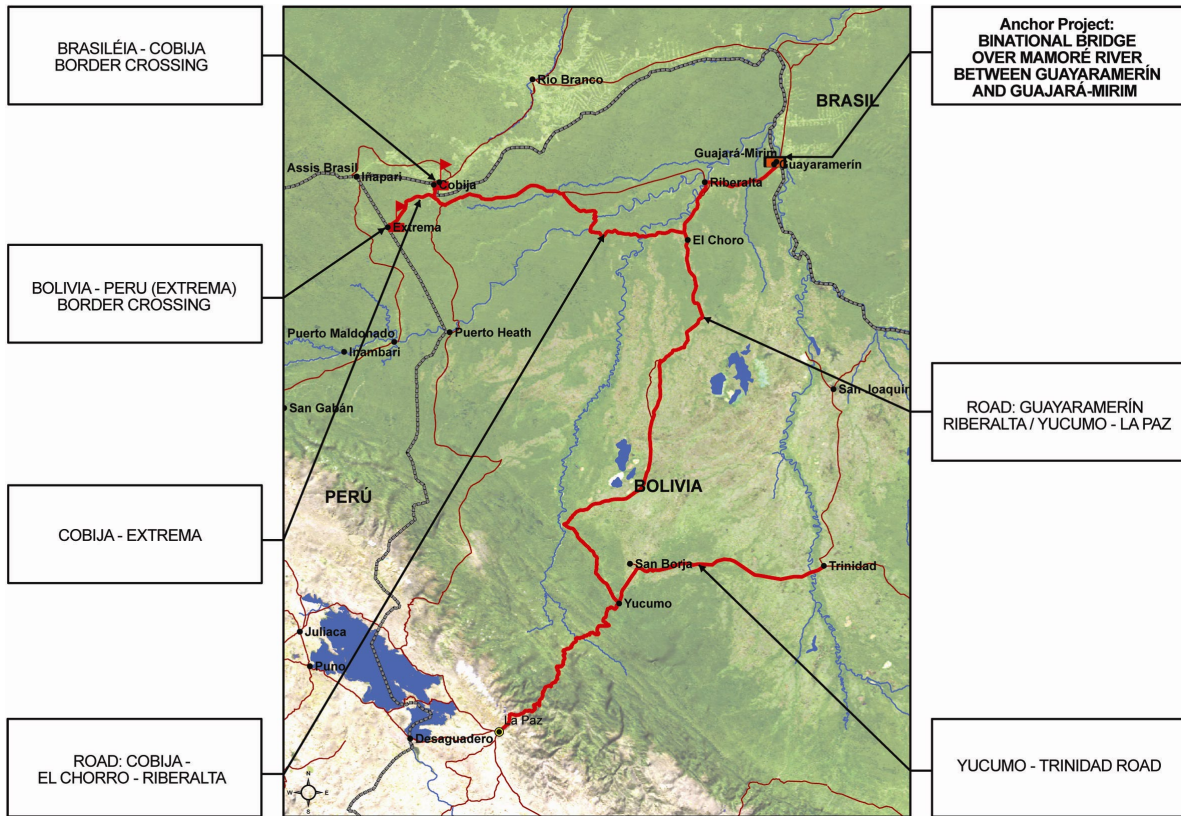


Table 155 - Peru - Brazil - Bolivia Hub - Group 2: Related Investments

Peru - Brazil - Bolivia Hub: Group 2	Estimated Investment (US\$ million)
Binational Bridge over Mamoré River between Guayaramerín and Guajará - Mirim	100.0
Road: Cobija - El Chorro - Riberalta	80.0
Yucumo - Trinidad Road	200.0
Cobija - Extrema	29.0
Bolivia - Peru (Extrema) Border Crossing	2.0
Braziléia - Cobija Border Crossing	0.0
Road: Guayaramerín - Riberalta/Yucumo - La Paz	550.0
TOTAL	961.0

Group 3: River Corridor Madeira - Madre de Dios - Beni

STRATEGIC FUNCTION

- Consolidate an international river integration corridor that mainly impacts on the transportation logistics and the socio-economic development of the regions of Madre de Dios, in Peru; Rondônia, in Brazil, and Pando and Beni, in Bolivia.
- Facilitate changes in the energy matrix by increasing the supply of renewable energy in the region.

