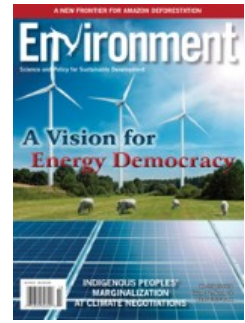


The Down Side of Cross-Border Integration: The Case of Deforestation in the Brazilian Mato Grosso and Bolivian Santa Cruz Lowlands



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The Down Side of Cross-Border Integration:

Deforestation in the Amazon



THE CASE OF DEFORESTATION

in the Brazilian Mato Grosso and Bolivian Santa Cruz Lowlands

by Anne Cristina de la Vega-Leinert and Christoph Huber

Since the 1990s, growing comprehension of the critical regulating function of tropical rain forests and awareness of their destruction have placed the Amazon at the center of international and national environmental and climate policies.¹ The case of Brazil²

demonstrated that a mix of environmental (forest) laws can help to considerably slow down the high deforestation dynamics of the previous decades. This is supported by an appropriate deforestation monitoring system, a comprehensive network of protected areas and their effective management, and the

enforcement of penalties in case of non-compliance (e.g., exclusion from public credits, penal sanctions). In addition, public and private-led market-oriented approaches have gained importance, such as supply-chain interventions for cattle (e.g., Terms of Adjustment of Conduct, G4 Zero-Deforestation

1 Agreement promoted by Greenpeace)
 2 or for soybean (e.g., Soy Moratorium),
 3 which tend to exclude producers using
 4 (newly) deforested areas from markets.³
 5 Although deforestation in the Amazon
 6 dropped by around 84%, from 27,772
 7 km² in 2004 to only 4,571 km² in 2012,⁴
 8 the limits of this approach have become
 9 clear. This is partly because Brazilian
 10 environmental governance mechanisms
 11 remain extremely contested.⁵ Moreover,
 12 as highlighted by Lahsen et al. (2016),⁶
 13 the focus on Amazonian conserva-
 14 tion has masked the displacement of
 15 deforestation into less visible and less
 16 emblematic, but nonetheless highly di-
 17 verse (both ecologically and culturally)
 18 regions such as the Cerrado. The trans-
 19 formation of the Amazon, therefore,
 20 cannot be seen as isolated from trends
 21 in surrounding regions, as deforestation
 22 and expansion of agriculture are shift-
 23 ing from the Amazon rain forest to the
 24 savannas, natural grasslands, and dry
 25 forests of Bolivia, Paraguay, Argentina
 26 (Table 1), and, more recently, Uruguay,
 27 while simultaneously conquering more
 28 remote Amazon forest areas.⁷

29 The drivers and the dynamics of de-
 30 forestation in South America are highly
 31

complex. State policy toward land al-
 location and land markets strongly
 influence access to areas suitable for
 conversion, with more powerful actors
 controlling the consolidated agricultural
 frontier, and driving more marginal ac-
 tors to more remote areas, who thereby
 open new fronts of deforestation.⁸ With
 increasing transnational integration, es-
 pecially in the expanding soybean-live-
 stock-based economy, so-called leakage
 effects of environmental policies, as well
 as their cross-biome and cross-border
 implications, need to be better under-
 stood.⁹ This article is a step in this direc-
 tion. We focus on the border region be-
 tween the Brazilian state of Mato Grosso
 and the eastern Bolivian lowlands in the
 department of Santa Cruz (Figures 1
 and 2), where two main South American
 deforestation fronts converge.¹⁰ Both re-
 gions combine the highest soybean and
 livestock production of their respective
 countries. Indeed, large parts of Mato
 Grosso belong to the so-called Amazon
 Arc of Fire, or Arc of Deforestation.¹¹ In
 keeping with national trends, deforesta-
 tion rates in Mato Grosso did slow down
 compared to previous decades, although
 in recent years no further decline has

been observed.¹² By contrast, the de-
 partment of Santa Cruz has constituted
 a hotspot in forest conversion since the
 end of the 1980s, showing few signs of
 reversing these trends.¹³ Here we focus
 on the parallel, though differing, tra-
 jectories of these two regions to explore
 their growing interconnection and pos-
 sible implications for future patterns of
 deforestation.

Agricultural expansion and land-use change patterns in Mato Grosso

Until the mid-20th century, the fed-
 eral state of Mato Grosso remained
 largely excluded from national eco-
 nomic cycles, and hence was only mar-
 ginally affected by large-scale environ-
 mental changes. Mato Grosso, which
 comprises parts of the Amazon (53%),
 Cerrado (40%), and Pantanal (7%) bi-
 oomes, was mainly inhabited by indige-
 nous groups until the early 18th century,
 when so-called bandeirantes¹⁴ obtained
 the first large-scale properties to exploit
 gold finds. From the 1930s on, President
 Getúlio Vargas proclaimed the March

Table 1. The Soybean and Livestock Sectors as Drivers of Deforestation and Land Conversion in South America

	Brazil	Argentina	Paraguay	Bolivia
Total terrestrial surface (km ²) ¹	8,515,767	2,780,400	406,752	1,098,581
Forest area (km ²) (2015) ²	4,935,380	271,120	153,230	547,640
in % of total land area	59	9.9	38.6	50.6
Change in forest area: 1990–2015 (km ²) ²	531,670	76,810	58,340	80,310
in % of total 1990 forest area	9.72	22.08	27.57	12.79
Annual rate of change: 1990–2015 (%)	–0.4	–1.0	–1.3	–0.5
Proportion of Agriculture in GDP ³	4.57	5.61	18.08	11.59
Heads of cattle	218,225,177	52,636,778	13,858,584	9,082,193
Rank in top 10 cattle producers worldwide ⁴	1	6	not in top 10	not in top 10
Soybean production (tonnes) (2016) ⁴	96,296,714	58,799,258	9,163,030	3,204,639
Area under soybean cultivation (km ²) (2016) ⁴	331,536.79	195,046.48	33,700	13,363.99
Rank in top 10 soybean producers worldwide ⁴	2	3	6	9

