



## Variety of indigenous peoples' opinions of large infrastructure projects: The TIPNIS road in the Bolivian Amazon



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### ABSTRACT

Due to an unprecedented expansion of infrastructure projects, extensive areas of the planet are opened to new environmental pressures. Infrastructure projects are often contentious and generate resistance, particularly in territories inhabited by Indigenous Peoples. In this work, we study local attitudes towards the construction of a controversial road that would cross the Isiboro-Sécure National Park and Indigenous Territory (TIPNIS), one of Bolivia's main biodiversity hotspots. We analyze the attitudes of lowland Indigenous Peoples living in the Multiethnic Indigenous Territory (TIM), an area neighboring TIPNIS that would be affected by the road. We rely on two yearly face-to-face surveys of 857 individuals in 24 villages, implemented in September-December 2012 and 2013 when the conflict was still high. Results suggest that, in contrast to the large-scale opposition to the road by lowland Indigenous Peoples living in TIPNIS, those living in TIM were generally supportive of the road construction, mainly due to the expectation of better economic opportunities that it would bring. Moreover, the share of people with a positive attitude towards the road was higher among people in richer households, arguably because people with stronger links to the market would likely benefit most from the new road. Beyond the specific setting, our results show that there can be substantial heterogeneity of local attitudes towards the construction of large infrastructure projects, attitudes shaped by household characteristics.

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### 1. Introduction

The construction of large-scale infrastructure, such as roads, hydroelectric dams, or oil and gas pipelines, is opening up extensive areas in the tropics to new environmental pressures (Finer et al., 2015; Gallice, Larrea-Gallegos, & Vázquez-Rowe, 2017; Johansson, Fader, Seaquist, & Nicholas, 2016; Laurance et al., 2014). A growing body of research documents the many environmental (e.g., land encroachment, wildlife poaching, forest fragmentation, exotic-species invasions, illegal mining) and social impacts (e.g., land speculation, corruption, political conflict) of these projects, particularly on the lives of local inhabitants (e.g., Laurance & Arrea, 2017; Martínez-Alier, Temper, Del Bene, & Scheidel,

2016; Perz, Cabrera, Carvalho, Castillo, & Barnes, 2010; van Dijck, 2008). In view of these impacts, new infrastructure projects have often sparked controversy and resistance from local to global scales (Bebbington & Bebbington, 2011; Martínez-Alier et al., 2016; Robinson, 2003). Scholars have documented many cases of contestation to infrastructure projects in the Global South (e.g., Martin, 2011; Orta-Martínez & Finer, 2010; Temper & Martínez-Alier, 2013), but also cases in Western countries, such as the opposition of the Sioux Tribe of South Dakota (USA) to the construction of an oil pipeline through their lands (Cozzarelli et al., 2017; Januchowski-Hartley, Hilborn, Crocker, & Murphy, 2016; Shrestha, Chilkoor, Wilder, Gadhamshetty, & Stone, 2017).

Different theoretical approaches have been developed to examine local responses towards infrastructure projects. Sociologists and behavioral economists have concentrated on the psychological mechanisms shaping responses (e.g., Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000; Boudet et al., 2014). Cultural anthropologists have looked at how local responses towards infrastructure projects are shaped by worldviews and different ways of relating

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to the environment (e.g., Harvey & Knox, 2015). Political ecologists have tried to situate local responses in their broader sociopolitical context, examining their environmental justice dimensions and their links to emerging political economies (e.g., Temper & Martínez-Alier, 2013; Harnish, Cliggett, & Scudder, 2019).

Despite the different theoretical approaches, three patterns characterize previous research on local responses towards infrastructure projects. First, prior research has more often documented local opposition than local support to infrastructure projects (Hensengerth, 2017; Hirsch, 2017; Walker & Simmons, 2018). Second, previous works have focused on the role of social movements, paying less attention to individual opinions (defined here as the expression of the judgment of an individual about a particular set of facts) (e.g., Sikor & Newell, 2014; Temper, Del Bene, & Martínez-Alier, 2015; Thorkildsen, 2018; Veltmeyer & Bowles, 2014). And third, this literature has often portrayed Indigenous Peoples as monolithic blocks of resistance towards new infrastructure development, often assuming Indigenous leaders represent the voices of all (Bebbington & Bebbington, 2011; de la Cuadra, 2015; Orta-Martínez & Finer, 2010). Thus, while some researchers have examined intracultural variation in responses to infrastructure projects (Boudet et al., 2014; Kontogianni, Tourkolia, Skourtos, & Damigos, 2014; Siciliano, Urban, Kim, & Dara Lonn, 2015), little research documents the diversity of opinions in a group (McNeish, 2013).

There are many reasons why opinions of infrastructure projects might vary within a group. For example, as with many other social and environmental policies (Bhattarai, Beilin, & Ford, 2015; Denton, 2002; Jost et al., 2016; Ogra, 2008, 2012), there might be gendered differences (Veuthey & Gerber, 2012) that, if not addressed, could exacerbate gender economic disparities (Colson, 1999; Hanna, Vanclay, Langdon, & Arts, 2016; Lebel, Lebel, Singphonphrai, Duangsuwan, & Zhou, 2018; Lin, 2001). Besides gender, other socio-economic characteristics of individuals, households, and villages, such as age, income, and urban proximity shape individual opinions of new infrastructure projects and perceptions of the costs and benefits of the project (Diedrich & Aswani, 2016; Finucane et al., 2000; Kelman et al., 2016).