Map 67 - Peru - Brazil - Bolivia Hub - Group 3

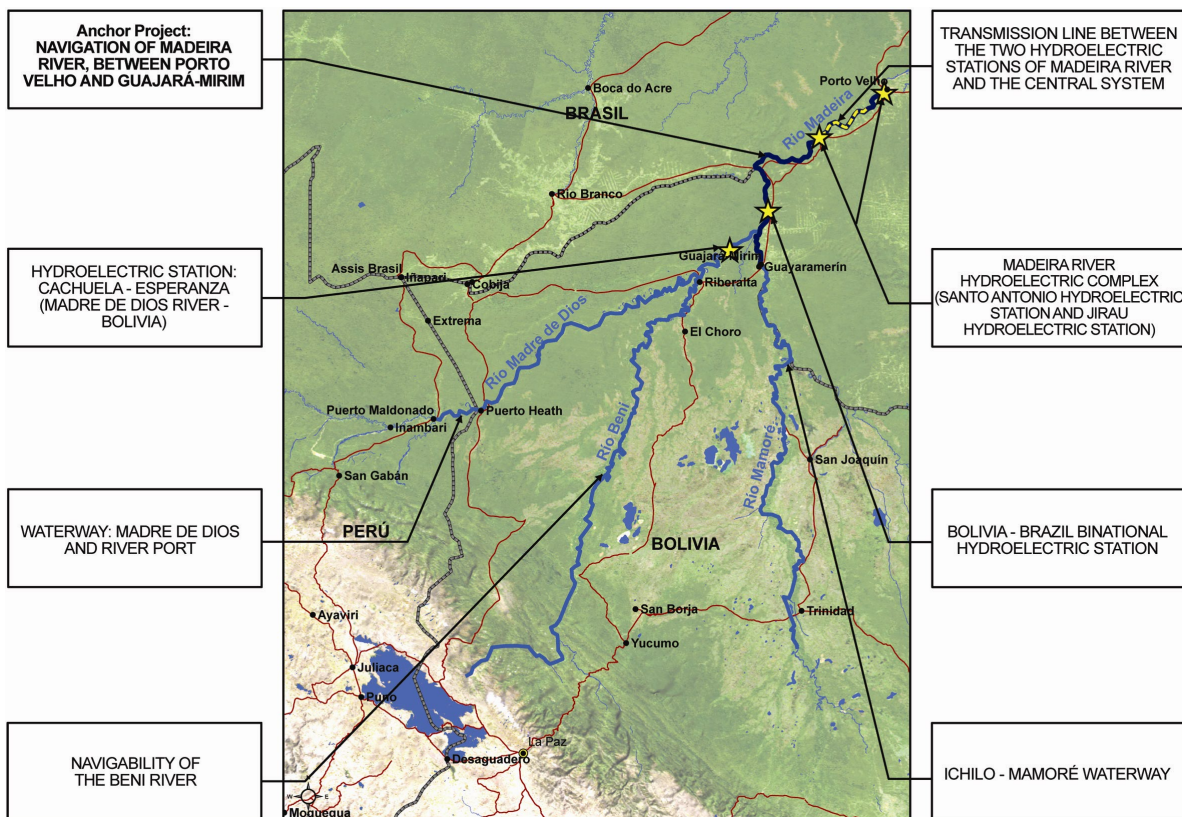


Table 156 - Peru - Brazil - Bolivia Hub - Group 3: Related Investments

Peru - Brazil - Bolivia Hub: Group 3	Estimated Investment (US\$ million)
Navigation of Madeira River, between Porto Velho and Guajar - Mirim	0.0
Hydroelectric Station: Cachuela - Esperanza (Madre de Dios River - Bolivia)	1,200.0
Ichilo - Mamor Waterway	0.0
Navigability of the Beni River	0.0
Waterway: Madre de Dios and River Port	0.0
Madeira River Hydroelectric Complex (Santo Antonio Hydroelectric Station and Jirau Hydroelectric Station)	6,200.0
Bolivia - Brazil Binational Hydroelectric Station	2,000.0
Transmission Line Between the Two Hydroelectric Stations of Madeira River and the Central System	1,000.0
TOTAL	10,400.0

III.9.6. The Peru - Brazil - Bolivia Hub's Project Portfolio

General Aspects

The countries have agreed to include twenty-three projects in the Peru - Brazil - Bolivia Hub, accounting for an estimated investment of US\$ 12,887.6 million, as summarized below:

Table 157 - General Aspects of the Peru - Brazil - Bolivia Hub's Portfolio

Peru - Brazil - Bolivia Hub	Name	Number of Projects	Estimated Investment (US\$ million)
Group 1	Corridor Porto Velho - Rio Branco - Puerto Ass (Ass Port) - Puerto Maldonado (Maldonado Port) - Cusco/Juliaca - Ports in the Pacific	8	1,526.6
Group 2	Rio Branco - Cobija - Riberalta - Yucumo - La Paz Corridor	7	961.0
Group 3	River Corridor Madeira - Madre de Dios - Beni	8	10,400.0
	TOTAL	23	12,887.6

Sector-based Breakdown

The following is a sector-based breakdown of the Hub's projects:

Table 158 - Sector-based Breakdown of the Peru - Brazil - Bolivia Hub's Portfolio