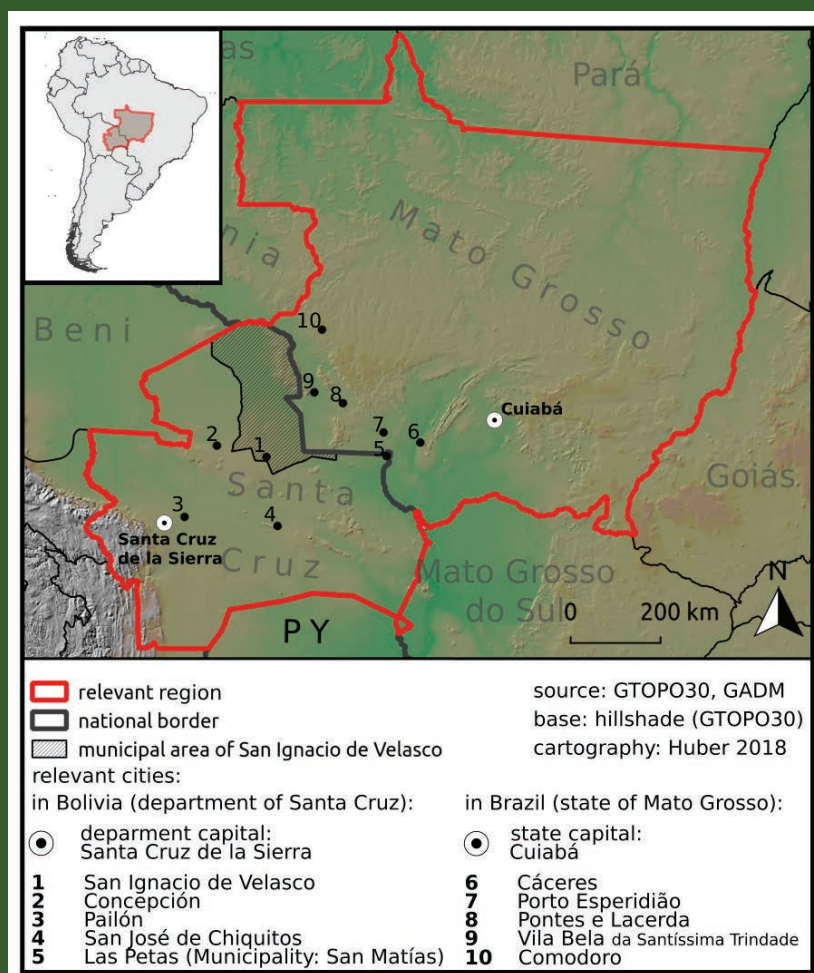
¹UN (2018) – Country profiles. <http://data.un.org>

²FAO (2015) – Global Forest Resources Assessment 2015 – www.fao.org/3/a-i4808e.pdf; World Bank

³World Bank (2018) – Agriculture, forestry, and fishing, value added (% of GDP) <https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS>

⁴FAO (2018) – FAOSTAT - <http://www.fao.org/faostat> (accessed 30 September 2018)

Figure 1. Location map



Source: GTOPO30, GADM. Base: hillshade (GTOPO30). Cartography: Huber, 2018

to distributive agrarian reform and a solution to social conflicts in the traditional agricultural regions of the south and southeast, where land concentration and population pressure caused a scarcity of land.¹⁵ The access to “empty land” (which in reality was often inhabited by indigenous people) lured various actors into the region, including landless migrants, smallholders, capitalized farmers, ranchers, sawmill operators, laborers, miners, investors and speculators.¹⁶ The process of transforming Mato Grosso into one of the biggest agricultural production areas of Brazil was initiated during the 1970s and 1980s, when the federal state played a critical role through regional development strategies (e.g., POLOCENTRO) and sector-specific programs (e.g., PRODECER) based on agricultural policies, tax incentives, subsidies, and credits designed to attract capital and modernize the agricultural sector through green-revolution approaches. Mechanized agriculture expanded in Mato Grosso thanks to the availability of large flat land areas (the plateaus—chapadões—of Mato Grosso). There, farmers from other parts of Brazil—especially from southern states, where the soy boom had started in the 1970s—could acquire large plots of land

Figure 2. Brazil – Bolivia border, south of the Noel Kempff Mercado National Park.



to the West, which, together with the foundation of the new national capital, Brasília, in 1960 and the associated development of (road) infrastructure to the interior, facilitated the integration of peripheral regions into the national economy. This was the starting point of far-reaching socioecological transformations in Mato Grosso, which accelerated during the Brazilian military administrations (1964–1985). For the federal state, the colonization of sparsely populated, but resource-rich, peripheral regions was of geostrategic importance to secure better control over national territory and increase economic value. Furthermore, the opening of new agricultural fronts offered an alternative

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Soybean cultivation in Mato Grosso.

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Soybean cultivation in Mato Grosso.

at comparatively cheap prices.¹⁷ Of critical importance was the state agricultural research institute, EMBRAPA, which introduced technical innovations, such as the breeding of new crop varieties that could adjust to the tropical soil and climatic conditions in Mato Grosso. These further enticed transnational compa-

nies to introduce new cultivation techniques (e.g., no-till farming), based on the use of high levels of pesticides and genetically modified seeds, into Brazil.¹⁸ Meanwhile, increasing global demand and food prices favored export-oriented agribusiness, thereby turning cultivation of agricultural commodities into a

lucrative business. In this respect, China has played a dominant role in global demand patterns, especially for soybean, as in the 1990s this country turned from a net exporter to a net importer, today importing ~60% of the total volume of soybeans traded globally.¹⁹ By integrating the global agribusiness production networks, Mato Grosso has become strongly dependent on transnational traders and agrochemical companies controlling international markets. Some Brazilian large-scale producers have, however, successfully grown into big agribusiness players and won an important market share in global production networks through the vertical integration of their activities. This new economic elite has gained strong political influence, at both regional and federal levels.²⁰ The colonization and expansion of the agricultural frontier has turned Mato Grosso into Brazil's largest production area of soybeans, corn, cotton, sunflowers, and cattle, with the agribusiness sector—including all associated industrial and distribution activities—currently accounting for 50.5% of the state's gross domestic product (GDP).²¹ This transformation has been accompanied by strong social and environmental disruption, including soil erosion and contamination (e.g., through the use of pesticides), and has contributed to discriminatory land tenure. Huge areas have been deforested for the expansion of agriculture and cattle ranching in the Amazon biome of Mato Grosso,²² but also of the Cerrado, which, compared to the Amazon forests, has a low international and national profile and is not protected by comprehensive conservation policies.²³ It is estimated that the Brazilian Cerrado has already lost more than 50% of its natural vegetation. In Mato Grosso alone more than 43,000 km² of Cerrado was deforested between 2001 and 2017 (i.e., 16% of total deforestation in the Brazilian Cerrado).²⁴ Although Mato Grosso has also become a leading producer of other agricultural crops at the national level, soybean clearly outperforms them in terms of area under cultivation. Furthermore, corn and cotton are usually

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1 planted in rotation for a second harvest.
 2 This provides a significant additional
 3 source of revenue but plays a minor role
 4 in agricultural expansion strategies in
 5 the region. A sequence of temporary
 6 economic cycles is often characteristic
 7 of agricultural frontiers in Amazon re-
 8 gions, where mechanized agriculture
 9 takes over areas that have been previ-
 10 ously deforested for other activities. For
 11 example, the transformation of former
 12 cattle ranches into soybean production
 13 areas is particularly noticeable in the
 14 north of Mato Grosso, in the transition
 15 zone between Cerrado and Amazon.

