



Shared-Use Infrastructure Along the World's Largest Iron Ore Operation: Lessons Learned from the Carajás Corridor - Executive Summary

Table of Contents

1. Background	2
2. Shared-Use Infrastructure Along the Corridor Today	3
3. Impacts of Shared-Use Along the Carajás Corridor	9
4. Lessons Learned from the Shared-Use of the Carajás Corridor	13
5. Recommendations: How To Further Leverage Shared-Use Benefits Along the Carajás Corridor?	16

From a government perspective, shared-use or open-access infrastructure arrangements can provide significant prospects for sustainable development. The shared use of infrastructure built by mining companies can spur and support additional mining projects and other economic activities and services to the benefit of surrounding communities and other third-party beneficiaries. From the viewpoint of a mining company, however, such arrangements pose risks to profitability and may, in some instances, benefit competitors.

This study uses lessons learned from the shared-use arrangements along the Carajás railway corridor in Brazil to shed light on how to strike a balance between divergent private and public interests, and how countries may learn from this approach in order to increase the benefits of existing and future shared-use projects.

*Cover photo: Passenger train on the Marabá Mixed Rail-Road Bridge
Photographer: Ricardo Teles / Agência Vale*





Executive Summary

1. Background

Upon the discovery of the Carajás iron ore reserves in 1967, the Brazilian federal government came to recognize their development as being central to its plan to develop the region around extractive, agricultural, and industrial activities, as well as attracting migrants to the region. The Greater Carajás Program (PGC) was established in 1980 and covered roughly 900,000 km², comprising the Carajás iron ore mine complex, two bauxite and aluminum projects, and a hydroelectric dam.

Within the PGC, Brazilian mining company Companhia Vale do Rio Doce (CVRD or Vale) invested the initial US\$ 3.1 billion (in current prices) toward the development of a mine–railway–port complex. Vale, as a state-owned company at the time, was not only tasked to profitably extract and export the iron ore from Carajás, but also of helping achieve the government’s economic and social objectives. The company built the Carajás Railroad (EFC), with an original length of 892 km, connecting Parauapebas (in the interior of Brazil’s northern state of Pará [PA]), where the iron ore mines are located, to Ponta da Madeira in São Marcos Bay, in São Luis (capital of Brazil’s northeastern state of Maranhão [MA]), where Vale built Ponta da Madeira Maritime Terminal, a private seaport in the Itaqui port complex. In addition to transporting iron ore from the mines to the port, the railway was also designed to provide passenger and general freight services.

Along with mining projects, throughout its history, Vale became a leading supplier of logistics services in Brazil. Vale was privatized in 1997 and rebranded as Vale S.A. in 2007. In 2010, Vale created the subsidiary VLI S.A. (VLI) in order to separate its general cargo business from core operations. In 2013 and 2014, Vale sold most of VLI’s share capital, retaining a 37.6% equity. VLI currently operates third-party general cargo transportation on the EFC as well as Ponta da Madeira’s general cargo pier.

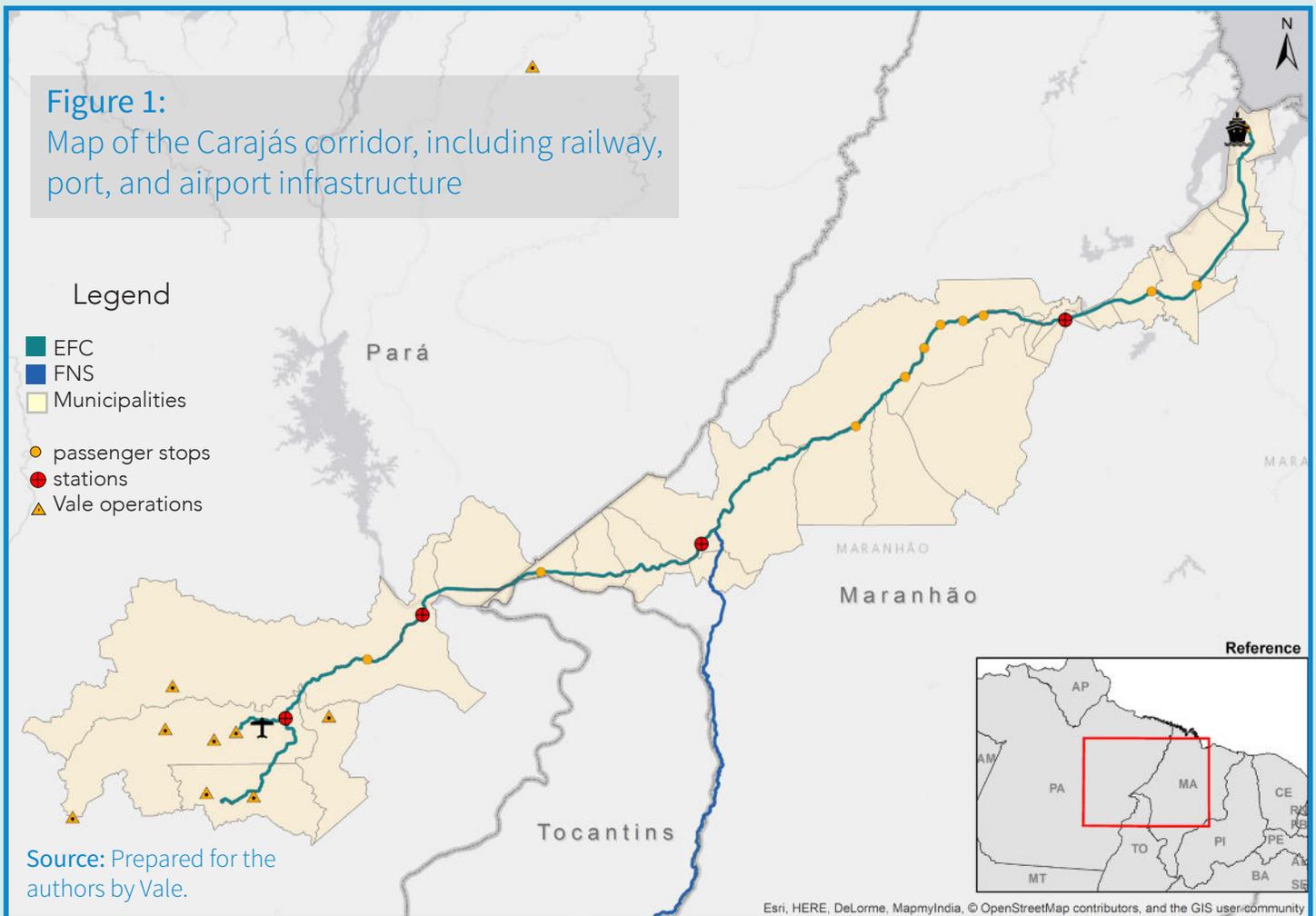


Photo: Loading of iron ore on railcars at Vale’s mine in Carajás.

Photographer: Ricardo Teles / Agência Vale

2. Shared-Use Infrastructure Along the Corridor Today

Vale built railway, seaport, airport, and telecommunications infrastructure along the Carajás corridor to serve its mining operations in the region (Figure 1). Aside from its core use as part of those operations, the infrastructure stands to benefit third-party users and local communities based on shared-use opportunities. We describe below each type of infrastructure, its shared-use potential, and how it is governed.



2.1 Railway Infrastructure

Increased efficiency of operations and subsequent expansions of the EFC have extended it to 998 km—most of it now duplicated—with a transport capacity of 230 million metric tons per annum (Mtpa) of iron ore (up from the original 35 Mtpa of iron ore), making it one of the most efficient railroads in Brazil. Between 2006 and 2016, Vale invested about R\$ 17 billion in the railroad. Vale uses the EFC primarily to transport iron ore, manganese, and copper it produces from its mines to the Itaquí port complex.

The Road–Rail Bridge of Marabá (PA) on the EFC—built for Vale’s needs, but with an added roadbed to serve shared-use purposes—links the city center to rural districts, facilitating the transport of passengers, food, fuel, and grains. Mixed road–rail structures like this one are good examples of shared-use practices that serve the interests of not only the mining company but also local communities and governments, by facilitating the transport of goods and people in an area where such transportation was previously less accessible and often unreliable.

Of particular relevance from a shared-use perspective, Vale offers passenger services on the EFC, making it Brazil’s longest railroad with passenger services. The passenger train has five stations and ten stops, running three times per week from the interior to the coast and three times per week from the coast to the interior. In 2019, 270,000 passengers used this service. Passenger trains transport around 1,200 passengers each and have the priority of circulation over cargo trains.

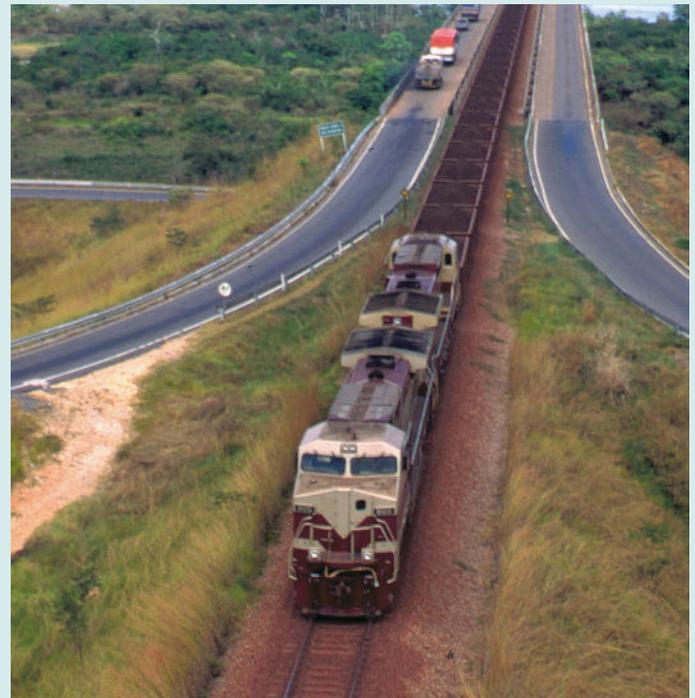


Photo: Iron ore train on the Marabá Road–Rail Bridge across the Tocantins River.

Photographer: Dario Zalis / Agência Vale

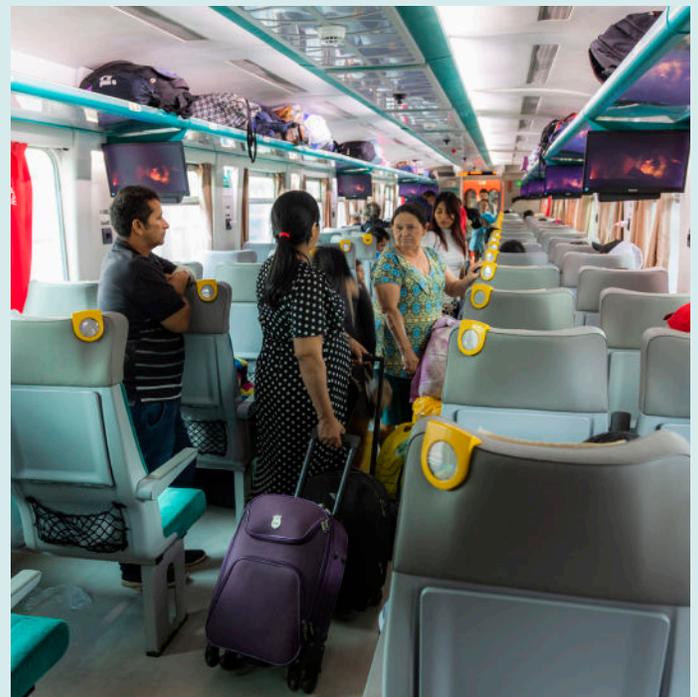
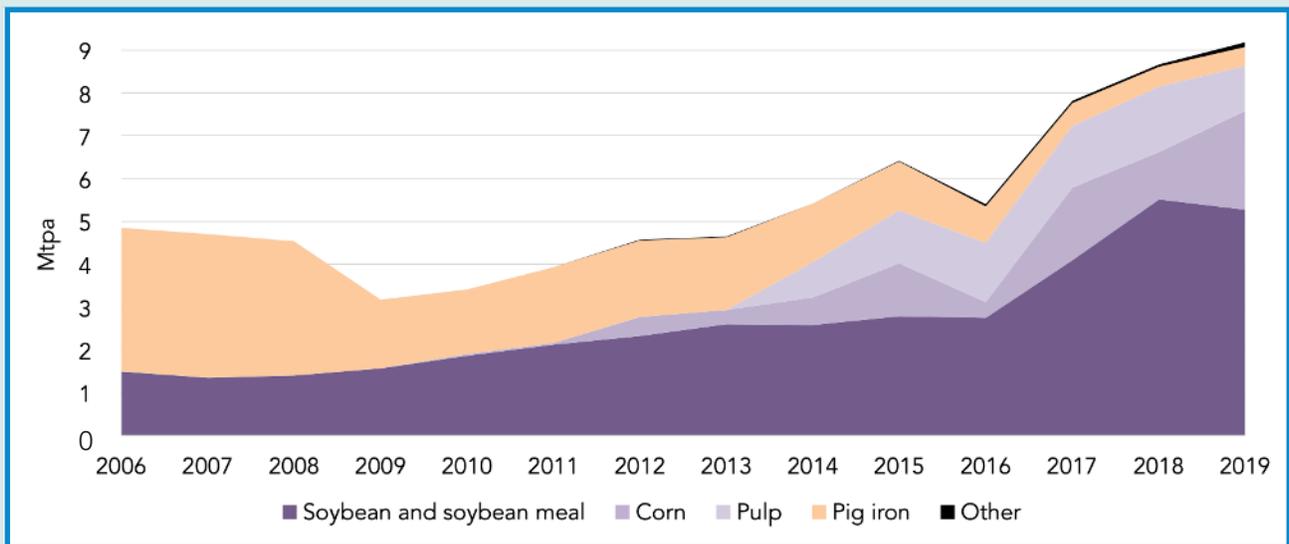


Photo: Passengers in railcar on the Carajás Railroad.

Photographer: Ricardo Teles / Agência Vale

Another shared-use component of the EFC is enabled by its connection to the North–South Railroad (FNS) (operated by VLI) in Açailândia (MA), allowing general cargo of third-party users to be transported between the interior of the country and the Itaqui port complex, as well as creating links with other ports (Figure 2). Further expansions and connections of the FNS railroad will contribute to future shared use and further inter-regional integration in the country. While Vale’s mineral production is the dominant cargo transported on the EFC, third-party users also have transported increasing volumes of soybean and soybean meal, corn, pulp, and pig iron along the EFC, including through its connection to the FNS railroad (Figure 3). In the past, the EFC and FNS have also been used to transport beverages, cement, trucks, wood, gas, sand, bricks, and fertilizers.

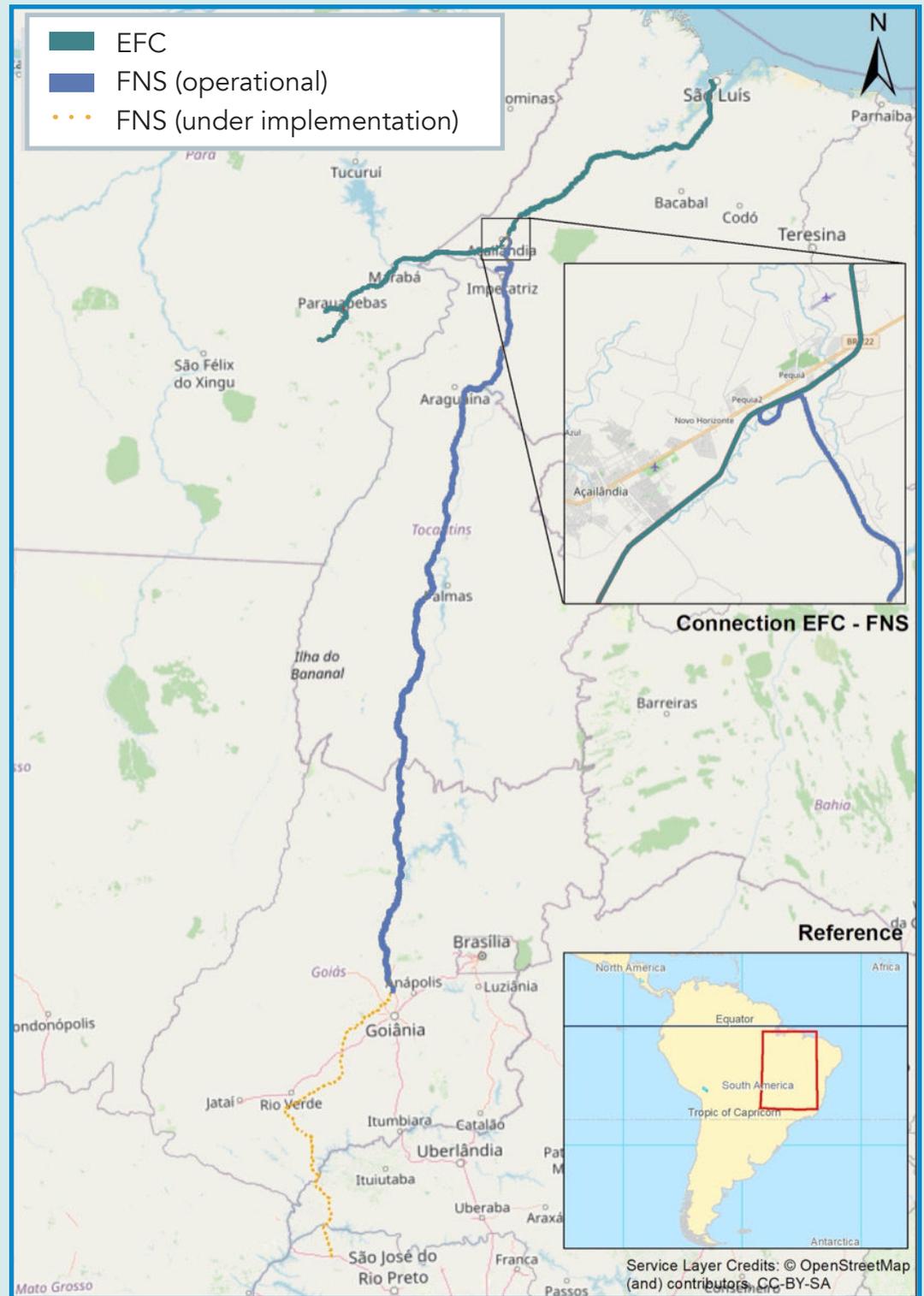
Figure 2: Cargo transported on the EFC to the Itaqui port complex, including through FNS connection, excluding Vale’s iron ore, manganese, and copper exports (2006–2019)



Note: Other (barely visible in the chart) includes sand, fuels (including ethanol, diesel, and others), vegetable oil, steelmaking products, manganese, and other cargo.

Source: Prepared by the authors based on ANTT data. Agência Nacional de Transportes Terrestres (ANTT), “Anuário do Setor Ferroviário – Transporte de Cargas – Origem/Destino 2006–2019,” ANTT, http://www.antt.gov.br/ferrovias/arquivos/Anuario_Estatistico.html.

Figure 3:
Map of the North-South Railroad (FNS) and its connection with the Carajás Railroad (EFC)



Source: Prepared for the authors by Vale.

Vale owns and operates all rolling stock (railcars and locomotives) needed for its mining and operational purposes and the provision of passenger services along the EFC; in turn, VLI owns and operates all rolling stock it uses to transport third-party cargo along the FNS and the EFC. Both railroads use broad track gauge; however, the fact that certain railway networks in other regions in Brazil use different gauges increases the logistics costs of railway interconnection.

The regulatory framework that governs the EFC and FNS consists of laws, regulations, and concession and sub-concession agreements. The National Agency for Land Transportation (Agência Nacional de Transportes Terrestres [ANTT]) is Brazil's independent regulatory agency for all land transportation. Several ANTT resolutions are relevant to shared use in Brazil, including the right of third-party users to invest in capacity expansions needed to accommodate transportation demands and the provision that users who are highly dependent on railway transportation are entitled to require the allocation of capacity or take-or-pay basis and subject to special freight rates. ANTT has also established a minimum level of capacity for transportation of general cargo on the EFC (8.65%), although Vale has indicated that demand has remained consistently below that established level.

The concession agreement for the EFC grants Vale a 30-year exclusive concession, dating from 1997, to develop and exploit cargo and passenger services on the railroad. Under the concession agreement, Vale is required to allow third-party access to any party that requests it. Vale negotiates access agreements with third-party users, but the federal government may make determinations regarding the avoidance of market power abuse. Vale may set freight rates for its cargo services, subject to certain limitations, and ANTT may impose caps on these. ANTT-approved price schedules set fares charged to passengers for passenger services. Federal legislation requires that Vale operationally prioritize passenger trains over cargo trains.

A mutual access agreement between Vale and a subsidiary of VLI governs transportation services with origin along the EFC and destination along the FNS or vice versa. As a rule, each concessionaire remains responsible for operating the trains in its concession area, with cargo being exchanged at the Vale-operated terminal in Açailândia (MA). Every year, Vale and VLI meet to agree on an annual plan, with indicative allocations of capacity to each other's cargo. Allocations are updated monthly, based on each party's most recent forecasts of demand for services. Each party undertakes to provide the other with access up to the capacity allocated in the annual plan. However, neither party assumes take-or-pay obligations. Although each concessionaire is responsible for agreeing its terms with the customers, the division of freight rates between the two concessionaires is made under a pre-agreed formula.



Photo: VLI's fuel railcars at the Marabá loading depot.

Photographer: Ricardo Teles / Agência Vale

Brazil's federal government is negotiating an extension of Vale's concession for an additional 30 years. The concession's extension should result in improvements in terms of the shared use of the EFC. Furthermore, the new agreement would obligate Vale to expand the railroad's capacity whenever 90% of railroad capacity is reached—always leaving 10% of available capacity—and to double the frequency of passenger services.

2.2 Port Infrastructure

In 2018, 198 million metric tons of iron ore were shipped out of Ponta da Madeira Maritime Terminal. The agreement granting Vale title to the Ponta da Madeira terminal designates it as a mixed-use private terminal, capable of shared use. Cargo including pig iron, soybeans, and corn are stored by facilities there. New private-use terminals sprouting up in São Luís (MA) and Alcântara (MA) will result in greater demand for the shared-use infrastructure of EFC and will require further expansion.

Vale built Pier II in 1994 for shipments of general cargo and handed it over to VLI in 2010. It is the only pier at Ponta da Madeira from which non-mineral exports can be shipped, making it significant from the perspective of shared use. It was later incorporated into the public port of Itaqui but remains operated by VLI.

A new grain terminal entered in operation in the Itaqui port complex in 2015, and there are projects to build additional grain terminals in the region, all of them relying on connections to the EFC to receive cargo. This greater demand for the shared use of the EFC will likely mean further investments in the expansion of its capacity.

Vale pays for dredging and signaling of the navigation channel of the Itaqui port complex. Vale's sharing of the dredge for periodic maintenance dredging of berths in the public port of Itaqui has significantly reduced costs for the public entity that manages the port (EMAP).

2.3 Airport Infrastructure and Helicopter Services

Vale built the Carajás Airport in 1981 in Marabá (PA) to serve its mining operations and, in 1985, handed it over to INFRAERO, Brazil's airport infrastructure company, which is controlled by Brazil's federal government and responsible for operating most of the country's commercial airports. The airport serves an annual average of 124,000 passengers, roughly 90% of which can be linked to Vale's businesses, even though Vale no longer operates it. The airport links the region to other states and regions, fostering economic growth within the state.

Vale and INFRAERO have entered into several contractual arrangements regarding the use of the airport. Under one such arrangement, Vale has agreed to grant a leasehold over the airport site and support INFRAERO in firefighting and emergency services without requiring in exchange any payment. Vale also shares helicopter services with Brazil's environmental agency to monitor the Carajás National Forest to prevent illegal invasions and logging.

2.4 Information and Communications Technology Infrastructure

Three fiber-optic cables are placed along the EFC. As a result, publicly accessible telecommunications services have been expanded in a previously poorly served area, and allowing for shared-use with telecommunications companies has meant savings for the companies and lower environmental impacts by deforestation. Vale has also partnered with the telecommunications company Vivo to develop a 4G/LTE network that will serve to operate autonomous mining trucks and blasthole drills at Vale's newest iron ore mines—the S11D project. As part of the agreement, Vivo will also offer frequencies for public 4G/LTE service. This agreement may serve as a model for a larger plan to provide 4G/LTE coverage along the entire EFC.



3. Impacts of Shared-Use Along the Carajás Corridor

Municipalities along the Carajás corridor have received significant socioeconomic benefits, including affordable and accessible passenger transportation, as well as the benefits that come with royalty revenues and corporate social responsibility (CSR) investments made by Vale. Municipalities in which direct mining activities are performed receive 60% mining royalties (CFEM), and those indirectly affected by mining activities receive 15% of CFEM royalties (CFEM-Affected). In certain municipalities with low budgets, CFEM-Affected royalties can make up more than 5% of their total revenues.

Poverty levels in the municipalities of the Carajás corridor are some of the highest in the country, even though extreme poverty has decreased in both Maranhão and Pará, a process that was accelerated by the development activities associated with the shared use of the corridor. GDP per capita in municipalities along the corridor are lower than Brazil's national GDP per capita in all but three municipalities—Canaã dos Carajás, Curionópolis, and Parauapebas; all of them are located in the state of Pará (PA) and host direct mining activities. In 2010, the Human Development Index (HDI) in municipalities located along the corridor was higher than other municipalities in Maranhão and Pará that lie outside the corridor (Figures 4 and 5). Socioeconomic indicators are highest at the endpoints of the corridor, where mining activities are hosted, in the state capital São Luís, where the port of Itaquí is located, and in urban centers that serve as logistics hubs along the corridor.

Figure 4:
Evolution of the Human Development Index (HDI) for Municipalities in Maranhão State (1991, 2000, 2010)

Source: Prepared by the authors based on IBGE data. Calculations by the authors based on census data from IBGE, “Atlas of Human Development in Brazil,” United Nations Development Programme, Institute for Applied Economic Research, and João Pinheiro Foundation, <http://www.atlasbrasil.org.br/2013/en/consulta>.

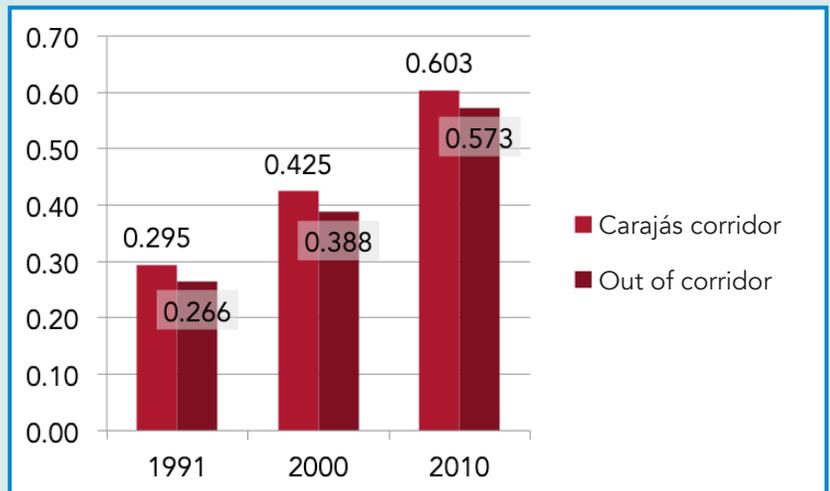
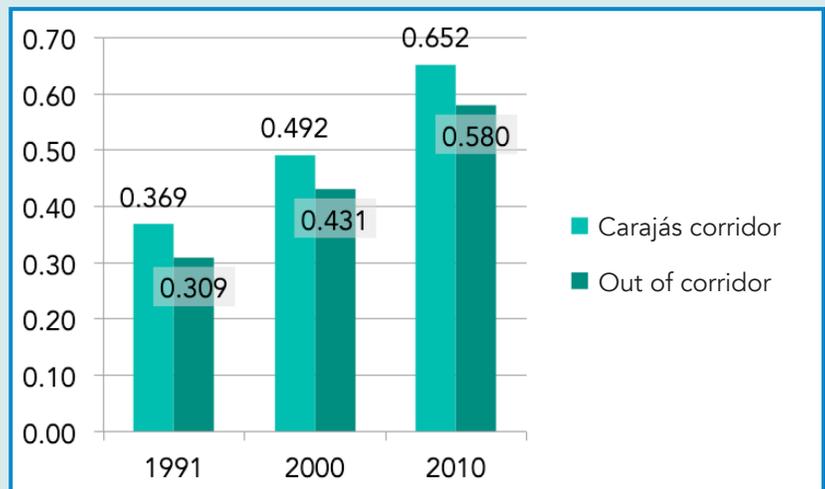


Figure 5:
Evolution of the Human Development Index (HDI) for Municipalities in Pará State (1991, 2000, 2010)

Source: Prepared by the authors based on IBGE data. Calculations by the authors based on census data from IBGE, “Atlas of Human Development in Brazil,” United Nations Development Programme, Institute for Applied Economic Research, and João Pinheiro Foundation, <http://www.atlasbrasil.org.br/2013/en/consulta>.



Social conflicts persist in the area of influence of the Carajás corridor, including conflicts arising from the land interests of Indigenous Peoples, residents of communities of Afro-Brazilian slave descendants (Quilombolas), small-scale farmers, and large-scale landowners in the region. These conflicts have historical roots that predate the Carajás Railroad and may be more closely related to broader changes in the socioeconomic and environmental landscape of the Amazon region, particularly since the 1980s, than to the development and shared use of the corridor. There has also been dissatisfaction regarding negative environmental and health impacts of the passage of trains, economic activities enabled by the railroad (such as pig-iron smelting), and the construction works for its double-track expansion. Blocking of the tracks by protesters still occurs, though often motivated by reasons unrelated to the Carajás Railroad.

Environmentally, Carajás is in a precarious position: it is one of the richest mineral reserves, yet it is located within the Amazon rainforest, an extremely important and vulnerable biome. Certain activities enabled by the shared use of the corridor—such as large-scale agriculture and pig-iron smelting—have had an impact on deforestation and biodiversity loss. When planning for future economic development in the region, prospective activities should be measured against the sustainable management and use of Amazonian resources.

Additional environmental impacts of the corridor, as reported by affected communities, include the suppression of wetlands; flooding resulting from insufficient rainwater drainage systems along the railroad; air, soil, and water pollution resulting from pig-iron smelters and dust and iron ore particles falling from trains; damage to buildings, roads, and wells caused by vibrations from passing trains; ecosystem fragmentation; and wildlife loss.

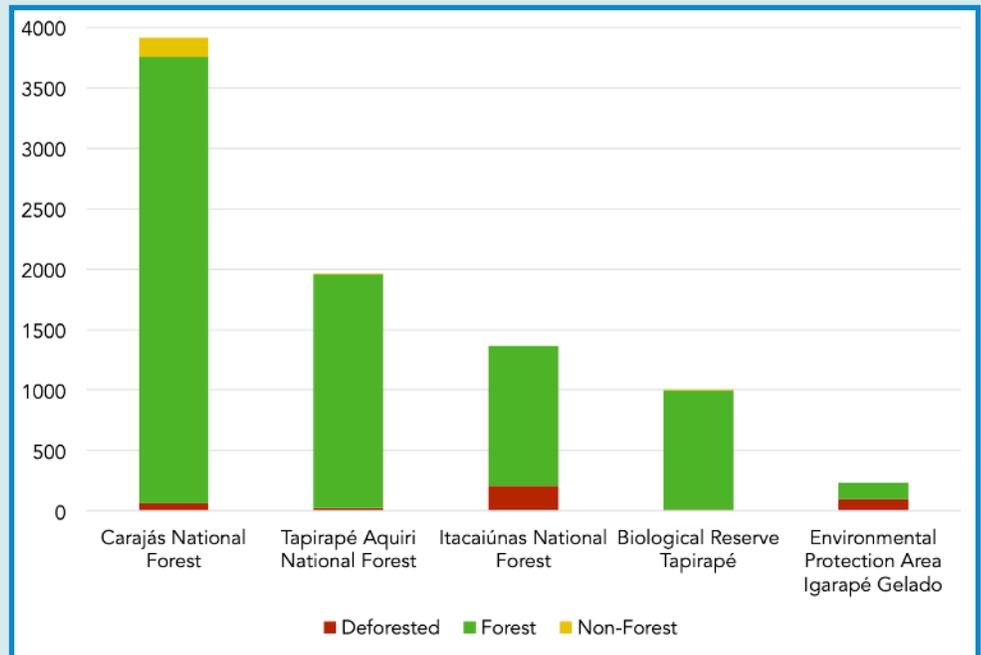


Photo: Aerial view of Parauapebas (PA).
Photographer: Ricardo Teles / Agência Vale

Throughout its operations in the Carajás region, Vale has consistently supported the forest conservation efforts of the agency responsible for managing the Carajás National Forest, the Chico Mendes Institute for Biodiversity Conservation (ICMbio) (Figures 6 and 7). For example, Vale funds the Carajás National Forest fire protection program, monitors invasions and illegal logging in the area, and conducts and sponsors research and community-based activities to mitigate the broader environmental impacts of its activities.

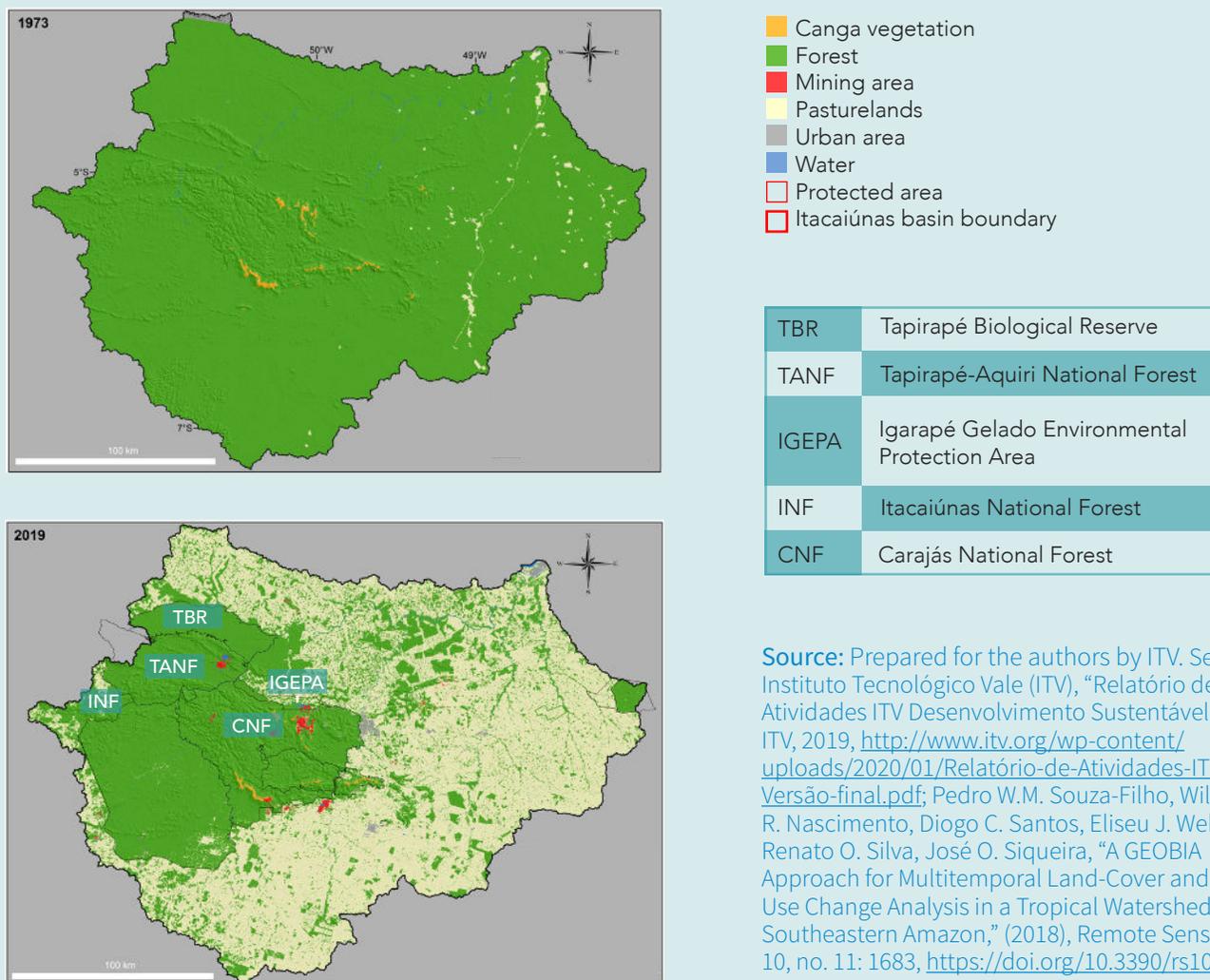
Figure 6:
Deforested areas and forest coverage in conservation units supported by Vale in the Carajás region (in km²) (2019)

Source: Prepared by the authors based on INPE data. Instituto Nacional de Pesquisas Espaciais (INPE), “PRODES – Desflorestamento nas Unidades de Conservação,” INPE, 2019, <http://www.dpi.inpe.br/prodesdigital/prodesuc.php>.



Opportunities to further improve the socioeconomic benefits of the shared use of the corridor and mitigate environmental harms for affected communities are many. A central focus of further development should be to ensure that the shared-use benefits are captured by these communities, rather than mostly going to economic actors external to the corridor, such as large-scale grain producers from other regions. While they benefit from the shared use of the railroad, they leave the negative impacts of the corridor for the local communities to bear.

Figure 7: Deforested areas and forest coverage in conservation units supported by Vale in the Carajás region (1973 and 2019)



4. Lessons Learned from the Shared-Use of the Carajás Corridor

Various positive economic, social, and environmental impacts illustrate the successes of the shared use of the Carajás corridor infrastructure from a sustainable development perspective:

- The EFC is a **safe, efficient, and reliable mode of transport**, providing **long-distance passenger services** accessible to low-income communities.
- The **third-party general cargo services** on the EFC, in particular through its connection to the FNS railroad, benefits exports of soybeans, soybean meal, corn, pulp, and pig iron.
- The 2.34-km **mixed road-rail bridge** across the Tocantins River reduces logistic costs in the region of Marabá (PA).
- Investments in **port infrastructure**, including the general cargo pier operated by VLI and Vale's signaling and dredging of the navigation channel, benefit the Itaquí port complex.
- The **Carajás Airport** in Parauapebas (PA), built by Vale and handed over to Brazil's airport authority, provides commercial passenger and cargo services for the Carajás region.
- Vale's provision of **helicopter services** and other support to Brazil's environmental agencies helps avoid deforestation and illegal logging in Carajás conservation units.
- ICT infrastructure—including fiber-optic cables along the EFC and Vale's project for a private 4G/LTE network—lowers the costs of providing Internet and cellular services.
- The **socioeconomic indicators** in the municipalities along the Carajás corridor are higher than those of Maranhão and Pará municipalities lying outside the corridor.

Reasons explaining the success of the shared use of the Carajás corridor include the following:

- The plans of Brazil's federal government to unlock the economic development potential of the Carajás region and to develop a larger national railway network connecting it to other regions of the country.
- Vale's initial role—when still a state-owned company—in helping the government achieve the socioeconomic objectives underlying those plans.
- Stringent legal provisions governing shared use, contained in federal laws and decrees, railway concession and sub-concession agreements, and rules issued and enforced by pertinent regulatory agencies, as well as private contracts.
- Vale's expertise in logistics reflected historically in the development of the company as an integrated mining and logistics company.
- The contractual arrangement with VLI, Vale's subsidiary set up to oversee third-party cargo transportation, helping to avoid conflicts of interest between Vale and other users of the EFC and limit the potential misuse of Vale's monopoly position.
- Strong coordination mechanisms established between Vale and VLI to limit the coordination cost on Vale's logistic chain.
- Social pressures on Vale resulting from its role in the region's economy, leading it to seek to generate socioeconomic benefits beyond that resulting from the mining operations.



Photo: Mineral, fuel, and general cargo railcars on the Carajás Railroad, near the Ponta da Madeira terminal.

At the same time, the shared-use undertaking in Carajás involves certain risks and negative impacts, from an economic, social, and environmental perspective:

- **Economic dimension:** Shared use of the Carajás corridor has not benefited the prevalent smallholding agriculture and farming within the region. It has also involved costs for Vale, such as infrastructure projects handed out without compensation, notably, the Carajás Airport and the road-rail bridge in Marabá (PA); the cross-subsidization of passenger services; and additional planning and coordination efforts with VLI. The Carajás experience also evidences the risk of failing to harmonize track gauges in broader networks at the outset when planning for logistic corridors.

- **Social dimension:** The Carajás corridor and its shared use have not harmonized the level of development across corridor municipalities. They have also contributed to high population growth in the region without the necessary infrastructure and services.
- **Environmental dimension:** The environmental impacts resulting from the development and shared use of the Carajás corridor include deforestation and the resulting loss of biodiversity and carbon sinks; air, noise, soil, and water pollution; and other negative impacts resulting from the passage of trains and from economic activities that developed along the railway, such as large-scale agriculture and cattle farming, and pig-iron smelting. The shared-use potential of the corridor is constrained by the risks posed and impacts caused by its location in an economically, socially, and environmentally sensitive area (Figure 8).



5. Recommendations: How To Further Leverage Shared-Use Benefits Along the Carajás Corridor?

To further leverage shared-use benefits of the Carajás corridor—thus promoting sustainable development for the benefit of the communities of the region and helping Vale retain its social license to operate—the mining company, in collaboration with federal, state, and municipal authorities and other stakeholders, could consider adopting a series of measures and strengthening its existing efforts in various areas:



Photo: Vale employee Pedro Aderson loading the general cargo railcar attached to the passenger train in 1992.

Photo credits: Pedro Aderson's personal archives

- Enhancing shared-use benefits requires **close collaboration between Vale, VLI, and the Vale Foundation**. It also requires close coordination with the federal government, the state governments of Maranhão and Pará, and the governments of the 28 corridor municipalities. This collaboration and coordination effort should include exploring the viability of unlocking the potential of the Carajás corridor for the long-distance transport of products currently carried in trucks, such as fertilizers imported into the port of Itaqui.
- The stakeholders mentioned above could prepare a **corridor-based development plan for the region to help identify synergies for private sector and government investments to improve development outcomes**. This plan should be data driven and could usefully leverage Brazil's collection of data and monitoring platforms related to the Sustainable Development Goals to identify areas of intervention, coordinate activities, assess the impact of development interventions, and adapt these accordingly if unsuccessful. The plan could include a coordination mechanism between Vale, VLI, and corporate users of the Carajás and North-South Railroads and the port infrastructure in Itaqui and its vicinity to make **joint investments along the corridor**. Corporate railway users could pool resources for and creatively explore the implementation of projects to improve the economic, social, and environmental conditions of Indigenous Peoples, Quilombolas, and local communities living along the corridor, which bear the negative impacts of heavier rail traffic.
- Vale and VLI should consider **reintroducing general cargo railcars** on the passenger train for smaller cargoes. In the past, Vale added a general cargo railcar to the passenger service, allowing passengers to transport agricultural produce from their farms to sell in São Luis (MA) and bring back goods such as seafood to sell inland. Reintroducing this service could provide a lifeline to small-scale farmers and other local entrepreneurs to transport their products by rail. Dry ports in strategic locations along the corridor could be setup that agglomerate and load the railcar before the arrival of the train. As demand increases, specific general cargo trains could be offered at least every other day in each direction.

- Vale could consider making **further safety- and environment-oriented improvements to the Carajás Railroad**, such as upgrading railway stations and stops, building additional pedestrian overpasses, and implementing measures to reduce the encroachment of third parties on the no-build zone on each side of the railway tracks (“faixa de domínio”). In line with Vale’s decarbonization efforts, it should consider expediting existing plans to electrify trains on the Carajás Railroad, which currently run on diesel. These additional investments would help mitigate the negative impacts of rail traffic perceived by local populations.
- Vale could consider how to foster the further roll out of **telecommunication services in the region**, collaborating with telecommunication companies and building on Vale’s experiences in sharing fiber optic and 4G/LTE infrastructure. As Internet access will continue to gain importance and can increase the efficiency of public services, these efforts could be usefully pursued. For instance, connecting public entities such as schools and hospitals could advance several Sustainable Development Goals along the corridor. Such a project would probably reach a larger number of people in the region than corporate social responsibility activities in individual municipalities. Inputs would be required from stakeholders within Vale, the government, and the telecommunications sector. Providing free WiFi and Internet access to corridor communities—for example, at railway stations—would generate additional benefits and improve the company’s social license to operate.
- While historically in the Carajás region priority was given to economic development over environmental protection, Vale has grown more environmentally sensitive to the indirect impact that the development of the corridor has had on the increased deforestation rates in corridor municipalities. With the growing climate urgency and the growing deforestation of the Amazon rainforest, it is fundamental for Vale to reinforce its efforts and allocate all necessary financial resources to achieve environmental and climate change objectives.

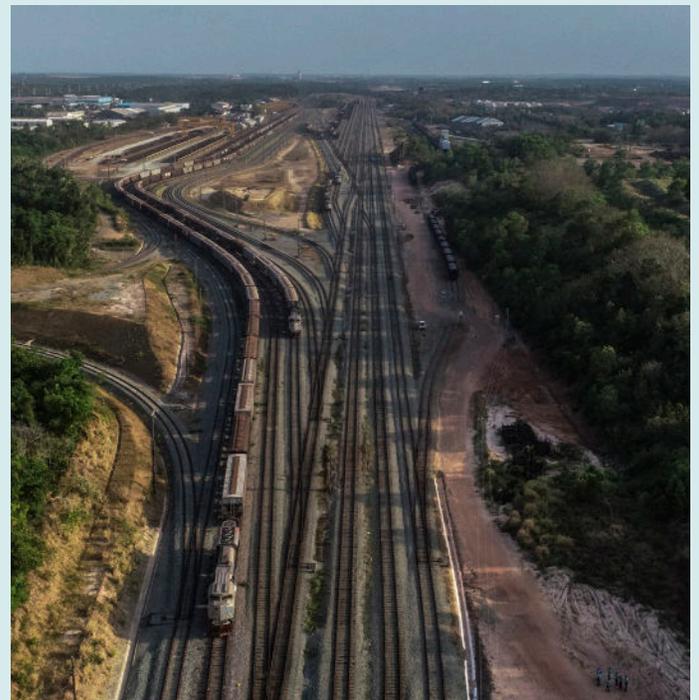


Photo: Different types of railcar on the Carajás Railroad.

Photographer: Ricardo Teles / Agência Vale

- To ensure zero additional deforestation in expansion projects, and to assess forest and biodiversity conservation potential beyond the conservation units already protected, consistently adopting the forest-smart mining approach developed by the World Bank's PROFOR program could be particularly effective. This approach recommends conducting landscape assessments, strategic environmental and social impact assessments, and ecosystem services assessments. It also entails considering the direct, indirect, and cumulative impacts for forests and associated communities over time and wide areas and the systematic application of the mitigation hierarchy (avoidance, minimization, mitigation, and offsetting). Implementing this approach requires cross sectoral collaboration within the company and constant coordination between the company, local authorities, environmental agencies, and communities. Vale could encourage and enable the government to secure strong property rights and land tenure systems, for instance, by providing funding for external experts in land tenure rights.
- Vale should consider expediting its climate change strategy to achieve carbon neutrality before 2050, monitoring progress closely and applying goals to individual sites, without internal cross-compensation. Deforestation should count as adding emissions, and offset programs should only be used as a last resort. If offset programs are used, they must follow the principles developed by the Business and Biodiversity Offsets Program (BBOP) and be rigorously developed to avoid the pitfalls of ill-designed offset programs implemented to date. Vale should also adopt a value chain approach, applying targets for carbon neutrality not only for Scope 1 and 2, but also to Scope 3. To pursue a potential Scope 3 commitment, Vale should engage in action-oriented partnerships with its suppliers and customers to identify the technology solutions to decarbonize, particularly in shipping and steel.



Adopting carbon neutrality targets for Scope 3 emissions acknowledges the need to decarbonize steel production.



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Back Cover: Photo: VLI general cargo train on the Carajás Railroad.
Photographer: Ricardo Teles / Agência Vale

Design: Michael Morgan

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