Sector/Subsector	Transport		Energy	
	Number of Projects	Estimated Investment (US\$ million)	Number of Projects	Estimated Investment (US\$ million)
Road	7	2,363.6		
River	4	0.0		
Border Crossing	3	2.0		
Air	3	122.0		
Energy generation			3	9,400.0
Energy interconnection			3	1,000.0
TOTAL	17	2,487.6	6	10,400.0

Project Typology

The Hub's project typology is summarized in the following tables:

Table 159 - Road Transport Project Typology in the Peru - Brazil - Bolivia Hub

Project Typology	Number of Projects	Estimated Investment (US\$ million)
Expansion of road capacity	1	1,392.6
Paving (new works)	4	859.0
Bridges (new and refitted)	2	112.0
TOTAL	7	2,363.6

Table 160 - Air Transport Project Typology in the Peru - Brazil - Bolivia Hub

Project Typology	Number of Projects	Estimated Investment (US\$ million)
Airport expansion	3	122.0
TOTAL	3	122.0

Table 161 - Energy Project Typology in the Peru - Brazil - Bolivia Hub

Project Typology	Number of Projects	Estimated Investment (US\$ million)
Energy interconnection	3	1,000.0
Energy generation	3	9,400.0
TOTAL	6	10,400.0

Table 162 - River Transport Project Typology in the Peru - Brazil - Bolivia Hub

Project Typology	Number of Projects	Estimated Investment (US\$ million)
Improvement of river navigability	4	0.0
TOTAL	4	0.0

Table 163 - Border Crossing Project Typology in the Peru - Brazil - Bolivia Hub

Project Typology	Number of Projects	Estimated Investment (US\$ million)
Infrastructure for new border control centers	3	2.0
TOTAL	3	2.0

Anchor Projects

The countries identified three anchor projects in the Hub, totaling an estimated investment of US\$ 1,492.6 million, according to the following detail:

Table 164 - Peru - Brazil - Bolivia Hub's Anchor Projects

Group	Anchor Project	Estimated Investment (US\$ million)	Financing Source	Scope	Project Stage
1	Paving: Iñapari - Puerto Maldonado (Maldonado Port) - Inambari, Inambari - Juliaca/Inambari - Cusco	1,392.6	Public	National	Execution
2	Binational Bridge over Mamoré River between Guayaramerín and Guajará - Mirim	100.0	Public	Binational	Pre-execution
3	Navigation of Madeira River between Porto Velho and Guajará - Mirim	0.0	Public	National	Profiling
	TOTAL	1,492.6			

III.10. Main Infrastructure-related Restrictions to Development

South America—and to a greater or lesser extent, all the areas of influence of the ten IIRSA’s Hubs—is a very vast territory, with low population density, huge empty areas in between population centers, and important production centers associated with the main economic activities (mining, hydrocarbons, agriculture, forestry, etc.) of the regions. In addition, its urban centers are among the largest in the world, with cities such as São Paulo, Buenos Aires, Rio de Janeiro, Bogotá and Lima, which are among the most densely populated in the world.

In general terms, the South American territory—and for that matter the ten Hubs’ areas of influence—can be divided into three clearly distinct geographical regions with their respective impact in terms of population density and development: the littoral or coastal region, on the two oceans (in countries without seacoast, its equivalent would be the central hub or area), which are usually economically consolidated areas; the intermediate region, which normally coincides with territorial occupation and development progress inland into the countries; and finally the isolated or least connected region (Amazon rainforest, Andean ranges, Patagonian desert, Andean desert, etc.). This last region is characterized by important deficiencies in territorial connectivity with the rest of a country and beyond its borders, with its neighboring countries.

Transport infrastructure problems in the different areas described are, obviously, quite varied—in some cases there will be a need to improve the service rendered by existing infrastructure due to an increase in demand, while in others the need is to define how to integrate isolated areas, trying to find the best solution from the perspective of sustainable development.

Therefore, the table below presents a summary of the main restrictions to transport, as observed in the territories of the ten IIRSA’s Integration and Development Hubs:

Table 165 - Major Limitations to Transport in the Ten IIRSA’s Hubs

Roads	<ul style="list-style-type: none"> Insufficient capacity in some road stretches and congested urban crossroads Crossing of different natural barriers (Andes, big rivers, etc.) Physical problems at border crossings Road security problems Lack of common standards and geometries Condition of roads, hard shoulders, and signs due to discontinuous maintenance Delays in solving specific road interruptions caused by natural disasters
Railway network	<ul style="list-style-type: none"> Limitations for the operation of big trains Differences in rail gauges and loading gauges Lack of multimodal connections Low speed allowed Low and discontinued investment in this modality
Airports	<ul style="list-style-type: none"> Problems regarding insufficient capacity at some terminals Lack of equipment to guarantee operational reliability and security
Ports and navigable waterways	<ul style="list-style-type: none"> Correction of critical passages and navigation aids to ensure navigability Lack of multimodal connections with land transport

Automotive transportation	<p>Cargo reservation restrictions forcing transshipments</p> <p>Much delay and high costs at border crossings</p> <p>Tax asymmetries</p> <p>Differences in permits requirements</p>
Railway transportation	<p>Delays at border crossings</p> <p>Difficulties in the interchange of rolling stock</p> <p>Irregular service</p>
Air transportation	<p>Market entry restrictions for specific imports</p> <p>Differences in permits requirements</p>
River and maritime transportation	<p>Cargo reservation restrictions</p> <p>Drafts leading to an inefficient use of vessels</p> <p>Unbalances in terms of traffic directions</p> <p>Implementation of intermodal transportation to ensure connectivity of waterways</p> <p>Safety rules leading to excessive costs</p> <p>Delays and difficulties in the implementation of river transportation agreements</p>
Border Crossings	<p>Insufficient infrastructure with accessibility problems</p> <p>Lack of coordination regarding working hours and requirements to be met</p> <p>Blocked accessibility due to a growing number of informal activities, which sometimes pose obstacles to legal trade</p> <p>Long delays and extra costs in the multiple operations at border crossings</p> <p>Delays in ICTs investments</p>