16 As soybean cultivation expands over
 17 land formerly used as pasture, cattle
 18 ranching is being displaced into more
 19 remote areas in the Amazon, thereby
 20 triggering new cycles of deforestation.
 21 Despite growing concern from environ-
 22 mental groups, representatives of the
 23 agribusiness have spread a discourse
 24 that portrays mechanized agriculture as
 25 sustainable (i.e., since in many areas it
 26 does not directly drive deforestation).
 27 This narrative instrumentalizes the con-
 28 cept of “land sparing,” which promotes
 29 the intensification of agriculture to con-
 30 tain the expansion of agricultural land
 31 over forested areas.²⁵ Mechanized agri-
 32 culture, for example, is explicitly men-
 33 tioned in the national plan designed to
 34 reduce agriculture-based greenhouse
 35 gas emissions (Plano ABC), a plan sub-
 36 sidizing credits to farmers to encourage
 37 measures of intensification such as, for
 38 example, no-till farming or the rehabili-
 39 tation of degraded pastures. Advocates
 40 of the agribusiness, furthermore, refer
 41 to the high level of compliance within
 42 the Soy Moratorium²⁶ to demonstrate a
 43 decoupling of soy production from de-
 44 forestation. Critics, however, interpret
 45 this as little more than a green-washing
 46 of the soy supply chain²⁷ and point out
 47 that the Soy Moratorium takes neither
 48 deforestation in the Cerrado nor indi-
 49 rect land-use change²⁸ into consider-
 50 ation. These aspects need to be consid-
 51 ered in assessments of the real impact
 52 of soybean expansion on forest cover
 53 (Table 2), including their cross-border
 54 implications. This extends to Brazil-
 55 ian operators in the cattle and soybean
 56



Soybean cultivation and extensive pasture in Mato Grosso.

Table 2. Soybean Cultivation Area (1,000 ha) in Mato Grosso

	1993	2003	2013	2014	2015	2016	2017
Brazil	10,654	18,527	27,948	30,308	32,206	33,339	33,980
Mato Grosso	1,680	4,414	7,931	8,628	8,983	9,147	9,287

Source: IBGE - Produção Agrícola Municipal

sector, who pursue land concentration and deforestation in neighboring countries. The influx of Brazilian capital has been particularly strong in Bolivia since the 1990s. Thus, as early as 2006/2007, it was estimated that Brazilian farmers controlled 40.3% of the total soybean area, mainly in the surroundings of Santa Cruz de la Sierra, while Brazilian cattle ranchers accumulate 700,000 ha of land for pasture close to the border.²⁹

The Opening of a New Frontier in the Eastern Bolivian Lowlands

Looking at a satellite view of the Brazilian-Bolivian border west of Cuiabá, the sharp contrast in vegetational cover is staggering, especially around the Bo-

livian National Park Noel Kempff Mercado, as the forest limits literally follow the contours of this international border. Forests still cover approximately half of Bolivia’s land area (~52 million ha), of which the Amazon forest biome



Soybean cultivation in Mato Grosso.

1 represents ~38%, while the Chaco and
 2 Chiquitano forests each cover 17%.³⁰ Al-
 3 though, compared to neighboring coun-
 4 tries, large-scale deforestation in Bolivia
 5 is relatively recent, current trends are
 6 deeply worrying because the pace of
 7 forest conversion has consistently accel-
 8 erated in the last decades and because
 9 deforestation is effectively becoming le-
 10 galized (see Figure 3).³¹

11 Two main forest conversion patterns
 12 can be observed in the Bolivian low-
 13 lands, especially in the Department of
 14 Santa Cruz, based on detailed defores-
 15 tation data for 2016–2017 (see Supple-
 16 mentary Material). Most deforestation
 17 occurs on private land used for large-
 18 scale cattle ranching or mechanized
 19 agriculture (~78%), with the remaining
 20 ~22% taking place on communal land—
 21 from both local indigenous communi-
 22 ties and Andean peasant colonies—
 23 where initial subsistence agriculture is
 24 gradually replaced by semimechanized
 25 commercial systems.

26 The drastic land-use changes wit-
 27 nessed in the Bolivian lowlands mirror
 28 trends depicted for Mato Grosso and are
 29 driven by complex national and cross-
 30 border interests. The Santa Cruz low-
 31 lands also benefit from comparatively
 32 fertile soils and sufficient precipitation
 33 to allow mechanized, monoculture sys-
 34 tems with extensive livestock produc-
 35 tion, and have constituted a key asset

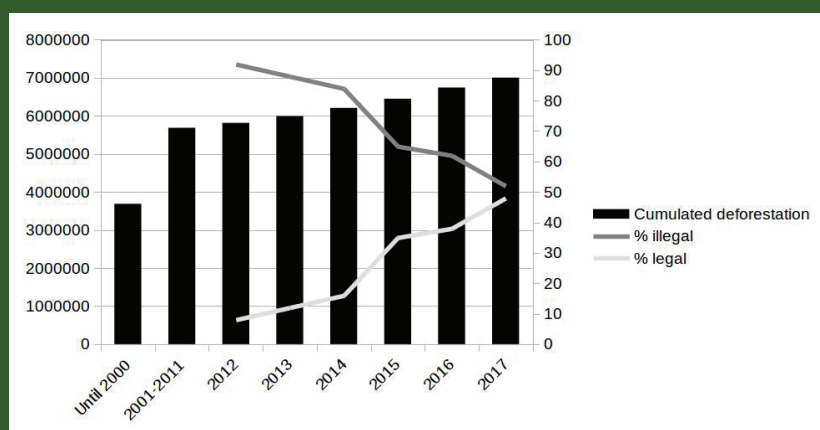
in development policies from the late
 1950s.³² These have been framed by
 the narrative of the March to the East,
 which was based on the Bohan Plan,
 “the greatest development program
 planned, implemented, and financed
 by the United States.”³³ This sought to
 transform the “empty,” “idle” Santa Cruz
 lowlands into productive agricultural
 land (based on rice, corn, wheat, sugar
 cane, and cotton) to satisfy domestic
 food needs and provide raw material
 for the industry through an import sub-
 stitution policy.³⁴ The expansion of the
 agricultural frontier was spurred by the
 development of road infrastructure—in
 particular the Cochabamba–Santa Cruz
 road, which literally paved the way to
 the colonization of the lowlands.³⁵ This
 was supported by policies and public
 incentives that encouraged the in-mi-
 gration of a range of actors, including
 poverty-stricken Andean landless peas-
 ants engaging in swidden agriculture, as
 well as Mennonite and Japanese com-
 munities that developed mechanized
 agriculture.³⁶

Land-use conversion is closely asso-
 ciated with mechanisms of land control.
 Despite the Agrarian Reform of 1952, in
 the lowlands, land ownership remained
 strongly skewed toward large, private
 properties. To remedy this, in the late
 1990s, a nationwide process of land ti-
 tling was initiated that gained renewed

strength during the first presidency of
 Evo Morales. In the lowlands, this re-
 sulted in the designation of large indig-
 enous territories, the formal titling of
 indigenous communal land, and new
 waves of land allocation particularly to
 Andean colonists. Nevertheless, these
 achievements have not reversed historic
 agrarian inequalities, in particular in the
 lowlands.³⁷ In 2008, severe conflicts op-
 posed the MAS (Movimiento al Social-
 ismo) government and the separatist,
 traditional elite of the “Media Luna”³⁸
 lowland departments, against the back-
 drop of declining global prices for raw
 materials, and thus lower state extrac-
 tive rent. To pacify the rebellious low-
 lands elite, an unexpected alliance was
 established between the agribusiness (in
 particular soybean sector) and the cen-
 tral state.³⁹ The expansion of the agricul-
 tural frontier through the conversion of
 forest and the intensification and indus-
 trialization of the agriculture and cattle
 sectors have been enshrined as strategic
 for Bolivia in the national development
 strategy. This stipulates that “forests are
 not considered to be idle land for agri-
 culture anymore, instead they become
 integral stages for the production and
 transformation of foodstuffs, biodiver-
 sity resources, and medicines.”⁴⁰ In ef-
 fect, the original discourse underlying
 the March to the East is still structur-
 ing national policy, treating forests as
 productive areas of critical importance
 to diversify the national productive ma-
 trix, reduce dependency on the oil and
 gas rent and to guarantee national food
 sovereignty through the expansion of
 the commercial agricultural sector. To
 this end, access to forested areas and
 their conversion are being facilitated
 by the progressive removal of existing
 regulations of forest protection.