In this article, we analyze individual opinions of the construction of a controversial road that would have crossed the Isiboro-Sécure National Park and Indigenous Territory (TIPNIS, for its Spanish acronym), one of Bolivia's main biodiversity hotspots (Fernández-Llamazares et al., 2018). Previous work on responses to this planned road has largely focused either on Indigenous Peoples within TIPNIS (Fabricant & Postero, 2015; Laing, 2015; McNeish, 2013) or on actors with political representation (Reyes-García, Andres-Conejero, Díaz-Reviriego, Fernández-Llamazares, & Molina, 2019), largely portraying the conflict as one of Indigenous Peoples' sovereignty only within TIPNIS (e.g., Laing, 2015; Hope, 2016). Surprisingly, local opinions in adjacent Indigenous Peoples' territories, which would also be affected by the road, remain unknown. We focus on one such territory, the Multiethnic Indigenous Territory (*Territorio Indígena Multiétnico*; hereinafter TIM). We have three main goals. First, we examine local opinions of the proposed road and changes in opinion between 2012 and 2013, before and after the peak of the conflict. Second, we analyze reasons behind the individual opinions given. Third, we explore which specific individual-, household-, and village-level characteristics are associated with positive opinions of the road. Overall, our work brings to light much diversity in local opinions and arguments related to the construction of a large infrastructure project and emphasizes how such diversity adds complexity to gaining local consent for such projects. Our study has one policy implication in and beyond Bolivia: Institutions wishing to gain local consent before undertaking infrastructure project will face obstacles if local opinions vary as much as they do in our case study.

## 2. Case study

The proposal to build a road crossing the Isiboro-Sécure Indigenous Territory and National Park (TIPNIS) in the Bolivian Amazon has sparked one of the most noticeable social-environmental conflicts in South America's history (Fernández-Llamazares et al., 2018; Hope, 2016; Romero-Muñoz, Fernández-Llamazares, Moraes, Larrea-Alcázar, & Wordley, 2019). The proposal has been contentious for three reasons. First, the road would have crossed a national park protected from infrastructure development by national laws. The possibility of breaking the law ignited opposition from environmental groups (Mendizábal, 2012; Calla, 2011; Fernández-Llamazares & Rocha, 2015). Second, the road would have crossed areas officially recognized as Indigenous Peoples' territories, without having requested the Free, Prior and Informed Consent (FPIC) of the Indigenous communities living in these areas, required by both national and international laws (Cariño, 2005; MacInnes, Colchester, & Whitmore, 2017; McNeish, 2013; Sanchez-López, 2015). This is particularly significant because Bolivia is a signatory of the 1989 binding law of the International Labour Organization (ILO) Convention 169 concerning Indigenous and Tribal peoples in Independent Countries, which includes rights to give or withhold FPIC and to benefit from any activities undertaken in their territory.

Finally, the road was contentious because ethnic groups in the area differed in their views about its potential impacts. With over 50% of people self-identifying as Indigenous, Bolivia currently has one of the highest share of Indigenous People in Latin America, with contrasting differences between highland (90% of Bolivia Indigenous populations) and lowland Indigenous Peoples (INE, 2015, pp. 28–29; Reimão & Taş, 2017). TIPNIS is home to both highland and lowland Indigenous Peoples. The area was originally inhabited by lowland groups living along the Isiboro and Sécure rivers. For subsistence, these groups relied on horticulture, hunting, fishing, and plant gathering. During the 1970s, Aymara and Quechua colonizers from the highlands started to colonize the southern part of the TIPNIS. In contrast with lowland groups, people of highland origin live in permanent settlements and rely on the cash economy, notably coca cultivation (McNeish, 2013; Lalander, 2017).

### 2.1. Background and context of the road through TIPNIS

As part of the Initiative for the Integration of the Regional Infrastructure of South America, IIRSA, (van Dijk, 2008; Zibechi, 2006), in 2009 the Bolivian government announced the plan to construct a highway connecting the town of Villa Tunari (department of Cochabamba) and the town of San Ignacio de Moxos (department of Beni) (Fig. 1). The proposed road had three sections. Section I crossed an area known as Polygon 7, inhabited largely by people of Aymara and Quechua descent. Section II crossed TIPNIS, one of Bolivia's most biologically diverse protected area and the ancestral homeland of three lowland Indigenous groups (Moxeño,<sup>1</sup> Yuracaré, and Tsimane') (Fernández-Llamazares et al., 2018; Thomas, 2009). Finally, Section III crossed TIM, an Indigenous territory inhabited by Moxeño, Yuracaré, Movima, and Tsimane'.

Indigenous Peoples of highland origin, mostly settled around Section I of the proposed road and welcomed the project because they thought it would bring economic improvements (Reyes-García et al., 2019). In contrast, Section II was contentious from the outset and was opposed by lowland Indigenous Peoples in TIPNIS (Petherick, 2011). Finally, the views about the road of

<sup>1</sup> Following Diedrich and Aswani (2011), we group Trinitarios, Ignacianos, Loretanos, and Javerianos under the term Moxeño.

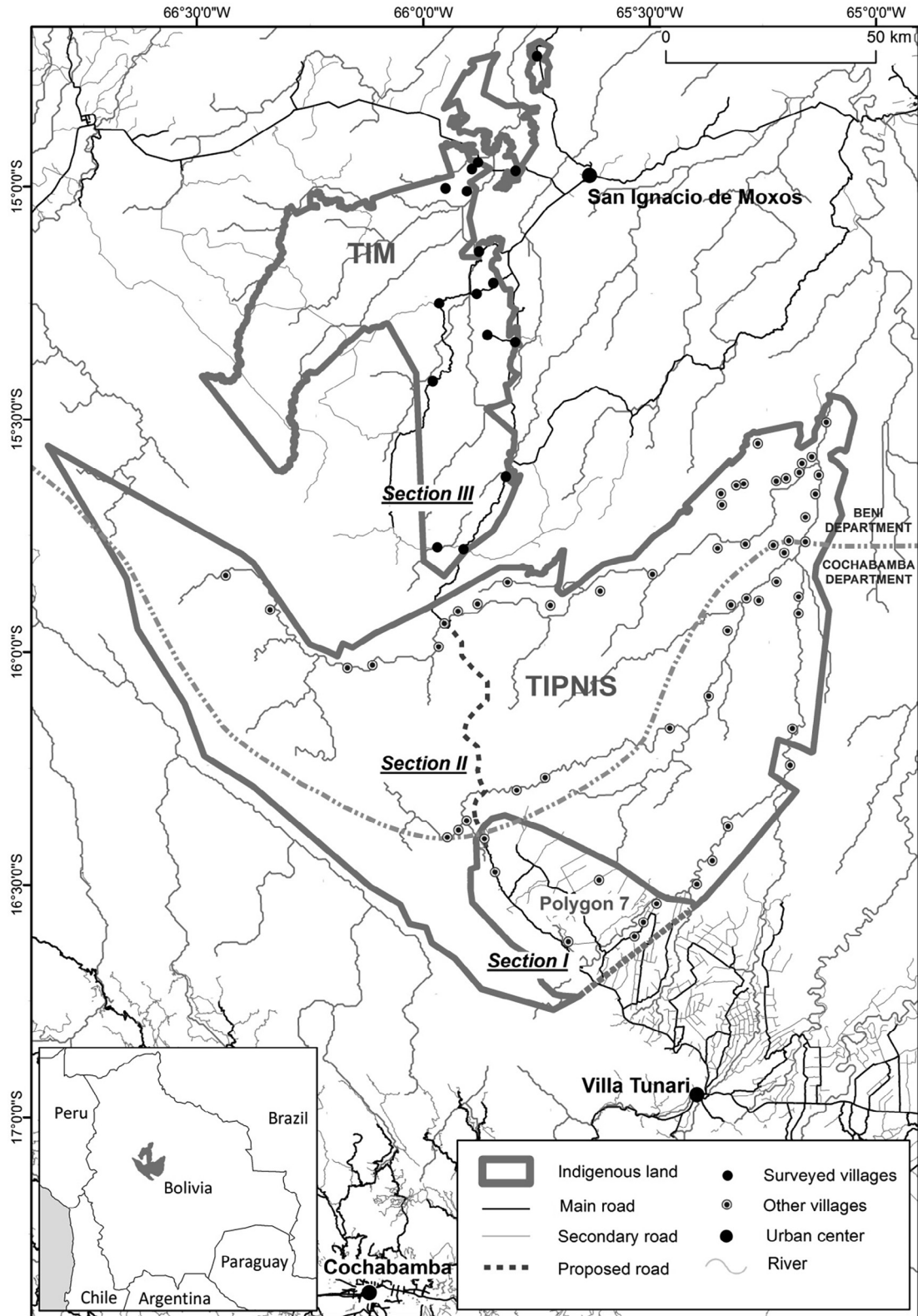


Fig. 1. Map of the study area showing the location of TIPNIS and TIM and the proposed road.

Indigenous Peoples in Section III remain undocumented, but portrayed in the media as favorable to the construction of the road (García Linera, 2014).

Because Indigenous Peoples in TIPNIS opposed the construction of the road, the proposed road drew media attention and frayed the

government (Mendizábal, 2012; Calla, 2011). The contract to build the road was signed in 2009 with a Brazilian company and the conflict was sharp during 2011–2012. Indeed, after several months of frustrated negotiations to persuade the government to abort the project, the opposition peaked between August and October

2011, when about 1,000 people marched from the lowland city of Trinidad (department of Beni) to Bolivia's capital, La Paz, in the highlands. The march covered a distance of 600 km and a climb of more than 4000 m. Marchers managed to persuade the government to pass a law granting TIPNIS the status of 'intangible' (Delgado-Pugley, 2013), which would ban the construction of the road. However, soon after (December 2011-February 2012), Indigenous Peoples of highland origin organized another march in favor of the road, which resulted in a new law according to which the government would consult TIPNIS inhabitants about the construction of the road. Lowland Indigenous Peoples organized yet another march to demand the abolishment of the consultation law (April-May 2012), but negotiations were unsuccessful. During October-December 2012 the government consulted with villages in TIPNIS about the feasibility of constructing the road (Fabricant & Postero, 2015; Fontana & Grugel, 2016). The consultation consisted of community meetings which started with government representatives presenting information about the proposed road followed by a discussion in which the community collectively decided whether they endorsed the project (MOPV and MAAA, 2008). Results of the consultation showed that 80% of TIPNIS communities supported the construction of the road, although several organizations contested the results claiming that there had been coercion and manipulation and that many communities had not been consulted (FIDH & APDHB, 2013). After the consultation, the conflict subsided but was reactivated in August 2017 with a new law annulling the intangibility of TIPNIS (Fernández-Llamazares et al., 2018).

## 2.2. The Territorio Indígena Multiétnico (TIM)

The Multiethnic Indigenous Territory (Lat S: 14° 30' – 15° 51'; Long W: 65° 30' – 65° 36') was recognized in 1990 through Supreme Decree 22611, which granted around 400,000 ha of communal land to Moxeño, Yuracaré, Movima, and Tsimane' living in that area. The area has a mean annual temperature of 26 °C and a mean annual rainfall of 1431 mm, with important interannual climatic variation (Díaz-Astete, 2011). The climate is markedly seasonal, with four months with less than 100 mm of rainfall and episodic cold spells during June-August. TIM's altitude varies between 150 and 440 m above sea level. Most of the area is covered with savannas and moist lowland forests with much biodiversity. The area hosts several plant species of concern to conservationists, including some of the last patches of mahogany (*Swietenia macrophylla*) in Bolivia (Kometter et al., 2004).

The area is also home to four Amazonian Indigenous groups, Moxeño, Yuracaré, Movima, and Tsimane', and to a growing number of highlanders who have moved to the area since the 1960s (Bauchet, Undurraga, Reyes-García, Behrman, & Godoy, 2018). The main economic activity of the lowland Indigenous groups is slash-and-burn cultivation, supplemented with fishing, hunting, and plant collection. These groups also engage in wage labor in cattle ranches and logging camps, with much variation between groups. Moxeño have had long exposure to Jesuit missions and Westerners (Block, 1994). Fluent in Spanish, literate, and acculturated into the livestock culture, Moxeño have been useful ranchhands for Spanish cattle owners and many have now their own cattle. Movima and, to a lesser extent, Yuracaré have also had relatively long exposure to outsiders. Most Yuracaré and Movima are fluent in Spanish and are well-integrated into the market economy and often also work as ranch-hands (Thomas, 2012). Tsimane' have historically been less exposed to outsiders and rely more on horticulture and foraging than on seasonal wage labor in cattle ranches or logging camps (Huanca, 2008; Reyes-García et al., 2014; Ringhofer, 2010).

## 3. Methods

This study draws on two yearly face-to-face surveys of 857 adults (age  $\geq 16$ ) in 24 villages in TIM (Fig. 1). Fieldwork took place during September-December 2012 and 2013, when the conflict about the road was still high but beginning to weaken. The surveys included questions about (a) respondents' opinions of the road and (b) individual and household demographic and socio-economic characteristics. Before any data collection, we obtained FPIC from villages and individuals participating in the study, as well as the agreement of the political organization representing the Indigenous groups in TIM<sup>2</sup>. We also approached the political leaders of TIPNIS to inform them about this research, which they largely welcomed.

*Sample:* Of the 27 villages in TIM, we carried out surveys in 24 villages (89%). Due to high transport costs, we could not access three villages. Only 29% of the villages visited were accessible all year by motorized vehicles. Villages were inhabited by households from different lowland groups and were typically small (mean = 28 households/village in 2012, SD = 19 households/village). Table 1 shows the number of villages and the population of households and adults in 2012 and 2013. Population figures came from the registry of village authorities provided to us at the time of the survey.

In each household, we interviewed the male and the female heads present at the moment of the interview and willing to participate, but not other adults in the household. Thus, of the 1544 adults present in 2012, we interviewed 1062 household heads (68.8%). For our analysis we only retained data from adults 1) who were surveyed in 2012 and again in 2013; 2) who self-identified with a lowland Indigenous group (i.e., Tsimane', Moxeño, Yuracaré, and Movima) and 3) who answered questions on opinions about the road. Thus, our final sample contains 747 people in regressions using 2012 data and to 776 people in regressions using 2013 data, which represents 67.7% and 55.0% of all the adults in the studied villages (Table 2).

*Opinions of the road:* To measure opinions of the road, we followed Allendorf (2007) and Triguero-Mas, Olomi-Sola, Jha, Zorondo-Rodriguez, and Reyes-García (2009) and asked respondents: "Are you in favor of or against the construction of the TIPNIS road?" We coded responses as did not know (=0), in favor (=1), against (=2), uncertain (=3), and refused to answer (=4). We classified as uncertain people who thought the road might not affect them or might have positive and negative impacts. We then asked respondents to tell us their reasons and recorded the information *verbatim*.

*Individual-level information:* We collected information on respondents' sex, age, maximum school grade attained, and self-reported ethnicity. For the analysis, we differentiated between people who had never attended school, people who had attended but not completed primary school, and people who had completed primary school. Because the sample for some of the ethnic groups was small, we lumped people into three groups according to the group's historical exposure to outsiders: 1) Moxeño (n = 626; 73.0%), 2) Yuracaré and Movima (n = 72; 8.4%), and 3) Tsimane' (n = 159; 18.6%) (Supplementary Material, Table S1, Column 2).

*Household-level information:* Household-level information included household composition, monetary income, and land area cleared for agriculture. We used information on household composition to create a variable for the number of adults ( $\geq 16$  years old) and another for the number of children (<16 years old) in the

<sup>2</sup> This research adhered to the Code of Ethics of the International Society of Ethnobiology (ISE) and the study received IRB approval from Brandeis University (Protocol #10090: "The effects of roads on indigenous people's well-being and use of natural resources: A natural experiment in lowland Bolivia").

**Table 1**  
Population of households and adults and number of people interviewed.

	2012			2013		
	Total	Interviewed	%	Total	Interviewed	%
Villages	27	24	88.89	27	24	88.89
Households						
Total	679	621	91.46	675	631	93.48
Selected for analysis*	672	529	78.72	669	529	79.07
Adults						
Total	1544	1062	68.78	1626	1099	67.59
Selected for analysis*	1144	774	67.66	1411	776	55.00

\*We retained data from adults (age  $\geq 16$ ) 1) who were interviewed in both survey years; 2) who self-identified as Tsimane', Moxeño, Yuracaré, or Movima and 3) who answered questions on opinions of the road.

**Table 2**  
Summary statistics of the sample for multivariate analysis. Cells indicate the mean and standard deviation (in parenthesis) or the percentage (%) for categorical variables.

	(1) 2012 <sup>a</sup>	(2) 2013 <sup>b</sup>
<b>Part A. Individual characteristics</b>		
Number of individuals	747	776
Age in years	41.8 (15.20)	42.4 (15.21)
Female	51.7%	51.3%
Schooling		
No-schooling	20.08%	20.62%
Some primary	49.80%	48.58%
Completed primary	30.12%	30.80%
Ethnicity		
Tsimane'	13.52%	14.82%
Moxeño	77.38%	76.16%
Yuracaré and Movima	9.10%	9.02%
<b>Part B. Household characteristics</b>		
Number of households	469	492
Number of adults ( $\geq 16$ years) in household	2.58 (1.04)	2.67 (1.11)
Number of children in household	2.34 (1.92)	2.43 (1.94)
Daily household income (PPP)	4.40 (7.96)	6.00 (10.91)
Land area cleared, in tareas (10 tareas = 1 ha)	41.16 (47.76)	42.64 (46.13)
<b>Panel C. Village characteristics</b>		
Number of villages	24	24
Village size, number of households	28.0 (18.62)	27.9 (18.60)
Year-round village road access	54.2%	54.2%

<sup>a</sup> Household heads interviewed in 2012 and 2013 who self-identify with a lowland Indigenous group and provided a response to the question on road perception in the 2012 survey.

<sup>b</sup> Household heads interviewed in 2012 and 2013 who self-identify with a lowland Indigenous group and provided a response to the question on road perception in the 2013 survey.

household. To calculate household monetary income, we collected information on cash earnings from the sale of goods and from wage labor by the two household heads during the 14 days before the interview. Income measures were aggregated and transformed to daily income in Purchasing Power Parity (PPP) US\$. The total forest area cleared for agriculture included the clearing of old-growth and fallow forests during the year before the interview. Forest clearance constitutes an additional but separate measure of income as about 40% of households in the sample did not earn cash.

**Village-level information:** We interviewed a village representative (e.g., school teacher) to collect information on the number of households in a village and year-round access to the village by a motor vehicle.

**Data analysis:** We organize the analysis around the three aims of the article. First, to examine local opinions of the proposed road, we describe the opinions and look at changes in opinions between 2012 and 2013. Second, we describe people's explanations for their opinions. To do so, we recorded verbatim responses, and coded responses as reasons in support or against the road. In coding

responses, we tried to remain faithful to the verbatim reasons but had to exercise our own judgement in how to code. As the number of explanations varied from one person to another—with some people providing more than one explanation and some none—the total number of explanations during the two years ( $n = 1689$ ) does not match the number of respondents ( $n = 1523$ ). Moreover, as about 10% of the people interviewed refused to answer questions about their opinion of the road, we also analyzed whether these people differed in any of the measured characteristics from the rest of the sample.

Last, to explore which individual-, household-, and village-level characteristics predicted support for the road we estimated the parameters for the following regression:

$$Positive_{iht} = \gamma_{0v} + \gamma_1 I_{iht} + \gamma_2 H_{iht} + \gamma_3 V_{vt} + \varepsilon_{ih} \quad (1)$$

where *Positive* is a binary variable that took the value of 1 if individual *i* of household *h* in village *v* at time *t* said they were in favor of the road construction, and 0 for all the other responses, except for people who chose not to answer this question who were excluded from this analysis. *I* is a vector of variables that includes individual-level characteristics of the respondent. *H* is a vector of variables that includes household-level characteristics and *V* is a vector of variables that includes village-level characteristics.  $\varepsilon_{ih}$  is the error term. Standard errors were clustered at the village level. We used ordinary least squares regressions, first analyzing 2012 and 2013 data separately and then analyzing the pooled sample controlling for survey year.

Additionally, to assess whether the significant individual- and household-level predictors of favoring the road were fixed or varied randomly across villages we used a hierarchical linear model in which we allowed significant predictors in the fixed-effect estimation from equation (1) to vary randomly between villages. We did so because some village traits, like road access, could be associated with opinions of the road and could thus influence the associations between individual- and household-level predictors and opinions of the road.

## 4. Results

### 4.1. Opinions of the proposed road and changes in opinion

Across the two years, most respondents favored the construction of the road (57.3% in 2012 and 63% in 2013; Table 3). Other respondents were divided between those who were against the road (16.7% in 2012 and 12.5% in 2013), those who were uncertain (about 11% in either year), and those who did not want to answer the question (12.8% in 2012 and 9.4% in 2013). Only 3% of respondents both in 2012 and 2013 said they did not know about the road project.

**Table 3**  
Percentage of respondents holding different opinions of the construction of the TIPNIS road; years 2012 and 2013 (n = 857).

2013	2012					
	Does not know	For	Against	Un-certain	Did not answer	Total
Does not know	0.0	1.6	0.6	0.0	0.9	3.1
For	1.9	44.6	7.2	5.0	4.9	63.6
Against	0.4	4.0	4.8	1.7	1.6	12.5
Uncertain	0.2	3.5	3.0	3.5	1.0	11.3
Did not answer	0.2	3.6	1.0	0.2	4.3	9.4
Total	2.7	57.3	16.7	10.5	12.8	100

Does not know = undecided, still forming an opinion; Uncertain = says effects are ambiguous; Did not answer = missing, did not want to answer.

Within the sample, opinions about the road changed substantially after only one year, with a general increase in positive opinions (Table 3). The share of respondents with a positive opinion increased from 57.3% to 63.6%, while the share of respondents with a negative opinion and who did not want to provide an answer decreased (16.7% to 12.5% and 12.8% to 9.4% respectively). The share of respondents with an uncertain opinion did not change (11%).

The detailed analysis of changes in opinion between the two survey years confirms the trend towards increasing road acceptance. The analysis shows that 490 people (57% of the sample) did not change their opinion from 2012 to 2013. Most of them (77%, or 45% of all individuals) held a positive opinion of the road during the two survey rounds. In addition, most respondents who changed their mind changed from a negative (7.2% of all individuals) or uncertain opinion (5.0% of all individuals) towards a positive opinion. Of those who favored the project in 2012 but changed their mind in 2013, 31% (4% of all individuals) turned against the construction of the road, 28% (3.5% of all individuals) became uncertain, and the remainder did not know or did not answer (Table 3).

The respondents who did not state their opinion of the construction of the road were not randomly distributed across the sample (Table 4). More than half of the people who did not answer this question were Tsimane' (52.7% in 2012 and 54.3% in 2013). Moreover, the share of people who did not reveal their preferences was higher among women and people with no schooling, particularly in 2013. In 2012, the percentage of people who did not reveal their preferences was higher among those who lived in villages without year-round road access than among those who lived in villages with year-round road access (65.4% vs. 34.6%), but the opposite was true in 2013. In 2013 45.7% of respondents in villages without road access did not answer, lower than the share of respondent in villages with year-round road access (54.3%).

#### 4.2. People's reasons for their opinions of the proposed road

*Reasons for supporting the road.* Since most people favored the road, it is not surprising that we recorded more reasons in support for the road than against the road (Table 5). Thus, in 2012 respondents gave 582 explanations for supporting the construction of the road, but only 209 explanations for opposing it. Additionally, over time, respondents found more reasons to support the road (from 582 to 629) and fewer to oppose it (from 209 to 152). Most people who wanted the road argued that the road would improve mobility and access to towns with markets; depending on the year, 34.7% to 39.4% of responses centered on these two reasons. Among those who wanted the road, few mentioned improved access to health and education; in 2012 only 2.6% mentioned health and education and in 2013 and even lower percent (1.9%).

*Reasons for opposing the road.* Among the reasons for disliking the road, the feeling of fear and insecurity was the most common,

**Table 4**  
Percentage of people in the sample who refused to give their opinion about the road in 2012 and 2013.

	2012	2013
Household heads in the sample	857	857
Number who refuse to answer	110	83
Refusals, as % of sample	12.8	9.4
Ethnicity (%)		
Tsimane'	52.7	54.3
Moxeño	43.6	43.2
Yuracaré and Movima	3.6	2.5
Gender (%)		
Men	39.1	32.1
Women	60.9	67.9
Schooling (%)		
None	75.4	85.2
Any	24.6	14.8
Year-round village road access (%)		
No	65.4	45.7
Yes	34.6	54.3

expressed in sentences around the idea that the road would bring criminals and drugs. These negative feelings accounted for 41.2% of the reasons in 2012 and for 43.4% in 2013. Concerns about the loss of land (~18% in either year), or threats to the environment (6.2% of the answers in 2012 and 9.2% in 2013) were not mentioned very often.

*Uncertain opinions.* A small part of the sample (10% in 2012 and 11% in 2013) expressed uncertain opinions about the potential effects of the road construction. Of those who do not had a clear opinion, most had the feeling that the road would not affect them (63.8% of people with uncertain opinion in 2012 and 72.9% in 2013), although some others argued that a road would be good if it was built outside TIPNIS (17.2% in 2012), was done after consent was obtained from Indigenous Peoples (8.6% in 2012), or had other modifications (5.2% in 2012). Only three respondents in 2012 and two in 2013 manifested that they did not care about the proposed construction of a road.

#### 4.3. Correlates of positive opinions about the construction of the road

Table 6 shows the results of ordinary least squares (OLS) regressions testing individual-, household- and village-level correlates of expressing a positive opinion about the proposed road in 2012 (column 1), 2013 (column 2), and in a sample with both years (column 3).

[i] *Individual-level characteristics.* Among individual-level characteristics, only the level of schooling predicted a positive opinion of the road, and only in 2012. People who had completed primary school were 19.8 percentage points less likely to endorse the construction of the road than people without any schooling ( $p = 0.02$ ). Age, sex, and ethnicity did not predict a person's opinion of the construction of the road in any of the two survey years.

**Table 5**  
Frequency and percentage of explanations (n = 1689) of opinions of the road.

	2012		2013	
	N	%	N	%
<b>Positive opinions. The road will</b>				
improve market access	229	39.4	239	38.0
improve transportation	225	38.7	218	34.7
bring development	94	16.2	107	17.0
lower prices of products	19	3.3	53	8.4
improve access to health/education services	15	2.6	12	1.9
Total	582	100	629	100
<b>Negative opinions. The road will</b>				
Increase crime and insecurity	86	41.2	66	43.4
facilitate encroachment from outsiders	61	29.2	36	23.7
weaken land rights	39	18.7	28	18.4
harm the environment	13	6.2	14	9.2
bring general negative impacts	10	4.8	8	5.3
Total	209	100	152	100
<b>Uncertain opinions. The road</b>				
will not affect us	37	63.8	43	72.9
might be good, but if outside TIPNIS	10	17.2	8	13.6
might be good, but if the government obtains consent from Indigenous Peoples	5	8.6	2	3.4
might be good, but with some modifications	3	5.2	4	6.8
Respondent did not care	3	5.2	2	3.4
Total	58	100	59	100

Positive opinions = supports the construction of the road. Negative opinion = against the construction of the road. Uncertain opinions = undecided because road could have positive and negative effects.

[ii] *Household-level characteristics.* Among household-level characteristics, the number of adults in a household bore a negative association with expressing a positive opinion of the road in both years. Each additional adult in a household was associated with a five percentage-point lower probability of endorsing the road in 2012 ( $p = 0.03$ ) and 2013 ( $p = 0.007$ ). Having an additional child in the household was not associated with the probability that respondents would endorse the road in any of the two survey years. Household income, but not land area cleared for agriculture, was associated with a higher likelihood of endorsing the road in 2013: a 10 PPP US dollar increase in household income would raise the probability of favoring the road by 3.55 percentage points ( $p = 0.002$ , column 2).

[iii] *Village-level characteristics.* None of the two village-level variables tested, village size and road access, showed a statistically significant association with the likelihood of endorsing the road in 2012. But in 2013 village population size and year-round road access predicted having a positive opinion of the road. Each additional household in a village was associated with a 0.2 greater probability that a respondent would endorse the road ( $p = 0.04$ , column 2). Respondents in villages with year-round road access were 8.5 percentage points more likely to approve of the road than their counterparts in more isolated villages ( $p = 0.03$ , column 2).

[iv] *Additional analyses.* To enhance the sample size, we combined data from both years and ran a regression similar to the one in Column 1, but using the pool sample and adding a variable to control for survey year (Table 6, Column 3). The only individual- and household-level predictors significant at the five percent level or lower were number of adults in a household and household income.

Building on the statistically significant results of column 3, we used a hierarchical linear model to examine whether the effects of these significant predictors – number of adults in a household and household income – were fixed across villages, random, or both. The unconditional and conditional intra-cluster (village) correlations of opinions of the road were 0.18 and 0.16, lending support to the idea that villages explained a significant portion of

**Table 6**  
Results of OLS regressions estimating individual-, household-, and village-level correlates of positive opinions of the proposal to build a road through TIPNIS.

	(1) 2012	(2) 2013	(3) Pooled
Sample:	2012	2013	Pooled
Dependent variable:	1 if respondent has a positive opinion about the road construction, 0 otherwise		
<i>Individual-level characteristics</i>			
Age (years)	-0.0024 (0.0018)	-0.0009 (0.0016)	-0.0015 (0.0014)
Gender (female = 1; male = 0)	-0.0368 (0.0267)	-0.0271 (0.0247)	-0.0310 (0.0192)
<i>Schooling (no-schooling omitted and used as a reference category)</i>			
Some primary school (1–5 grade)	-0.0719 (0.0667)	0.0485 (0.0565)	-0.0083 (0.0468)
Completed primary school (>5 grade)	-0.1983** (0.0830)	-0.0162 (0.0688)	-0.1010* (0.0578)
<i>Ethnicity (Tsimane' omitted and used as a reference category)</i>			
Moxeño	0.0237 (0.0797)	0.0604 (0.0749)	0.0389 (0.0611)
Yuracaré and Movima	-0.0627 (0.1024)	0.0196 (0.0935)	-0.0261 (0.0780)
<i>Household-level characteristics</i>			
Number of adults in household	-0.0496** (0.0228)	-0.0527*** (0.0195)	-0.0525*** (0.0161)
Number of children in household	-0.0140 (0.0133)	0.0028 (0.0116)	-0.0053 (0.0100)
Daily household income (US\$, PPP)	0.0029 (0.0022)	0.0035*** (0.0011)	0.0032*** (0.0011)
Land area cleared (tareas)	0.0005 (0.0006)	-0.0005 (0.0004)	-0.0000 (0.0004)
<i>Village-level characteristics</i>			
Village size, in households	0.0012 (0.0013)	0.0023** (0.0011)	0.0018* (0.0010)
Village has road access (yes = 1; no = 0)	0.0888* (0.0466)	0.0852** (0.0426)	0.0930** (0.0369)
Year of survey	^	^	0.0543** (0.0234)
Constant	0.8813*** (0.1166)	0.6848*** (0.1059)	-108.5265** (47.1126)
N	747	776	1523

Standard errors clustered by village in parentheses. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . ^Variable omitted from the analysis. The omitted schooling category is no schooling. The omitted ethnicity is Tsimane'.

the variation in opinions of the road. The results of the hierarchical linear regressions point to two findings. First, the fixed-effect estimates for the number of adults and household income were smaller than the estimates in column 3, Table 6, and only statistically significant for the number of adults in a household. Second, and more importantly, the results of the likelihood ratio tests suggest that the three significant predictors of column 3, Table 6, did not vary randomly between villages, giving greater weight to the results of the OLS regression than to the results of the hierarchical linear models (see S2 in Supplementary material for results of hierarchical linear regressions).

## 5. Discussion

Results from two yearly surveys on local opinions of a planned road that would cross the Territorio Indígena Multiétnico (TIM) in Bolivia reveal three noteworthy findings. First, in contrast to previously documented large-scale opposition towards the same road by lowland Indigenous Peoples living in TIPNIS (Fabricant & Postero, 2015; Hope, 2016; Laing, 2015), lowland Indigenous Peoples living in TIM generally supported the construction of the road. Moreover, support increased at the peak of the conflict

(2012–2013). Second, people favored the road because of the expected economic opportunities that it would bring. And third, in line with other studies on local opinions about infrastructure projects in low-income nations (e.g., Boudet et al., 2014; Kontogianni et al., 2014; Siciliano et al., 2015), local opinions of the road did not vary randomly and were mostly associated with household- and village-level rather than with individual-level characteristics.

### 5.1. Biases and caveats

Before discussing our findings, we present some biases and a caveat of this work. Results from our work might be affected by sampling and omitted variable biases. First, although our sample for multivariate analysis covers over 50% of the adult population in the studied villages, it might not necessarily be representative of the whole population in the area. On the one side, we excluded highlanders living in the study site. Inclusion of this population might have increased the percentage of positive opinions (see Reyes-García et al., 2019). On the other side, our analysis shows Tsimane' were more likely than other groups to refuse to opine about the road, an attitude that might reflect refusal to endorse the road. These missing answers weaken the confidence we can place on the links between ethnicity and opinions about the road. Results might also suffer from omitted variable bias. For example, our survey did not capture information on whether individuals belong to unions or other social organizations, a potentially important explanation for the variation in individual opinions.

Last, there is also an important caveat to interpreting our data in relation to previous literature on this conflict. We compare opinions among inhabitants of TIM and other lowland areas, particularly TIPNIS. The comparison might be defective because data for TIM documenting much heterogeneity came from a survey whereas data for other regions came from published literature, which might have downplayed heterogeneity of responses in those areas. A tighter, controlled comparison would have used surveys across a range of lowland sites.

### 5.2. Positive opinions of the construction of the TIPNIS road

Mostly drawing on information gathered from lowland Indigenous Peoples living in TIPNIS, previous scholarly works analyzing the conflict have documented fierce opposition towards the construction of the TIPNIS road (FIDH & APDHB, 2013; Reyes-García et al., 2019). In contrast, findings from our surveys indicate that during 2012 and 2013, at the peak of the conflict, about 60% of lowland Indigenous Peoples in a large sample of households from communities in the adjacent TIM territory supported the construction of the road, and that support increased between the two years.

Opinions of the construction of the road from people living in TIM and TIPNIS might differ substantially due to differences in livelihoods and in the expected impacts of the project. Lowland Indigenous Peoples living in these two territories have experienced different development paths during the past decades, which might explain why their opinions differ. Having a less complex orography, TIM is already crisscrossed by an extensive network of secondary roads that have been illegally opened by loggers and cattle ranchers over the past three decades (Fernández-Llamazares et al., 2018; Paneque-Gálvez et al., 2013). Similarly, plans for Section III of the road (through TIM) imply mostly upgrading and reorganizing pre-existing dirt roads into a paved highway. This pre-existing network of roads might influence local opinions of the new road because, over time, people in TIM have become largely used to road infrastructure. On the contrary, TIPNIS has remained relatively isolated, with lowland Indigenous Peoples in the area being essentially river-dependent for communication

and transport (Thomas, 2012). Moreover, Section II would require opening a first cut in what is largely considered a relatively intact ecosystem of high conservation value (Fernández-Llamazares et al., 2018). Such differences might explain differences in opinions.

Additionally, local opinions of the road reported by Indigenous Peoples in TIM might have been influenced by the 2012 intense national media campaign orchestrated by the government trying to influence public opinion and gain support for the construction of the road. Moreover, the official result that 80% of the TIPNIS communities supported the road construction, while contested (FIDH & APDHB, 2013), might have also boosted local support for the road in neighboring TIM. This could also explain the increase in positive responses from 2012 to 2013.

### 5.3. Local explanations supporting the road

The second finding of this study is that local explanations given by Indigenous Peoples in TIM both in support and against the road varied from the main arguments reported in previous scholarly works and in the media. Support for the road was mostly related to market access (39% in 2012 and 38% in 2013) rather than to healthcare and education access, arguments typically used by policy-makers promoting the road (García Linera, 2013). The finding is also in line with research on the short-term effects of other infrastructure projects elsewhere. For example, in examining the effects of displacements due to construction of the Belo Monte Dam in the Brazilian Amazon, Randell (2016) found that the situation had short-term positive economic impacts, with wealth increasing for the majority of the population studied and socioeconomic inequality decreasing. In the same vein, feelings of fear and insecurity (41% in 2012 and 43% in 2013) seemed to prevail as the main motivations to oppose the road, rather than land rights (18%) or environmental issues (6.2% and 9.2% in year 2012 and 2013), which are the arguments most typically deployed in voicing opposition towards the road (Hope, 2016).

Again, it is possible that people living in TIM and TIPNIS have different reasons to either support or reject the construction of the road. For example, the conservationist discourse, drawing on notions of Indigenous environmentalism, might have permeated more strongly within TIPNIS, due to its dual status as an Indigenous territory and a protected area (Laing, 2015). This might explain why references to environmental issues such as deforestation or habitat loss were extremely rare among our interviewees in TIM, a region without conservation NGOs or government officials in charge of environmental affairs. Overall, our findings suggest that there is a mismatch between the public voices that have dominated the discourse around the conflict and the complex, nuanced, and varied views of the people living in some of the areas potentially affected by the road.

### 5.4. Variation in opinions about the construction of the road

Our last finding refers to variation in opinions about the road. Most of the variation was associated with household- and village-level characteristics. On the one side, the share of people who favored the road was higher among people in households with fewer adults and higher income. We do not have a clear explanation of why the number adults in a household was associated with a lower probability of favoring the road, but the finding that households with higher income and living in villages with existing road access are more likely to favor the road are in line with the large number of references to the potential economic opportunities offered by the road and with previous works showing that people with stronger links to the market economy seem to be the ones reaping most benefits from the opening of new roads (Angelsen, 2001, 2012; Perz et al., 2010; Rammelt, 2018).



Additionally, although village-level variation did not explain positive opinions of the road in 2012, in 2013 individuals living in larger and more connected villages were more likely to support the construction. It is possible that the result of public consultations on the proposed road, which showed large support, may have reached larger and better connected villages than their smaller, more isolated counterparts, propagating the idea that the road construction would be beneficial.

Particularities of the case study might help explain why some variables had a larger weight in explaining opinions of this infrastructure project, but the broader importance of our finding is that opinions about the road varied greatly; they were far from consensual.

## 6. Conclusion

In this work we analyzed data on the local opinions of the construction of a highly controversial road, focusing on a sample of lowland Indigenous Peoples living in an adjacent territory that might have been affected by the road. Lowland Indigenous Peoples from TIM were generally favorable to the construction of the road largely arguing that it could improve economic opportunities. We also found diversity in opinions largely patterned by household- and village-level characteristics.

Results from this work bring an additional layer of complexity in the understanding of social-ecological conflicts around new infrastructure development and have important implications for the implementation of processes of Free, Prior and Informed Consent (FPIC) on the ground. On the one side, our results bring to light the diversity of local attitudes and arguments related to the construction of large infrastructure projects and they highlight the importance of accurately reflecting heterogeneity in local opinions when examining opinions. In doing so, our results challenge portraits of Indigenous Peoples as uniform blocks of resistance towards new infrastructure development. On the other side, our results on the heterogeneity of local opinions of infrastructure pose an additional layer of complexity in obtaining FPIC from Indigenous Peoples to large infrastructure projects. International laws protect the right of Indigenous Peoples to give or withhold their Free, Prior and Informed Consent in relation to infrastructure projects, resource extraction, and other investment projects in their territories (Cariño, 2005; MacInnes et al., 2017), a process that has proven to be challenging to apply on the ground because most FPIC processes are based on the notion of reaching consensus (e.g., Cariño, 2005; Perreault, 2015) and do not have many mechanisms in place to accommodate diversity in opinions. Current procedures and mechanisms for the implementation of FPIC should be opened up to accommodate diversity and pluralism of opinions.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.worlddev.2019.104751>.

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