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Border Integrations: The Fusion of Political Ecology and Land Change Science to Inform and Contest Transboundary Integration in Amazonia

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BORDER INTEGRATIONS

The fusion of political ecology and land change
science to inform and contest transboundary
integration in Amazonia

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Introduction

In the southwestern Amazon lies the Sierra del Divisor, an isolated cluster of mist-covered peaks and ridges rising out of the steamy lowland rainforest. The forests of these fiercely dissected crests and valleys still ring with the low grunt of jaguar and the thunderous clacks of hundreds-strong herds of white-lipped peccaries, while the canopy sways with troops of the rare red Uakari monkey. This biodiversity inspired the Serra do Divisor National Park, and its transboundary sister reserve, but these forests are also home to humans: the descendants of Ashéninka warriors and rubber tappers, a re-emergent Nawa people,[1] and most elusive, the "uncontacted" Isconahua. These home-lands and ecosystems are crisscrossed with the ephemeral scars made by more recent arrivals: loggers, miners, and drug traffickers. However, the most important line in the Sierra del Divisor is the border itself, the international boundary that follows the Sierra's ridge dividing Peru's Ucayali river basin from Brazil's Juruá basin in the state of Acre. Relatively equidistant from the boundary ridgeline lie two cities, Ucayali's capital of Pucallpa, and Western Acre's commercial center, Cruzeiro do Sul. Both cities are the end of the road for their country's network of thoroughfares. For now. Planners and government officials increasingly view the 160 kilometers of forest separating the two cities as a temporary obstruction to continental integration.

A road connecting the two cities would bisect the border and have an impact on flora, fauna, and people. This chapter documents the struggle

against this road, a struggle to defend local livelihoods, flora, and fauna from a development initiative pushed at continental, national, and regional scales. In particular, we analyze the synergy of two divergent analytical approaches, land change science (LCS) and political ecology (PE), to gain the best understanding of the impacts of a transboundary road bridging the Brazilian and Peruvian Amazon between the cities of Cruzeiro do Sul and Pucallpa.

This ongoing research results from the desire for formal political institutions, local land managers, and other interest groups to understand the vulnerability of the landscapes between the two Amazonian cities. A fusion of LCS and PE shows potential to inform policy through the methodological rigor and science-based framing of LCS, while the explanatory richness of PE promises to apprise local communities and energize the activist groups necessary to hold policy makers accountable over time. This chapter sites local people within the transboundary dynamics of an infrastructure corridor and investigates how local activists must grapple with the tensions between LCS and PE in order to have their voices heard over the continental-, national-, and regional-scale development discourse. First, we introduce the challenges of conducting activist research bridging disciplinary and institutional boundaries. Then we describe the transboundary region and analyze the infrastructure initiative in question. Finally, we argue that local activists can benefit from an uneasy but necessary synergy of LCS and PE in order to reveal the potential impacts of the Pucallpa–Cruzeiro do Sul transportation corridor with data from both countries and a nuanced understanding of the power and praxis of the border.

Crossing boundaries with applied/activist research

Research bridging disciplinary and institutional boundaries is complex and negotiated. The complexity escalates when this research is applied or activist in nature. Academics struggle to embrace such directed research. While some geographers increasingly argue for embracing research as unavoidably political (Castree, 2008) and activism as a daily reality (Maxey, 1999), few academics define their research as activist or applied, and fewer still seek to create the research process and share the research product with marginalized actors and research colleagues. Rationales exist for the lack of activist research given that the academy only reluctantly validates results, the increased demands on time and communication, and the uncomfortable contradictions of aligning with a struggle (Hale, 2006).

Hale (2001, 2006, 2011) defined activist research as helping to reveal the root causes of inequality through political alignment with an organized group of people in struggle. For research to be activist, dialogue with the group in struggle should shape each phase of the research process, from conception of research to dissemination of results (Hale, 2006). Neither the

post-positivist land change scientist nor the post-structural political ecologist may be comfortable with this active alignment. A land change scientist, while potentially adopting a critical realist ontology open to multiple perspectives (Turner & Robbins, 2008), may be uncomfortable with the perception of pursuing objective empirical methods to further an overt agenda. Post-structural political ecologists, on the other hand, may embrace the activist agenda in theory (Peet & Watts, 2004), but then find that their local colleagues' pragmatic short-term decision making falls short of, and even compromises, the shared utopian vision (Hale, 2006). The challenge for the political ecologist is twofold. If political ecologists drive their partners and their work, they face an ethical dilemma—what gives an academic the right to dictate activist agendas for their vulnerable allies? If scholars deconstruct or criticize partners, they are guilty of a scholarly conceit that is unproductive for the allies, and only immediately serves the academic.

A few political ecologists have embraced the contradictions of conducting activist research with indigenous people in Latin America. Nietschmann's (2001) muddy boots approach, for example, required "doing," something that could put off critical theorists for being under-theorized and could alarm scientists for an overt bias. Nevertheless, Nietschmann appeared comfortable, if pugnacious, in the maelstrom: practicing science while acknowledging that "there is no neutral way in science" (2001, p. 182) and pursuing his livelihood as an academic although "academic geography is a product and advocate of the state" (2001, p. 183).[2] Bebbington (2004, p. 416), less truculent but still passionate, sought to be both critical and engaged, applauding "research approaches that are more dialogical, more conversational, and more embedded in the processes of which they aim to make sense." Activist researchers enthusiastically embedded in local movements must embrace ambiguity as they accompany their local research colleagues making rational choices ranging from aggressive protests and radical critiques of the hegemonic neoliberal state to imploring scientists to pursue positivist research on their behalf. This tolerance for ambiguity can rapidly pull an activist researcher into the same contradictions and predicaments that local people confront, and thus, provide insight, enrichment, and challenges (Hale, 2011).

For an academic, these challenges can be formidable. The useful products (maps, legal reports, surveys, etc.) desired by local partners are also the same instruments so often deconstructed by critical peers, and the means used to entangle the user in the neoliberal establishment (Bryan, 2011). At the same time, if one is seemingly more preoccupied with one's comrades and favorite fauna and flora, how can one avoid bias in the deployment of scientific research methodologies necessary for the cause(s)? Can one embrace both a critical PE and a post-positivist LCS to help what one studies? Hale eloquently described the cognitive dissonance necessary to stride forward with each foot on a distinct and uncertain intellectual footing.

I also have argued that the mandate of activist research, of produc-
ing theory grounded in the contradictions that the actors themselves
confront, ultimately requires us to straddle two disparate intellectual
worlds. We teach culture theory, but we also use the language and
invoke the authority of science to defend the legitimacy of our
research. One foot remains firmly planted in the rarified space of
cultural critique while the other returns cautiously, but confidently,
to law, demographics, statistics, human ecology, geographic infor-
mation systems, and other technologies of objective (no quotation
marks allowed) social science. It is not a comfortable, or even a very
coherent, position. It requires deft deployment of varied intellectual
registers—even epistemologies—depending on the exigencies of the
moment. It leaves all of our varied audiences edgy and mildly sus-
picious. But this alternating endorsement of both cultural critique
and objective social science may be a necessary concession to the
political realities of the worlds we live in and seek to engage with.
It certainly embodies a more accurate reflection of the utterly con-
tradictory struggles of the people with whom we are allied, and
more importantly still, it entails a commitment to generating the
kinds of knowledge they ask and need us to produce.

(Hale, 2006, p. 115)

If Bebbington, Hale, and Nietschmann embrace contradiction and success-
fully pursue activist research with their partners, the challenge escalates when
additional parties with distinct institutional backgrounds and agendas come
together to produce shared research. Shared research requires moving beyond
the boundaries of one's particular approach and the limits of a manageable
ambiguity. Before analyzing the contradictions of our endeavor further, we
introduce a site proposed for a transboundary road, a formidable continental
governance institution, and the recent history of the road project.

From division to integration: A backstory

The Sierra del Divisor region centers on a physical and political divide. This
broken chain of low mountains divides not only the Ucayali and Juruá
watersheds, but also the countries of Peru and Brazil. The mountains rise
dramatically out of the dense *terra firme* tropical forest, and provide habitat
for some of the region's rare and endemic species (Vriesendorp et al., 2006).
These species receive some protection within Brazil's Serra do Divisor
National Park and Peru's Sierra del Divisor Reserved Zone. Small villages and
indigenous communities lie along the rivers skirting the edges of these two
protected areas, while the elusive Isconahua indigenous people may still
roam the dividing ridge. Peru created the Isconahua Territorial Reserve to
protect these indigenous hunter gatherers, but loggers and hunters continue

to penetrate this reserve and the overlapping and adjoining conservation areas, even as drug traffickers hike coca paste across the border (Salisbury & Fagan, 2013).

The greatest threat to the Isconahua, rural livelihoods, and the biodiversity of the Sierra del Divisor region was envisioned a half century before the creation of these reserves. In 1943, the Peruvian president, Manuel Prado Ugarteche, inaugurated the Federico Basadre Highway to Pucallpa: "This highway does not end here. This . . . will unite Peru and Brazil . . . " (Soría Rodríguez, 1992, p. 57). The decades that followed focused less on integrating economies than safeguarding sovereignty. In the mid-1970s, the Brazilian army made their presence felt with a jeep trail, the BR-364, from Cruzeiro do Sul to the border; while a few years later, the Peruvian army countered with an isolated military settlement project 3 km from the boundary (Salisbury et al., 2010). Ten years later both the trail and settlement project were largely overgrown, and in 1989, Brazil established the Serra do Divisor National Park.

IIRSA: A continental initiative

The turn of the century inspired integration planning in Amazonia, beginning with the establishment of the Initiative for the Integration of the Regional Infrastructure of South America, known by the Spanish/Portuguese acronym of IIRSA. Created in 2000 by all the South American presidents,[3] IIRSA seeks to improve connectivity of transportation, energy, and telecommunications throughout the continent in order to catalyze an increased South American presence in global markets by unleashing the economic potential of the continent's resources (Pieck, 2011). Financing for IIRSA arrives from national, private, and regional development banks, and public–private partnerships (Van Dijck, 2008; Perz, 2012). These institutions channel funds into 10 overlapping IIRSA axes that in September 2011 consisted in 531 projects representing an estimated investment of over US$116 million (IIRSA, 2011). The social and environmental impacts of IIRSA projects will be felt throughout Amazonia given the goal of expanding and entrenching extractive-based economies from the rural peripheries to urban centers (Bebbington, 2009; Pieck, 2011). The IIRSA integration network threatens to expand deforestation fronts, galvanize extraction via roads and pipelines, and alter Amazonian landscapes through dam building (Killeen, 2007). In response, civil society has challenged IIRSA, but activism has yet to fundamentally alter IIRSA development plans (Pieck, 2011; Perz, 2012).

Documents and maps from the IIRSA Executive Technical Group from 2001 and 2002 demonstrate no plans for bisecting the Sierra del Divisor (IIRSA, 2012a, 2012b). Instead, the transport planning of choice included improving the road to Pucallpa before using the Ucayali River to head north

to Brazil. In December 2003. the Pucallpa–Cruzeiro do Sul road and energy corridor first appeared in the IIRSA project portfolio as part of Amazon Axis Group 4, but with an asterisk indicating "Brazil requires consultation" (IIRSA, 2003). A year later, the road corridor figured on the map with an estimated cost of US$247 million, but this time with no asterisk (IIRSA, 2004). Table 7.1 (below) details the project's fluctuating names and costs. In 2011, IIRSA added "railway" to the corridor's title, but in addition to, rather than replacing, the road title, and assigning the corridor no cost at all (IIRSA, 2011, p. 41). The IIRSA project database in August 2012 used the same title, but the Brazilian portion of the narrative focused entirely on rail, while the Peruvian portion only contained references to a road study. In addition, while both the Brazilian and Peruvian portions of the narrative described the need for socio-environmental impact studies and the participation of civil society, the Peruvian section described a project profile study under way entitled "Construction of the Pucallpa–Cruzeiro do Sul road, Peru–Brazilian border section which is scheduled to be approved in November of 2012 . . . for an estimated investment of US$210 million for the Peruvian section" (IIRSA, 2012a). The project database map uses a red line to represent the Pucallpa–Cruzeiro do Sul railway road corridor, but the map privileges the road over the rail by showing no hatching between the cities, unlike the hatched symbology used for the neighboring Vilhena to Cruzeiro do Sul railway (Figure 7.1 below). In summary, the project database reveals ambiguity in titles, maps, and text, as to whether IIRSA is committed to building a railway rather than a road through the Sierra del Divisor.

Table 7.1 Names and estimated costs of IIRSA Pucallpa–Cruzeiro do Sol project

Project source	Project title	Estimated cost US$
IIRSA 2003 Project Portfolio	Pucallpa–Cruzeiro do Sul road corridor	No price listed
IIRSA 2004 Project Portfolio	Pucallpa–Cruzeiro do Sul road corridor	247,000,000
IIRSA 2007 Project Portfolio	Pucallpa–Cruzeiro do Sul road corridor	247,000,000
IIRSA 2009 Project Portfolio	Pucallpa–Cruzeiro do Sul road corridor	200,000,000
IIRSA 2010 Project Portfolio	Pucallpa–Cruzeiro do Sul road corridor	300,000,000
IIRSA 2011 Project Portfolio	Pucallpa–Cruzeiro do Sul railway road corridor	0
IIRSA 2012 Project Database	Pucallpa–Cruzeiro do Sul railway road corridor	210,000,000*

Note: *"The estimated investment amount corresponds to Peruvian section" (IIRSA, 2012a).

Pucallpa Intermodal Logistics Center	Pucallpa Airport	Pucallpa–Cruzeiro do Sul railway road connection	Integration railway: Section Vilhena–Porto Velho–Rio Branco–Cruzeiro do Sul

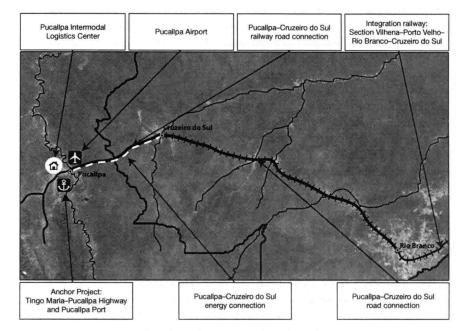| Anchor Project: Tingo Maria–Pucallpa Highway and Pucallpa Port	Pucallpa–Cruzeiro do Sul energy connection	Pucallpa–Cruzeiro do Sul road connection

Figure 7.1 The map of IIRSA's Amazon Axis Group 4 (IIRSA, 2012a) shows confusion between text and graphics as to whether the Pucallpa–Cruzeiro do Sul corridor is destined for road or rail.

Source: Figure remade and translated by the University of Richmond's Spatial Analysis Lab.

Scaling the Sierra del Divisor

The apparent ambiguity of IIRSA concerning the choices of rail and road results from a complex web of multi-scale interactions including motocross-fixated regional presidents, activist civic society, and international institutions, among others. Our interest in the region began with the creation of the 1998 management plan for the Serra do Divisor National Park in Brazil and knowledge that article 3 of the federal decree that created the park (No. 97.839) allowed the future building of the BR-364 road through the park if environmental protection standards were met (Scarcello et al., 1998). Five years later, across the border in Peru, the Ucayali governor, Edwin Vásquez López, a prominent sawmill owner, began a crusade to build the Pucallpa–Cruzeiro do Sul road. In June 2003, Governor Vásquez signed an act of agreement in Cruzeiro do Sul focused on border integration, and a month later, in an IIRSA meeting in Trujillo, proposed that the Pucallpa–Cruzeiro do Sul road be added to the Amazon Multimodal Integration Axis. By December 2003, Vásquez had succeeded in adding the road corridor to the project portfolio of the Amazon Multimodal Integration

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Axis (IIRSA, 2003). Vásquez's engineers were in the field a month after the Trujillo meeting, cutting a 95 km exploratory trail to the Brazilian border (GOREU, 2004). Vásquez saw progress in 2004 as he and the governor of Acre, Jorge Viana, signed the Act of Intention to Develop the Pucallpa–Cruzeiro do Sul Commercial and Integration Axis (*Diario Ahora*, 2004). However, Viana's standing forest development discourse differed from the message of Vásquez's timber-based government. A memorable meeting on April 24, 2004 in Rio Branco had Vásquez and Acre's minister of planning discussing the impact of the road over several transboundary maps. Vásquez offered US$1.2 million of Ucayali money to build a dirt road to the Peruvian side before emphatically pointing at the Isconahua Territorial Reserve on the map and declaring, "Everyone there has shoes, there are no uncontacteds" (Salisbury field notes April 24, 2004). The Acre coalition responded that they would only consider a road if Ucayali protected the border. Vásquez then proposed the creation of an Isconahua–Murunahua regional conservation zone along the border, even as Peruvian loggers unleashed by the new forestry law pulled timber from both sides of the Divisor (Salisbury et al., 2011). The discovery and capture of more than 20 Peruvian loggers inside the Brazilian National Park and neighboring indigenous territories derailed Vásquez's road-building plans, but his engineers' trail formed the axis of skid trails to harvest timber not only in the Isconahua Territorial Reserve, but also across the sierra in Brazil's national park. The Vásquez government ended in 2006 amidst lawsuits accusing him of beginning road building without the appropriate technical, economic, and environmental studies necessary. The subsequent governor, Jorge Velásquez Portocarrero, took a more passive approach to transboundary infrastructure, given that the road project was the Vásquez administration's signature project.

While Governor Velásquez did not openly talk about the road early in his administration, his office produced the 2000–2018 Ucayali Participatory Departmental Road Plan. The plan targeted the Pucallpa–Cruzeiro do Sul road for construction over two years starting in 2016. The document named two different prices for the 95.6 km road with a discrepancy of almost US$2 million. The plan sited the road between the town of Mazaray and border monument No. 67 with the goals of incorporating potential zones of ecotourism, and non-timber forest products, while providing access to Brazilian products such as agro-industrial products, cattle, minerals, hydrocarbons, and construction materials (GOREU, 2008, pp. 103–104).

Ucayali civil society remained concerned about the road project despite being largely unaware of the details of the participatory Ucayali road plan. This concern stemmed from the project's permanence in the IIRSA project portfolio and the knowledge that the road would pass through the Sierra del Divisor reserved zone and indigenous territories, such as the Shipibo-Conibo community of Flor de Ucayali. In July 2008, 41 indigenous federations, non-governmental organizations, institutions, and communities formed the

Ucayali Region's Megaproject Monitoring Group (GMMRU), a Peruvian civil society assemblage, whose principal objective included monitoring IIRSA projects to build local awareness and participation, promote transparency in decision making, and take preventative action if necessary (Arana et al., 2010). The initial coordinator for the GMMRU was the director of the Pucallpa office of the Instituto del Bien Común, an NGO with strong links to Ucayali indigenous federations and an increasing involvement in conservation initiatives. Equally important was the logistical support, Lima contacts, and legal training of the coordinator for the infrastructure working group (GTI) of the Initiative for Conservation in the Andean Amazon (ICAA) of the U.S. Agency for International Development (USAID). The GMMRU sprang to action against the proposed Pucallpa–Cruzeiro do Sul road project in December 2009 following the December 10 agreement of President Lula da Silva of Brazil and President García of Peru to begin working on the creation of the Pucallpa–Cruzeiro do Sul road in early 2010 (Maldonado, 2009). The first GMMRU goal, gathering as much information as possible concerning the road, led to the writing of this chapter.

Synergies and differences across boundaries

The practice of transboundary PE and a borderland-focused LCS generates numerous challenges. The experience of working with the GMMRU to block the road through activist research shows the necessity of grappling with the apparent divergences of applied PE and objective post-positivist LCS approaches. The GMMRU uses both modeling and legal/political pressure to simultaneously inform the Peruvian state of the Sierra del Divisor's geography and vulnerability, while holding the state and its chosen consultancy accountable to infrastructure planning norms.

GMMRU dynamics

"The road project is happening. Roads are disastrous for biodiversity and indigenous livelihoods in tropical rainforests. The Sierra del Divisor will thus be destroyed if we do not do something." This rhetorical quote captures the logic that motivated the creation of the GMMRU and its subsequent actions. The GMMRU did not spring fully formed from the soil of the Sierra del Divisor. Rather, the GMMRU resulted from painstaking organizing by indigenous communities, umbrella federations, non-governmental organizations, government directorates, politicians, and researchers then brought together by a common interest in the region, modest funding, and charismatic leadership. The GMMRU defines itself as a grassroots representation of civil society, or local organization; but also is subject to many tensions generated across multiple scales and networks including local-place-based roots, management from a regional office, national political connections, and a

reliance on international funding. The GMMRU seeks to speak for species and local peoples who have no voice to stop the road. However, multiple interests exist as they would in any group. Indeed, some members, both colonist and indigenous, are pro-road, a position many of the authors here consider unsavory, but also understandable, given these members' high, if unrealistic, expectations for road-based development. Regardless, something all members of the GMMRU could agree on after seeing the road proposal was the need for more and better information (geographic, environmental, economic, sociocultural) to inform the proposal and all stakeholders.

Modeling to inform the state

Peru's Ministry of Transportation and Communications' (MTC) Provías Nacional Office sent out a call for proposals for a pre-investment study of the road (Provías Nacional, 2010). The Provías terms of reference asked applicants to include costs for three different paved surfaces, thus privileging road over railway. The terms asked for three different routes, but then limited those routes by defining the starting point of the road as Pucallpa and the end point as border monument No. 67.

Concerned about the impacts that road or rail would have on the culturally and biologically rich landscape between Pucallpa and Cruzeiro do Sul, and fearful that Peruvian decision makers would be ignorant and/or insensitive to the complex human and physical geography when determining where to build the corridor, the Indigenous Landscapes Consortium of the Initiative for the Conservation of the Andean Amazon (ICAA) contracted a consultant to conduct a technical analysis of the possible socio-environmental impacts based on a variety of potential routes. The consultant, familiar with LCS, created a model using a Geographic Information System (GIS) to spatially analyze compiled biophysical, sociocultural, and administrative layers, and identify three alternative least-cost routes using standardized spatial units of analysis and a classification system of assigned socio-environmental values. In short, what transportation routes would be least damaging for the Sierra del Divisor's human–environment systems?

The presentation of the model and results to the GMMRU underscored some of the challenges facing a synthesis of LCS and PE in a transboundary context. First, the presentation of science-based results to an activist group, including indigenous representatives with personal field-based knowledge of the study region, underscored PE's sensitivity to the exclusive role of science as a judge of environmental conditions, and how this role may marginalize different ways of knowing while placing undue power in the hands of technical experts (Peet et al., 2011). Second, the model's focus on alternative least-cost routes tacitly accepted the corridor as a foregone conclusion, moving the debate away from alternatives to the corridor to identifying least-cost alternative corridors. The acceptance of the corridor recalls Goldman's

(2005) analysis of how the World Bank produces green knowledge to move debates toward what kind of development there should be, rather than if development should occur at all. The visualization of alternative routes can be appropriated by Peru's MTC to accelerate corridor construction. Third, the study echoed the limitations and biases of national development planners: The model provided analysis only on the Peruvian portion of the proposed road, given the consultant only had access to detailed data from Peru, not Brazil (see Figure 7.2 below). Thus, the alternative routes analyzed extended from Pucallpa to the Brazilian border, leaving the Brazil side of the map blank, and perhaps reaching border destinations completely untenable to planners and stakeholders in Brazil. The visualization of Peruvian least-cost paths to the border could be interpreted as threats to Brazilian sovereignty, and reminds us of transboundary political ecology's attention to the unanticipated impacts of national environmental policies (Salisbury et al., 2011).

GMMRU's use of science-based knowledge

Despite these critiques, the model and map products had utility, particularly for policy makers seeking to understand the challenges of the region and predisposed to accept a science-based environmental knowledge. Indeed, the ICAA factsheet for Pucallpa–Cruzeiro do Sul stated, "Modeling studies have strong explanatory value for decision makers given all of the proposals are supported by scientific terminology. Therefore, these explanatory studies allow potential victims to assert their rights against the promoters and implementers of infrastructure projects" (Arana et al., 2010). None of the GMMRU members objected to using the study on the grounds of privileging science, the marginalization of alternative knowledge, or the empowerment of technical experts. Was this because the rural and indigenous members were habituated to marginalization, recognized the power of the shiny scientific output, simply trusted their fellow GMMRU members who supported this activity, or accepted the study for another reason? The answer probably falls within the overlap of the range of possibilities.

Statements from a focus group of GMMRU indigenous participants centered on the utilitarian, democratic, and powerful nature of scientific information.[4] Respondents stated that "It is important that the people use the same information as the scientists." Leaders saw the GMMRU as a means to access and critique scientific and other information: "[P]articipating in the GMMRU allows us to understand various positions, and to improve our position to be more critical of the information." The ability to critically analyze scientific studies, environmental laws, and other forms of information appears increasingly important for indigenous people as development initiatives overlap indigenous territories and livelihoods. Indigenous participation in the GMMRU to analyze scientific information more effectively and contest megaproject initiatives also indicates an implicit acceptance of the
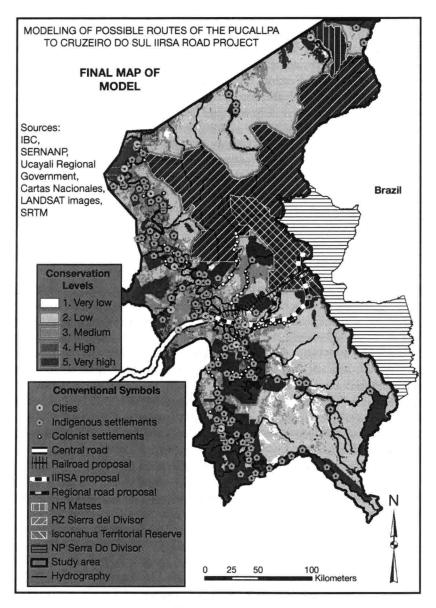
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Figure 7.2 The modeling study of Saito Diaz and Geomáticos Consultores (2010) helped the GMMRU visualize areas of high vulnerability, but also can be used by the state. The map exalts technology and science over traditional knowledge and only analyzes the Peruvian half of the corridor.

Source: Figure remade and translated by the University of Richmond's Spatial Analysis Lab.

Note: IBC = Instituto del Bien Común; SERNANP = Servicio Nacional de Áreas Naturales Protegidas; SRTM = Shuttle Radar Topography Mission.

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neoliberal system, albeit in the sense of "We are using the system to fight the system" (Hale, 2006, p. 111). Indigenous members of the GMMRU argued that not all indigenous leaders agree with their involvement in the GMMRU: "The monitoring group is a sedative"; "That group does nothing"; "Much better if we begin a strike on the river." A few years earlier, indigenous leaders in Ucayali did block the Ucayali River in an organized and controversial demonstration against the laws of the García regime (Hughes, 2010). Were these the two main options for resistance: GMMRU or blockades? One leader acknowledged, "If there is no GMMRU, there is a mobilization." Thus, the indigenous members of the GMMRU appeared pragmatic, taking advantage of the availability of a persuasive science, and seeing this as empowering them to reach their objectives rather than marginalizing their ways of knowing. The leaders also acknowledged the trade-offs of membership in the GMMRU. At the same time, their GMMRU participation did not forgo them the right to blockade later. In any case, they stayed with the GMMRU and the modeling study.

The objections from the GMMRU regarding the use of the modeling study stemmed primarily from the model promoting one corridor over others, rather than negating the transportation corridor concept entirely. Related to this, the GMMRU thought Peru's MTC, lacking the technical skill, geographic information, funding, and motivation to produce a similar study, would instead just appropriate the study's recommended path as the desired route and accelerate the construction process. One indigenous leader shared the thought, "the information is good, but the government can use this for their own goals." The model's focus on only one half of the transboundary corridor alarmed the GMMRU. If Peru began building their half of the road, two possibilities could result: The road might not link to the route being planned in Brazil or Peru's active road construction could be used as a means to persuade the Brazilian anti-infrastructure contingent to accept the road as inevitable. Perhaps even more damaging than a road through a transboundary protected area is a road that simply leads up to the protected area border, inviting uncontrolled colonization and extraction.

GMMRU grapples with the state

The GMMRU needed to hold the state accountable, but all of their legal and political skill was necessary to rein in the MTC and verify the quality of their information. First, the GMMRU organized an inter-institutional meeting concerning the Pucallpa–Cruzeiro do Sul corridor on August 20, 2010. But to the frustration of all, the MTC, although invited, did not attend. In their absence, Peru's national director of IIRSA tried to mollify those present by assuring them that only studies were being proposed, and that once these were completed, a meeting in Pucallpa would increase participatory dialogue concerning the informative results. Representatives from indigenous

organizations shared their concern about the continued lack of dialogue, and the impact this road would have on local populations. Their concerns were not allayed when an Ucayali congressman opined the road to be a goal of powerful loggers (Faquín et al., 2010).

Previous to the meeting, in June, the GMMRU had sent a formal request asking for the information the MTC was using to create the Pucallpa–Cruzeiro do Sul road corridor project. The MTC responded by saying that the draft pre-investment profile study was in process so a contractor could then be hired to conduct the studies, which the MTC would share on the Internet (López Benavides, 2010). Unsatisfied, the GMMRU met with the vice minister of transportation and the executive director of Provías and received assurances that seven alternative routes and various means of transportation were being considered (Guimaraes et al., 2011). Provías opened the competition to find a contractor to conduct the preliminary studies, and published the terms on the Internet (Provías Nacional, 2010). The GMMRU quickly contested these terms in a letter to the presidents of Peru and Brazil, finding that the terms remained entirely focused on monument No. 67, continued asking for only three distinct routes, and did not consider the opinion of indigenous peoples, the Peruvian park service, Brazil, nor the corridor's economic feasibility and degree of environmental impact (GMMRU, 2010). On December 17, 2010, the competition was annulled due to technical errors in the two proposals submitted (Collantes Becerra, 2010). The GMMRU was fearful of this possibility, given that the MTC could invoke the *Menor Cuantia*, or insufficient bid, rule which allows the state to select their own choice of consultant, potentially the goal all along, in the case of insufficient quantity and quality of applications.

In August 2011, the MTC awarded Pucallpa Road Consortium (PRC), a small consultancy, US$425,000 to conduct the preliminary study (Provías Nacional, 2011). The GMMRU's efforts had changed the terms of reference to require the analysis of environmental and social impacts, and meetings with indigenous groups in the proposed corridor. However, the PRC's response was cursory: short community meetings along the corridor simply to comply with the terms. As the PRC mapped potential routes in the field, the GMMRU took to the field to gauge local opinions of the road. Unlike most GMMRU members and indigenous federation leaders, riverine populations and indigenous communities along the route expressed some level of support for the road, recognizing the educational, health, and economic benefits of improved access. They displayed no knowledge of the potential negative impacts of roads. The GMMRU also recorded indigenous testimonies of the PRC registering GPS points along the route. One resident shared this information:

> Three engineers arrived in the community and took points with a GPS in the very house of a community member. We asked them,

what are you doing? They said the national government plans to build the Pucallpa-Brazil road here. You have nothing to do with this plan, because it is a state decision.
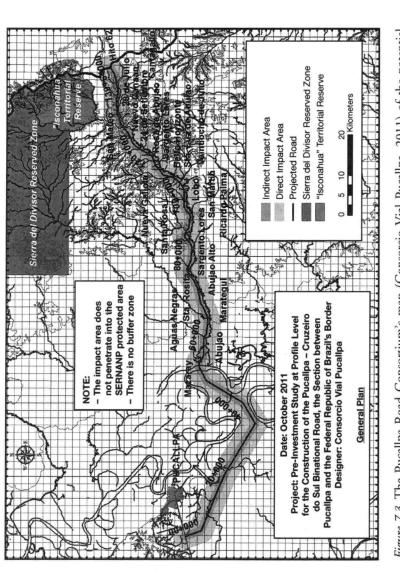
(M. P., 2012)

If local inhabitants had little to do with the state's plans, accurate maps also proved unimportant. As can be seen in Figure 7.3 (below), the PRC's map of their preferred 139 km route displayed an ignorance of the physical and human geography of the region. The hydrography represented dates back at least to 1983, with satellite imagery showing the section of the Ucayali River in the PRC map to now have five new meanders including a channel 8 km long which shortened the Ucayali River by over 60 km, creating an oxbow lake 68 km long (Abizaid, 2005). Not only does the map fail to show the actual river courses, and associated floodplains, but population centers are also often duplicated, misspelled, and incorrectly located: note the floating toponyms without georeferencing. The map fails to show the polygons of titled indigenous territories that fall within or are proximate to the planned road's area of influence: Both Santa Rosa and San Mateo are incorrectly located by name, with no indication of the location and extent of their territorial limits (Figure 7.3). The indirect and direct areas of influence are reversed in the legend, hardly inspiring confidence in the quality of PRC's environmental impact assessment. Finally, the map indicates the route to end at monument No. 62, the Repollo–Aquiniyaco portage trail crossing along the Jurua–Ucayali watershed divide, but published fieldwork finds monument No. 62 approximately 3.5 km to the southeast (Salisbury et al., 2010).

As the PRC finished up their preliminary study of the road in the summer of 2012, politicians in Acre and Ucayali continued to call for a railroad. The President of Ucayali stated, "We need a railway for environmental justice" (Kukurelo, 2012). Politicians in Lima also began arguing for a transboundary railway to alleviate poverty (Gamarra Saldivar, 2012). This railway development rhetoric could also be seen in two Peruvian railway proposals, FERRIPEB and FETAB, with FERRIPEB seeking private financing due to the "public necessity and national interest of the geopolitical bioceanic Peru-Brazil project . . . " (Congreso de la República, 2010, p. 428842). While these railway proposals appear preferable to the road, they lack public financing and have uncertain profitability. Also, their existence in no way guarantees the dissolution of the road project, and may indicate a future where two corridors, road *and* rail, bisect the Sierra del Divisor.

Conclusion

The information gathering, analysis, and activism of the GMMRU reveals ambiguity and misinformation at all scales concerning the Pucallpa–Cruzeiro do Sul transportation corridor. At the continental scale, the IIRSA database

Figure 7.3 The Pucallpa Road Consortium's map (Consorcio Vial Pucallpa, 2011) of the potential road's area of influence indicates a very poor understanding of the physical and human geography of the region.

Source: Figure remade and translated by the University of Richmond's Spatial Analysis lab.

indicates confusion as to whether the IIRSA-backed project is road, rail, or both; and also whether this project will be truly transboundary or simply facilitate illegal extraction by starting and ending in Peru. Within the Peruvian government, a road project continues to be planned despite objections and protestations over numerous procedural errors, lack of participation, and a profound ignorance of local geography by both the MTC and their chosen engineering firm, the PRC. Meanwhile, two different national rail projects languish in the absence of public money, but their coverage by the media confuses both the public and the policy makers. At the state level, both Acre and Ucayali governors reject the road and back an ecological railway. Nevertheless, Ucayali's transportation plan has a Pucallpa–Cruzeiro do Sul road planned for 2016. Interviews with local people along the proposed route in Peru indicate some support for a road, but indigenous leaders state that only the GMMRU's semi-successful efforts to resist the megaproject through legal process and scientific studies have prevented an indigenous anti-road strike.

Some political ecologists might argue for the strike as the only means for indigenous people to cleanly resist the neoliberal imposition of megaprojects, rather than compromise their knowledge and culture through GMMRU affiliation with conservation NGOs, science-based studies, and process-based protest through the existing political system. But what if the indigenous leaders prefer the pragmatic strategy of working through the GMMRU? Land change scientists, on the other hand, might see the ambiguity detailed in the previous paragraph as an opportunity for a scientific study to cleanly provide policy makers with the detailed and unbiased information necessary to make the best decision possible. But are these scientists secure working alongside a group with a clear agenda? Ultimately the indigenous members of the GMMRU appear at ease with the contradictions of working against the system from within the system, and of employing a portfolio of protest options to resist the imposition of megaprojects on their landscapes. To accomplish this goal, they see science as an opportunity rather than a danger, and PE as a strategy rather than a way of life. In short, the indigenous GMMRU members appear less radical and more pragmatic than many political ecologists. They seek a persuasive transboundary LCS model to combine with the ongoing PE deconstruction of the development discourses and active resistance through legal and bureaucratic process. In this sense, activist research partners must become similarly comfortable with the cognitive dissonance that may result from combining PE and LCS. Contradiction underscores the political realities of all the GMMRU partners, and by engaging this contradiction, researchers may bridge boundaries to not only generate the knowledge required to contest the immediate inequality, but also inform the theory needed to understand the contradictions of reconciling conservation and development with social and environmental justice. The contradictions and cognitive dissonance described here provide challenges for the

practice of sustainability science, reminding sustainability scientists to struggle not only with problem frames fusing LSC and PE (Turner & Robbins, 2008), but also to engage with problems as framed by local people.

Acknowledgments

Notes

1 Descendants of the Nawa people emerged from the farms and forests of the Sierra do Divisor National Park to claim indigenous heritage and territory in the latter part of the 1990s (Correia, 2005).
2 Offen (2004) and Robbins (2004) analyze Nietschmann's fascinating intellectual and activist struggles in Nicaragua.
3 French Guiana did not attend the meeting.
4 The group of indigenous leaders including the vice president of ORAU (Organización Regional AIDESEP [Interethnic Development Association of the Peruvian Rainforest] Ucayali) and the former vice president of AIDESEP met on June 2, 2012 to discuss science and indigenous activism.

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