First, under the law, formal land ten-
 ure is conditional on the provision of
 evidence that the land is actually being
 used (which allows for a status of legal
 possession) and the fulfillment of the
 so-called social and economic function
 of the land (i.e., through subsistence or
 commercial food production via ag-
 riculture and/or cattle ranching).⁴¹ By
 contrast, land tenure under forestry

Figure 3. Acceleration and formalization of deforestation in Bolivia.



Source: MMAyA & ABT (2018)

1 management needs to be additionally
2 substantiated by (1) the provision of formal
3 tenure ownership/allocation titles,
4 and (2) the development and approval
5 of a forest management plan, with both
6 conditions representing important administrative
7 and financial hurdles.⁴² Deforestation
8 has, therefore, become the easiest way to
9 demonstrate use and secure tenure, in
10 particular for large-scale owners, who
11 have the means to employ a number of
12 strategies to evade expropriation.⁴³ Second,
13 the ongoing land allocation process is
14 carried out centrally by the National
15 Institute of Agrarian Reform without
16 coordination with local authorities and
17 often irrespective of whether land is
18 actually inhabited, under customary use,
19 with conservation status, or classified as
20 land under permanent forest production.
21 New settlements and their associated
22 land use, therefore, constitute a pioneer
23 front that drives the expansion of
24 agriculture in ever more remote
25 forested areas.⁴⁴ Third, the agribusiness
26 and livestock sectors are benefiting from
27 important tax incentives to forest
28 conversion into “productive” land.⁴⁵ This
29 lobby puts forward its role in the
30 diversification of the national productive
31 matrix, the increasing proportion of
32 agriculture in Bolivia’s gross domestic
33 product (currently over 11%; see Table 1),
34 and its contribution to national food
35 sovereignty in order to push further
36 legal arrangements that may increase
37 the security of land tenure.⁴⁶ Fourth,
38 by contrast, the forestry sector is
39 facing a serious crisis. In the last
40 decade, timber extraction has
41 substantially diminished, and, with it,
42 the profitability of timber sales on
43 both the domestic and export markets.
44 With stricter public control on timber
45 trade to discourage exports, the
46 comparatively high value of Bolivia’s
47 currency in relation to the depreciating
48 currencies of neighboring countries,
49 and trends in wood consumption away
50 from massive wood to plywood, among
51 other factors, forestry is becoming
52 less attractive compared to cattle
53 ranching, arable agriculture, or
54 illegal activities related to drug
55 traffic in remote communities close
56 to the Brazilian border, with all

of these resulting in surging deforestation
for land conversion. Fifth, Law No. 741,
an explicit outcome of the recent
“Sembrando Bolivia” (Sowing Bolivia)
Summit of 2015, eases former
restrictions on deforestation for small
private properties, and land under
collective tenure with the explicit goal
of prioritizing food production, for
example, by increasing fourfold the
total surface that may be cleared.⁴⁷
Sixth, the central government, hand
in hand with its official opposition,
the traditional landowner elite,
pursues the development of road
infrastructure within the general
framework of the Initiative for the
Integration of Regional Infrastructure
in South America within the Inter-
Oceanic Axis⁴⁸ to facilitate the
expansion of the agricultural frontier.
As the governor of the department
of Santa Cruz, Rubén Costas, stated
in the inauguration of the new
tarmac road between Santa Cruz
and San Ignacio de Velasco in
September 2017: “We need to be
convinced and united because we are
not only talking about the integration
of Bolivia, but of the first central
corridor which is going to connect
the Pacific with the Atlantic. Bolivia
will become the integrative and
structuring axis of Latin America.”⁴⁹
Seventh, land use zoning is
increasingly performed based on
political and economic considerations.
Although land use regulations in
Santa Cruz are theoretically currently
based on the departmental
management plan (PLUS—Plan de
Uso de Suelo), which originally
determined land use categories
based on environmental indicators
that assessed the lands’ ecological
sensitivity and suitability for
agricultural use,⁵⁰ peasant colonists
are allocated forest land classified
as unsuitable for agricultural use.
In order to keep the land, these
communities must demonstrate that
they are using it. This explains why
they have strongly rejected the
particular regulations of forest
protection applicable on common
land in areas under permanent
forest production.⁵¹ Supported by
their unions, they are successfully
advocating the reclassification of
large expanses of land currently
under permanent forest production
into agricultural land in the

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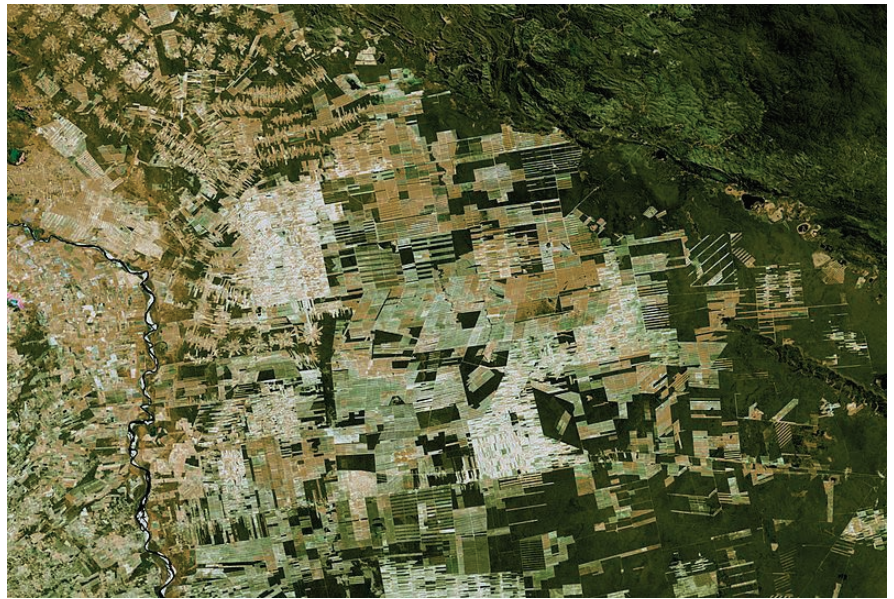
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Santa Cruz departmental management plan. This evolution continues to undermine past and present efforts to develop a solid legal framework for forest protection and conservation.

In 1965 the Isiboro Sécore National Park (1.2 million ha) was the first protected area designated in the Bolivian lowlands. It remained a mere “paper park” because it lacked specific institutions and resources to guarantee successful conservation management.⁵² After an initial phase in protected area designation, which lasted until 1991, the Rio Earth Summit and Bolivia’s ratification of the United Nations Convention on Biological Diversity in 1992 provided the necessary momentum to establish a comprehensive framework for forest protection, based on the Forest Law (Law No. 1700). The creation of two important institutions, the National Protected Area System and Service, resulted in the designation and expansion of most current national protected areas explicitly for the conservation of forests and biodiversity.⁵³ By 2013, in total, 70 protected areas had been designated in the Bolivian lowlands and Yungas, which cumulatively amount to 23.2 million ha (i.e., 30% of the surface of the lowlands and Yungas). These comprise 18 national (covering more than 15 million ha) and 52 subnational protected areas (covering 8.1 million ha), with the lion’s share of these (54%) located within the Santa Cruz Department.⁵⁴ Since 1998, however, the designation of new protected areas has primarily occurred at departmental and district levels, and considerations refocused on environmental protection (e.g., of water resources), the development of tourism,

1 and, more generally, attempts at con-
2 taining the expansion of the agricultural
3 frontiers. This is a daunting task against
4 the backdrop of the explicitly extractive
5 policy the MAS government pursues,
6 despite fundamental advances. Indeed,
7 2009 had all the potential to be a turn-
8 ing point for forest protection. The cen-
9 tral state enshrined Mother Earth in the
10 new Constitution of the Plurinational
11 State of Bolivia and enacted Framework
12 Law No. 300 of Mother Earth and Inte-
13 gral Development for Living Well. “This
14 Law defines land rights as a collective
15 subject of public interest and establishes
16 the collective and individual rights of
17 indigenous nations and peoples, rural
18 peoples, intercultural and Afro-Bolivian
19 communities within a comprehensive
20 development proposal for natural re-
21 source use.”⁵⁵ It established the Pluri-
22 national Authority of Mother Earth,
23 which introduced a non-market-based
24 financial mechanism to support the
25 implementation of the climate and envi-
26 ronmental agenda at the national level.
27 Furthermore, the new Forest and Land
28 Inspection and Social Control Author-
29 ity (ABT, *Autoridad de Fiscalización y*
30 *Control Social de Bosques y Tierra*) was
31 created, located in Santa Cruz de la Si-
32 erra, at the epicenter of deforestation.
33 Forest Law remained largely unchanged
34 since its formulation in 1996. Efforts
35 were, nevertheless, made to improve
36 monitoring of deforestation, increase
37 control of the timber sector, and deter
38 illegal forest clearing. Law No. 337,
39 however, has contributed to legitimizing
40 forest clearing for agricultural purposes
41 and granted landowners who carried
42 out deforestation illegally until 2011
43 amnesty, albeit conditional on payment
44 of fines and reforestation activities.

45 The preceding explains why the
46 pace of deforestation has continuously
47 increased from the 1960s until 2017,
48 when annual deforestation was lower
49 than in the previous year for the first
50 time on record.⁵⁶ Together with the sig-
51 nificant reduction in illegal forest clear-
52 ance observed since 2012 (Figure 3),
53 this has been hailed as an important
54 success by the ABT, which is currently
55 reviewing its future projection to envis-
56



Progression of the agricultural frontier along the Inter-Oceanic axis between 1984 and 2000.
Source: https://en.wikipedia.org/wiki/File:LandSat-Chiquitos,_Santa_Cruz,_Bolivia_1984.jpg
https://commons.wikimedia.org/wiki/File:LandSat-Chiquitos,_Santa_Cruz,_Bolivia_2000.jpg

age a stabilization of deforestation based
on these trends. Nevertheless, in prac-
tice, the achievement is, above all, the
legalization and formalization of for-
est clearance—a necessary step in the
implementation of the official strategic
goal of expanding the agricultural fron-
tier. What had constituted a cornerstone
in the development of alternative narra-
tives of development and conservation
in Latin America and inspired the world
to articulate new paths toward sustain-

ability is therefore becoming little more
than rhetoric.

The East Chiquitania: Where the Two Fronts Meet

Geologically, the Chiquitania lies
between the Andean piedmont to the
west, the Brazilian Shield to the east,
and the alluvial Chaco–Beni Plain, and
at the watershed between the Amazon

and Paraguay–Plata basins. The region possesses its own characteristic ecoregion, the Chiquitano Dry Forest, which comprises a range of forest communities belonging to the neotropical seasonal dry forest complex, and connects the Amazon, Andean valleys, and altiplano ecoregions to the dry and inundated savanna habitats and dry forests of the Cerrado, Gran Pantanal, and Chaco biomes.⁵⁷ The Chiquitano Dry Forest formerly extended into Brazil and Paraguay. In 2011, it still covered ~15 million ha and was estimated to have high levels of ecological integrity and functionality, which led to its incorporation

into the International Model Forest Network.⁵⁸ Until the 1980s, the Chiquitano Dry Forest was largely spared, thanks to its remote location at the periphery of the main areas of forest extraction and land conversion in Brazil and Bolivia, its low population, and a growing network of protected areas, forest concessions, and indigenous territories. Since then, however, the Chiquitania⁵⁹ has experienced some of the fastest rate of deforestation worldwide.⁶⁰ Located between two advancing frontiers, the mechanized agricultural frontier from the west and the cattle ranching frontier from the east, it is currently the major hotspot of

deforestation at national level. Satellite pictures from Chiquitos, a rural district that stretches along the road linking Santa Cruz de la Sierra to Corumbá on the Inter-Oceanic axis, illustrate the rapid pace of land conversion to establish soybean monoculture in the area between 1984 and 2000.

Land use conversion follows a west-to-east and a south-to-north axis, as more remote forested areas become accessible. This is well illustrated in Table 3, which depicts important contrasts in the productive matrix in four rural districts along these axes.⁶¹ Indeed, to the west and south, the rural districts

Table 3. Contrasting Land Use and Productive Matrix Along West–East and South North Axes in the Chiquitania

	Pailón		San José de Chiquitos		Concepción		San Ignacio de Velasco	
	ha	%	ha	%	ha	%	ha	%
Province	Chiquitos		Chiquitos		Ñufles Chávez		Velasco	
Total land area	1,029,119.01		2,248,340.75		2,902,207.4		4,870,600.65	
Population	37,866		28,922		18,800		52,362	
Of which Aymara / Quechua ¹	1,586	4.2	1,066	3.7	108	0.6	2,091	3.9
Of which “foreign” language ²	14,422	38.1	7,529	26	204	1.1	1,889	3.6
Arable land	326,423.84	31.2	69,937.14	13.9	34,154.45	6.3	76,953.14	3.7
Of which soybean	185,117.35	17.7	19,631.863	3.9	0		1,219	0.1
% of total arable land		56.7		28.1				1.6
Main commercial crops ³	Soybean, sorghum, sunflower, wheat, chia		Soybean, sorghum, sunflower, sesame, chia		Peanut, chia, sesame, bananas, beans		Peanut, soybean, sesame, bananas, chia	
Pasture	343,817.04	32.9	123,564.31	24.5	118,009.57	21.9	585,548.87	28.1
Of which cultivated	287,667.77	27.5	67,755.77	13.5	82,976.39	15.4	241,495.43	11.6
% of total pasture		83.7		54.8		70.3		41.2
# of heads of cattle	415,153		145,643		128,420		397,713	
Forestry	343,207.41	32.8	301,602.79	59.9	378,293.66	70.1	1,401,193.21	67.2
Total land under use ³	1,045,176.99		503,530.57		539,697.76		2,084,055.62	

¹Proxy for Andean colonist population.

²Proxy for Foreign colonists, in particular Mennonite, Japanese communities.

³Soybean, sorghum, sunflower, wheat are typically cultivated in fully mechanized, intensive systems, while peanut, sesame, chia, bananas and beans are cultivated mainly in swidden systems that can, in place be partly mechanized.

⁴Includes double counting through winter and summer cultivation.

Source: Instituto Nacional de Estadísticas: Fichas Resumen Censo de Poblacion y Vivienda 2012 - <http://censosbolivia.ine.gob.bo/censofichacomunidad/> - Ficha Resumen Censo Nacional Agropecuario 2013 - <http://sice.ine.gob.bo/censofichacna/> for the four rural districts. (accessed November 2018)

1 of Pailón and San José Chiquitos now
 2 mostly rely on (soybean) commercial
 3 agriculture and cattle ranching, while
 4 further to the north and east (Concep-
 5 ción and San Ignacio de Velasco) land
 6 use focuses on extensive cattle and for-
 7 estry. In San Ignacio de Velasco, which
 8 shares a border of ~500 km with Brazil
 9 and was ranked first in terms of defor-
 10 estation at the national level in 2017,⁶²
 11 the advancing agricultural and cattle
 12 ranching fronts meet. This rural district
 13 accumulates a rapidly growing herd of
 14 cattle on expanding pasture areas, with
 15 an embryonic commercial agricultural
 16 sector that is rapidly gaining momen-
 17 tum, in particular through the rapid in-
 18 flux of Mennonite and Andean colonies,
 19 as well as the incursion of large-scale
 20 agribusiness in the area.⁶³ Although
 21 the local rural district authorities offi-

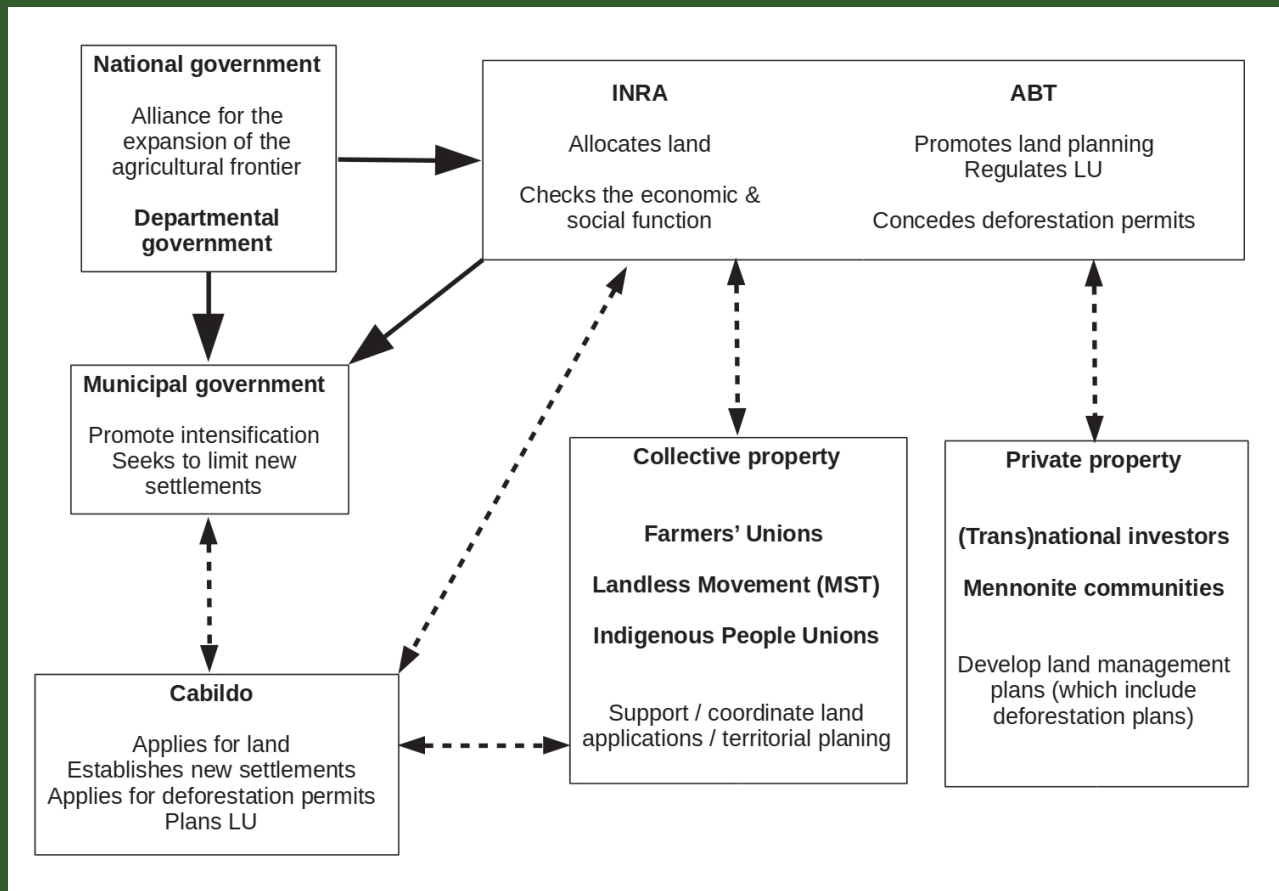
cially aim at containing new settlements
 and encouraging more sustainable ap-
 proaches to land conversion, their rural
 development approach is primarily
 based on the gradual mechanization,
 intensification, and concentration of ag-
 riculture on common land. San Ignacio
 de Velasco is emblematic of the process
 of land appropriation and expansion
 of extractive frontiers that is currently
 taking place in the eastern Bolivian
 lowlands in blatant contradiction to
 the official, post-neoliberal turn once
 pushed by the MAS government.⁶⁴ It has
 become a battlefield between a range of
 actors that, at different scales, all seek to
 increase their control on the land and
 natural resources of this still largely un-
 tapped area (Figure 4). Indeed, approxi-
 mately half of the land area of the rural
 district is located in protected areas, for-

est concessions, and the indigenous ter-
 ritory of Bajo Paraguá. Despite vast land
 reserves, accessible agricultural land is
 scarce and land prices, though still low
 in comparison to neighboring coun-
 tries, are rapidly rising. Competition
 between different actors to secure land
 is, therefore, spurring complex mecha-
 nisms, with formal land allocation and
 acquisition through the market consti-
 tuting the tip of the iceberg.⁶⁵

Current Efforts Toward Transborder Integration

Recently, an official bilateral platform
 has been created, which brings together
 public authorities and representatives of
 the private sector (in particular cattle
 ranchers' organizations) at different lev-

Figure 4. Key actors in San Ignacio de Velasco.



Source: Fieldwork. Credit: A.C. de la Vega-Leinert, 2018



els for greater integration in policy and trade between the seven rural districts of Mato Grosso (Vila Bela, Comodoro, Porto Esperidiao, Pontes Lacerdad, and Cáceres) and Santa Cruz (San Ignacio de Velasco and San Matías), which share a border. This reflects an effort to formalize cooperation and to establish coordinated action toward the regulation of fluxes of people and goods and a common fight against illegal activities, such as the smuggling of cattle and drugs (Table 4).

Taken collectively, these proposed measures acknowledge the reality of a porous and highly dynamic transborder region. Nevertheless, if the Bolivian partners hope to obtain important gains, it remains to be seen to what extent they

20 Transborder summit in San Ignacio de Velasco, 9th–10th March 2018.

24 **Table 4. Main Axes of Transborder Integration Pursued**

25 Measures proposed	
26 Livestock sector	
27	27 Establishment of a transborder committee bringing together private cattle ranchers, their organizations and
28	28 public authorities
29	29 Adoption of common good practice in the livestock sector
30	30 Coordinated action to combat cattle foot and mouth disease through vaccination campaigns
31	31 Transborder phyto-sanitary control points and common cattle registration and certification schemes
32	32
33	33
34 Custom, trade and security	
35	35 Revision of the Treaty of Roboré, the official legal framework for bilateral cooperation in matters of custom and
36	36 trade, to accommodate the present dynamism of the border region and ease the circulation of goods
37	37 Harmonization between custom systems and the creation of a bi-national chamber of commerce.
38	38 Creation of a transborder individual documentation system to facilitate and regulate the circulation of persons
39	39 Bi-national institution to intensify custom, migration and police control
40	40 Broader debate on the the necessity to create a transborder service of intelligence to avoid the illegal
41	41 circulation of persons and goods across the border
42	42 Transborder system of monitoring and data management on circulation of persons across the border
43	43
44	44
45 Environment, culture, tourism and transport	
46	46 Common strategy to develop transborder tourism, including transborder circuits and events
47	47 Exchange of experiences between participating rural districts concerning cultural tourism and natural
48	48 protected areas
49	49 Concerted efforts towards transborder protected area management
50	50 Transborder tourist routes to facilitate the circulation of tourists from one country to the other
51	51 Connected transport networks, via the continuation and improvement of existing roads. Each country being
52	52 responsible for the stretch of roads within their territory
53	53 Reciprocal and common standards in transborder transport services.
54	54
55	55
56	56

1 can really steer and negotiate beneficial
2 agreements with their mighty neighbor.
3 Further, as the key actors driving these
4 negotiations are private cattle ranch-
5 ers of both countries, it is also unclear
6 to what extent public authorities may
7 want, and have the capacity, to push
8 forward a common forest protection
9 agenda to contain the expanding agri-
10 cultural frontier.

11 Efforts in this direction are currently
12 being pursued within the Zona de In-
13 tegración Centro Oeste de América del
14 Sur (ZICOSUR),⁶⁶ which fosters eco-
15 nomic and trade exchange with Asia
16 and supports the diversification of the
17 productive matrix, the modernization
18 of the transport and communication
19 networks, and foreign investments in
20 the region based on the overall frame-
21 work of sustainable management.
22 Within this endeavor, a series of inter-
23 national conferences has been orga-
24 nized in recent years with the support of
25 the International Union for the Conser-
26 vation of Nature and the Biodiversity for
27 Life Flagship Initiative of the European
28 Union⁶⁷ to exchange local and transbor-
29 der experiences to promote best practice
30 in territorial planning, protected area
31 management, and sustainable land use.
32 These conferences bring together non-
33 governmental organizations (NGOs),
34 subnational authorities, and conserva-
35 tion managers to discuss how to de-
36 velop more integrated approaches in
37 transborder regions. This is an interest-
38 ing initiative, although much needs to
39 be done toward implementation, while,
40 certainly, more decisive efforts are re-
41 quired to contain and regulate transna-
42 tional land use displacement processes
43 and leakage effects of (national) forest
44 policies.

45 Conclusions

46
47
48
49 The processes of opening and ex-
50 panding the agricultural frontier in
51 Mato Grosso and the Chiquitania show
52 many similarities. In both cases, the in-
53 corporation of previously remote areas,
54 perceived as empty, wild, and idle, be-
55 came the cornerstone of national devel-

opment strategies. The central/federal
state played a critical role in creating
the necessary conditions for the appro-
priation of these vast territories and the
exploitation of their abundant natural
resources, including:

1. A framing discourse centered on a futures narrative of progress and modernization through the conquest of new frontiers.
2. Development of transport infrastructure to facilitate access.
3. Encouragement of colonization and support of production (through land allocation/titling, innovation in farming technology, the provision of economic incentives, and agricultural extension).

During the 1980s, increasing economic liberalization led both countries to a substantial restructuring and re-regulation of the agricultural sector, which resulted in an increasing control of the private agribusiness sector and a sharp reorientation of agricultural policy towards export-markets. Meanwhile, at the global level, a highly concentrated oilseed, cereal, and livestock sector emerged, which gained ever more strength within national boundaries. This new transnational corporative-driven model of territorial organization is controlled by the central actors of agribusiness production networks (i.e., traders, agrochemical firms, and large-scale producers), which control production conditions and infrastructure developments across the South American borders.⁶⁸ In both countries, this has been facilitated by complex formal and informal mechanisms to enable land appropriation by incoming (trans)national actors, thereby exacerbating the profound inequalities in land distribution and control (in particular via land markets, land traffic, and speculation on land). Nevertheless, there are important differences between the two national cases. The expansion of the agricultural frontier was initiated substantially earlier in Mato Grosso than in the Chiquitania, so that most of the frontier region in the Brazilian state can currently

be qualified as consolidated. Indeed,
even if land displacement is resulting in
new cycles of deforestation on pioneer
fronts of the Amazon, in Mato Grosso
the peak period in deforestation has
passed and the restructuring process in
the region is the ongoing intensification
of agricultural land use. In contrast, in
Bolivia, while the region immediately
surrounding Santa Cruz de la Sierra
may be consolidating, the agricultural
frontier in the Chiquitania is highly dy-
namic. Moreover, the Bolivian lowlands
are prey to accelerated forest conversion
stemming from multiple pressures, in-
cluding (1) the national development
strategy and (2) the increasing land
concentration in the hands of foreign
investors, farmers and cattle ranchers,
a process closely associated with land
conversion and use across the border in
neighboring Brazil.

As pioneer frontiers expand and
consolidate agricultural land use, de-
forestation is displaced to more remote
areas and less visible biomes across in-
ternational borders, such as the region
between Mato Grosso and Santa Cruz,
which is experiencing this process,
strongly driven by the state, in alliance
with the soybean–livestock sector. This
is exacerbating deforestation and land
conversion as west and east fronts meet.
Despite existing efforts within the ZI-
COSUR to support coordinated action
toward forest and biodiversity conserva-
tion, a transborder legal framework for
forest protection and associated control
and enforcement institutions have not
yet been established.

Based on current deforestation rates,
and despite a recent slight decreases in
the acceleration of deforestation both in
Mato Grosso and Santa Cruz, it seems
difficult not to be pessimistic. In view
of the ongoing perversion of the inspir-
ing discourse that drove the foundation
of the Plurinational State of Bolivia, in
particular its official post-liberalism,
post-capitalism turn and the enshrine-
ment of the concepts of Mother Earth,
Buen Vivir, and food sovereignty in its
new constitution, we are currently wit-
nessing the breakdown of this promis-
ing new order. The political dynamics

1 of the changing governments in Brazil
2 and that in place in Bolivia are also un-
3 helpful, as they hinder the articulation
4 and implementation of environmental
5 policy over the long term. Forest pro-
6 tection under the Brazilian Forest Code
7 has been found to depend highly on
8 successful political enforcement, but the
9 newly elected Brazilian president, Jair
10 Bolsonaro, has publicly declared his in-
11 tention to water down forest protection
12 regulations. Recent worrying simula-
13 tions based on such plausible changes in
14 policy indicate that deforestation rates
15 could surge back to levels experienced
16 in the early 2000s.⁶⁹ A similar simula-
17 tion exercise was performed for Bolivia
18 to evaluate the potential for forest pro-
19 tection based on the progressive legisla-
20 tion of the 2009 Constitution, compared
21 to policies driving the expansion of the
22 agricultural frontier under the Goals of
23 the Patriotic Agenda.⁷⁰ As Evo Morales
24 is actively campaigning for a fourth,
25 highly polemic, presidential term, his
26 administration strategically uses the
27 process of land allocation and reformu-
28 lation of land use regulations to but-
29 tress the support of the Andean farmers
30 lobby, while maintaining its current al-
31 liance with the oil seed–cattle ranching
32 sector.

33 To formulate, let alone implement,
34 effective strategies to mitigate defores-
35 tation in these case study areas, the de-
36 tailed processes that spur land use dis-
37 placement across the Brazilian–Bolivian
38 border, the formal and informal instru-
39 ments that drive them, and their local
40 to global socioecological implications
41 need to be better understood and made
42 visible. To this end, it is also important
43 to recognize the extent to which the
44 dark economy (land traffic, drug, food
45 and livestock smuggling), clientelist
46 governance, and pervasive corruption
47 (e.g., in land allocation and purchases)
48 contribute to the blatant violation or,
49 worse, the legal dismantlement of forest
50 protection law, especially in remote and
51 less regulated border regions.

52
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NOTES

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34. P. Pacheco, "Agricultural Expansion and Deforestation in Lowland Bolivia: The Import Substitution Versus the Structural Adjustment Mode," *Land Use Policy* 23 (2006): 206–25.

35. Today, this strategic axis belongs to the Inter-Oceanic Corridor within the current Initiative for the Integration of Regional Infrastructure of South America (IIRSA). See <http://www.iirsa.org/infographic> (accessed 30 September 2018).

36. M. K. Steininger, C. J. Tucker, J. R. G. Townshend, T. J. Killeen, A. Desch, V. Bell, and P. Ersts, "Tropical Deforestation in the Bolivian Amazon," *Environmental Conservation* 28, no. 2 (2001): 127–34; Müller et al., note 13.

37. Tierra, *Informe 2010: Territorios Indígena Originario Campesinos en Bolivia entre La Loma Santa y La Pachamama* (La Paz, Bolivia: Fundación Tierra, 2011); G. Colque, E. Tinta, and E. Sanjinés, *Segunda reforma agraria: una historia que incomoda* (La Paz, Bolivia: Fundación Tierra, 2016).

38. The "half moon" region includes the four lowland departments of Santa Cruz, Beni, Pando, and Tarija, where the traditional land elite spurred strong opposition against the MAS government soon after the election of Evo Morales in 2005.

39. The expansion of the agricultural frontier is a key instrument for the central government, which can thereby secure access to land and natural resources to

its traditional political basis, Andean farmers and their unions.

40. Author's translation. Ministerio de Comunicación, *13 Pilares de la Bolivia digna y soberana—Agenda patriótica 2025*, Ministerio de Comunicación, La Paz, Estado Plurinacional de Bolivia, 2015, 22, <https://observatorioplanificacion.cepal.org/sites/default/files/plan/files/agenda%20patriotica%202025%20PDGES.pdf> (accessed 1 November 2018).

41. CEDIB, *Tierra y Territorio* (Cochabamba: Centro de Documentación e Información Bolivia, Cochabamba, 2008).

42. M. Lindtner, *Factores claves que llevan a la expansión ganadera sobre el bosque* (Santa Cruz de la Sierra, Bolivia: Gesellschaft für internationale Zusammenarbeit, 2018).

43. C. Kay and M. Urioste, *Bolivia's Unfinished Agrarian Reform: Rural Poverty and Development Policies*, ISS/UNDP Land, Poverty and Public Action Policy Paper No. 3. (The Hague, The Netherlands, and La Paz, Bolivia: Institute of Social Studies, Fundación Tierra, 2005).

44. FCBC, *Problemática de las reservas forestales en el Departamento de Santa Cruz* (Santa Cruz, Bolivia: Fundación para la Conservación del Bosque Chiquitano, 2015).

45. Lindtner, note 42.

46. For example, by extending the period of verification of the economic function of the land for medium and large properties from 2 to 5 years. Cámara Forestal de Bolivia: Mesa 1: Tierra y Estructura Agraria - Cumbre Agropecuaria Sembrando Bolivia, <https://www.cfb.org.bo/noticias/economia-comercio/mesa-1-tierra-y-estructura-agraria-cumbre-agropecuaria-sembrando-bolivia> (accessed November 2018); E. Castañón Ballivián, "Discurso empresarial vs. realidad campesina: la ecología política de la producción de soja en Santa Cruz, Bolivia," *Cuestión Agraria* 2 (2015): 65–86.

47. Formerly, the 1997 Forest Law fixed at 5 ha the maximum area that could be deforested by a household for life in forest areas suitable for diverse uses and areas of permanent forest production (Resolución Ministerial No. 131/97—Reglamentación Especial De Desmontes y Quemadas Controladas). Recently, this limit has been raised to 20 ha; see <http://senado.gob.bo/legislativa/proyectos-ley/ley-741> (accessed 30 September 2018); TIERRA, *Cumbre Agropecuaria "Sembrando Bolivia"—Apuntes críticos para la agenda agropecuaria* (La Paz, Bolivian: Fundación Tierra, 2015).

48. IIRSA, <http://www.iirsa.org/infographic#ioc> (accessed 30 September 2018).

49. Rubén Costas, Speech on the inauguration of the tarmac road between San Ramón and San Ignacio de Velasco, 26 September 2017, <https://www.youtube.com/watch?v=s-9rVATHjyQ>

50. J. Latino, *Estudio de la capacidad de uso mayor de la tierra*, vol. II, Proyecto CUMAT, USAID, Bolivia-PL-480, La Paz, