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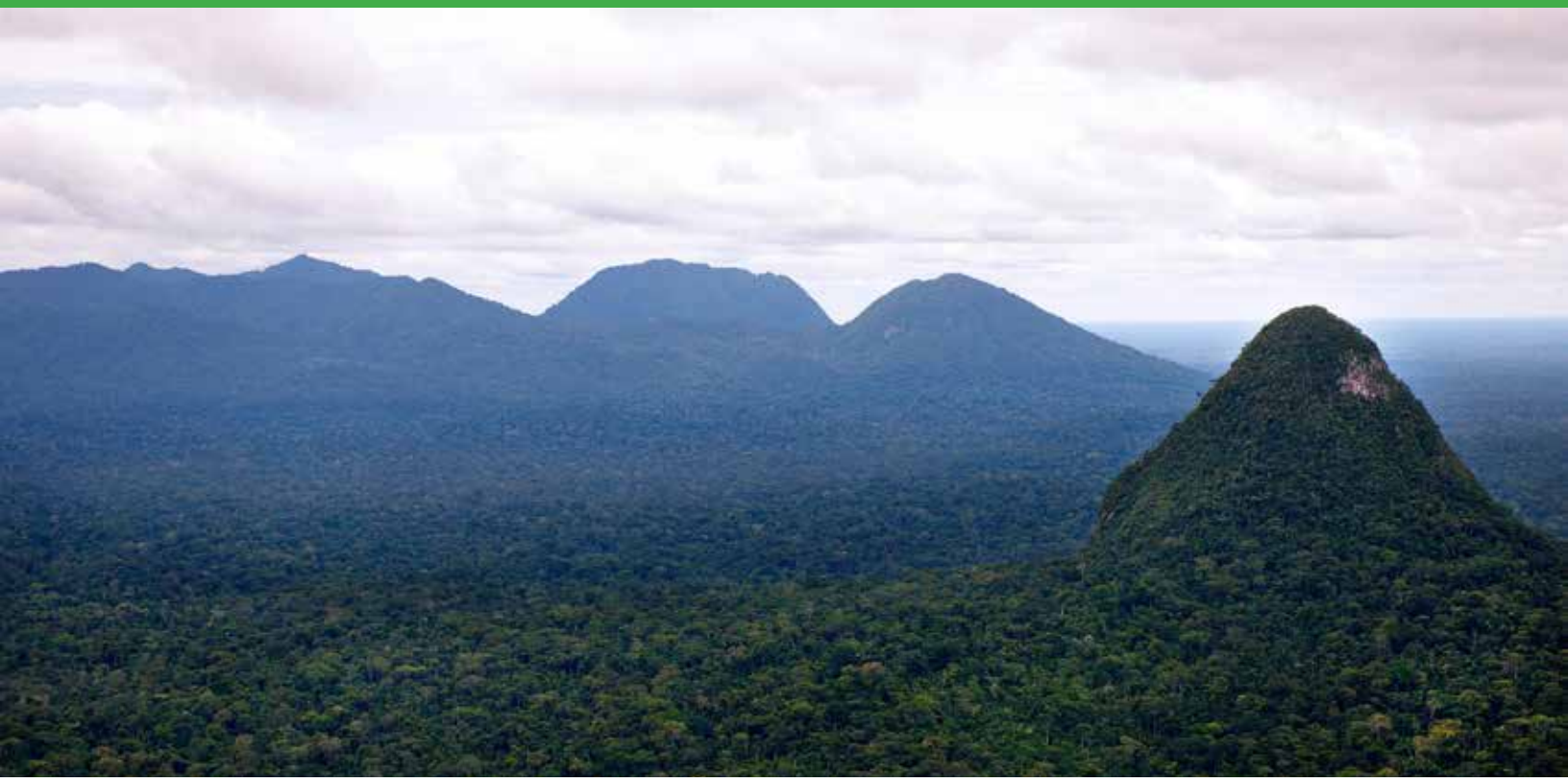
INFRASTRUCTURE AND CONSERVATION:
THE CASE OF A PUCALLPA-CRUZEIRO DO SUL TRANSPORT LINK



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Major infrastructure projects play a strategic role in the economic development of nations. However, many of these projects are carried out without careful analysis of their economic efficiency. Geographic location is a decisive factor in whether or not a project is efficient. Specifically, road projects built in fragile tropical ecosystems are almost always associated with high economic, environmental and social costs.

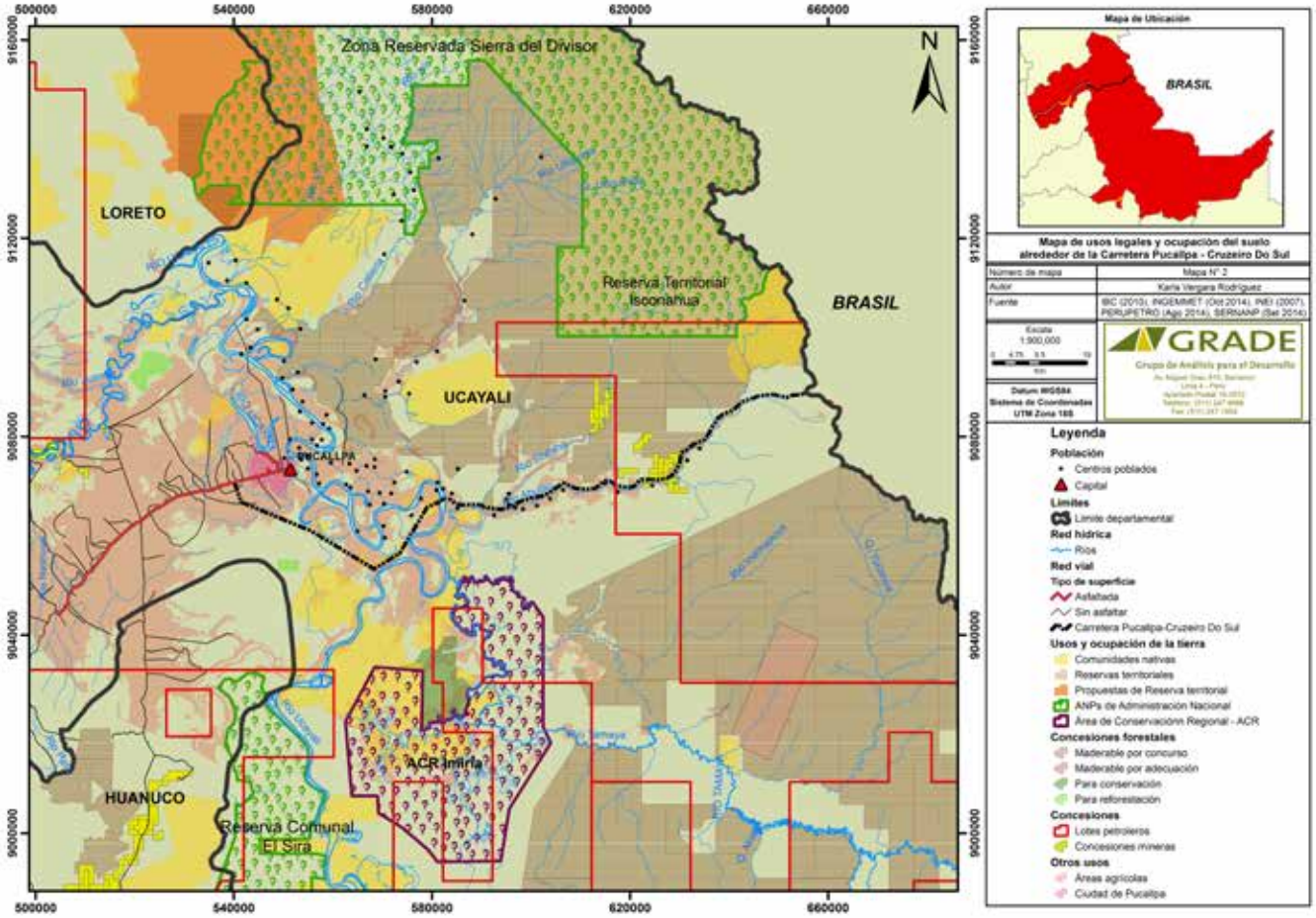
The project for a Pucallpa-Cruzeiro do Sul highway interconnection would represent the last section of what is known as the Central Interoceanic Highway (IOC), one of the primary roads in the package known as the Initiative for the Integration of the Regional Infrastructure of South America (IIRSA). This project risks generating significant environmental and social impacts. The project would pass through biologically rich areas of forest and river ecosystems near the Sierra del Divisor Reserved Zone and the Isconahua Territorial Reserve at the border with Brazil, as well as the native communities located within the project's zone of influence.

This highway project, first proposed 40 years ago, was reactivated in March 2004 when a Letter of Intent was signed between the Regional Government of Ucayali (GOREU) and the State of Acre in Brazil. This agreement's intent was to pave the way for pre-investment studies, environmental impact assessments, and other steps to analyze its economic, social and environmental viability. This agreement was ratified by joint declaration of

the presidents of Peru and Brazil in December 2009.

In 2010, the Peruvian Ministry of Transport and Communications (MTC) launched a request for proposals to conduct studies on the final section of the IOC in Peru, Pucallpa-Cruzeiro do Sul. The call was cancelled due to a lack of response. In June 2011, a second attempt let to a contract awarded to the Pucallpa Highway Consortium.

The proposed roadway has a length of 141 km, starting from the Federico Basadre highway and continuing toward the south side of the city of Pucallpa, where it crosses the Ucayali river at the village of Mazaray, continuing along the right bank of the Abujao river, and ending at the Brazilian border at border marker 62 (see map).
At the time the project was being adjudicated, it was examined via a multicriteria analysis carried out by Conservation Strategy Fund (CSF). This



Land uses and infrastructure in the Pucallpa region ◄

analysis, which considered economic, environmental and social factors, found that the highway project would be the third riskiest project out of a group of 36 roads being planned in five Amazon countries (Malky et al, 2011). Based on this finding, Glave et al (2012) conducted an economic analysis of the project, using preliminary data for construction costs, which were lower than those estimated in the later Pre-Feasibility study performed by the Pucallpa Highway Consortium. Glave's study found that the project would not be economically viable, with losses of US $134.6 million (in present value terms).

At present, the regional political and economic situation has relegated the project to the category of secondary priority. Recently, both Regional Government of Ucayali and the state of Acre have given preference to the Brazil-Peru Atlantic-Pacific Transcontinental Railroad project, in part because a rail project would cause fewer environmental impacts than a road. In this context, the Chinese government announced its support for a railroad project after a meeting between the presidents of Peru and China held in Brasilia in July 2014. The Pucallpa-Cruzeiro do Sul section might be part of this larger project, though it is currently unknown precisely what path the transcontinental project will take.

Image credit: Amazon © *Kalypso World Photography*

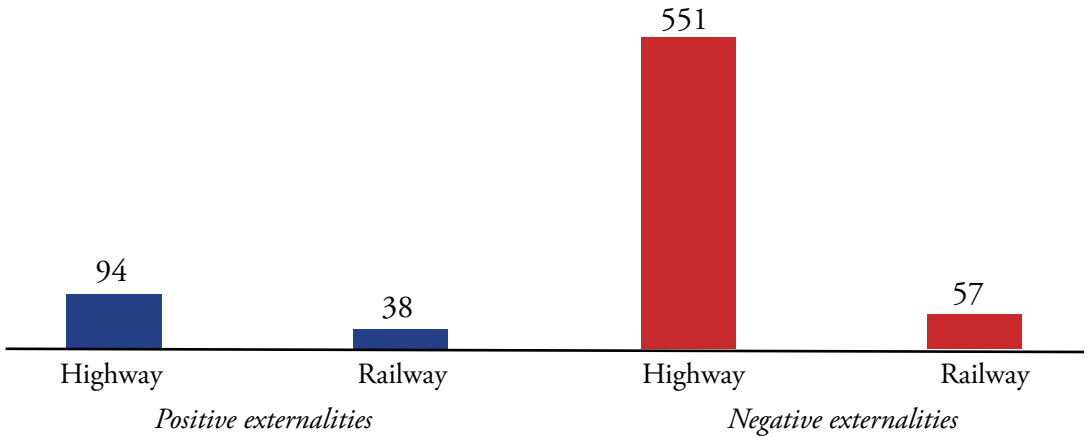
In 2014, CSF, The Nature Conservancy (TNC), and the consulting firm GRADE performed a new comprehensive economic analysis of the interconnection project, examining both the road and railway alternatives. This research used updated data from the Pucallpa Highway Consortium on the construction and maintenance costs for the highway project. The analysis of the rail link used as a reference the investment, maintenance and operation costs obtained from the feasibility study for the Yurimaguas-Iquitos project.

Road benefits were calculated with the Roads Economic Decision Model (RED) developed by the World Bank. This model estimates the net benefits based on the consumer surplus approach; that is, it assesses the benefits generated for users due to the reduction in vehicle operating costs and travel time new road or road improvement is in place. In regard to rail, a cost-benefit analysis was conducted, assuming the same logic for assessing the benefits based on the consumer surplus approach. In this case, the

reduction in vehicle operating costs were calculated using market rates for rail passenger and cargo transportation currently in effect in Peru, while the reduction in travel time was calculated considering the same cost-per-hour parameters used in the RED model.

Since no roadway currently exists, transport demand projections for initial traffic used as their benchmark the arrival and departure tonnages at the port of Pucallpa, traveling down the Ucayali and Abujao rivers parallel to the proposed route. From that initial traffic annual increases were projected, considering the effects of reduced transportation costs and the local development that would be generated in the project's area of influence. It should be pointed out that not only was the same transportation demand (expected traffic) applied for both projects, the same path was assumed as well. In other words, it was assumed that the railway project is an alternative to the highway (a possible section of the FETAB). The investment, maintenance and operating costs, as well as traffic estimates are completely different from those that would apply to the entirety of the project from Bayóvar to the Atlantic.

In addition to estimating the direct benefits and costs, the study quantifies a series of additional benefits and costs caused by the project but not paid or received by the project developer. These effects are known as "externalities." Positive externalities included increased access to education and health due to the time savings and reduced transportation costs that would be generated. Also estimated was the value of the timber and non-timber forest products that would be able to be marketed as a result of improved access. The negative externalities estimated included the costs of increased road and rail accidents, the increase in air pollution generated by the vehicles traveling as a result of either of the projects, and a value applied for deforestation and the reduction of environmental goods and services. Among those goods and services were the reduction of agricultural production due to soil erosion, reduced water supply from natural sources, and the reduction in carbon capture and storage capacity.



Positive and negative externalities of road and rail alternatives ◀

In order to assign values to the environmental and social externalities, various measurement methods applied and three different scenarios were considered: (i) with a railway project, (ii) with a highway project, and (iii) with no project. These projections were based on forest-cover change maps made between 1985 and 2011, and a set of variables associated with changes in land use during that period.

The scale of the positive and negative externalities was driven principally by the degree of improvement in access (positive externalities) and projections of deforestation.[1] In both road and rail scenarios the negative externalities would significantly outweigh the positive, but the figures for the road option are much worse than those for rail. The net value of the externalities for the railway option (US $ -19.2 million) is only 3.9% of the net value of the externalities for the highway (US $ -456.6 million).

Without considering the externalities, the net economic losses (net present value - NPV) would be US$ -662.9 million for the railroad, and US$ -308.9 million for the highway. In other words, neither project is economically feasible, with greater losses from rail due to its high up-front costs, However, when environmental and social externalities are included, the highway project would generate higher overall costs to Peruvian society (US $ 83.3 million more than the railway project).

		With externalities	Without externalities
Railway project	VAN	-682.12	-662.93
Highway project	VAN	-765.46	-308.90

Compiled by the authors

Economic analysis of road and railway alternatives, including environmental and social externalities (Net Present Value in millions of US$)

A sensitivity analysis established that for the highway project to be minimally feasible, 70% of the current traffic between Iñapari and Puerto Maldonado – a southern alternate to the link studied here – would have to be diverted to the Pucallpa-Cruzeiro do Sul project, which would render the southern route infeasible. For the railway to achieve the same objective (NPV equal to zero) the benefits from reduced transport costs to be multiplied by seven, or investment costs to be reduced nearly sixteen times.

[1] *Accessibility to a highway is greater than for a railroad since a road can be entered at any point along its path*

In conclusion, we find that both options would generate high costs for Peruvians and the country's economy. Of the two, the least damaging alternative in environmental and social terms would be the railway.

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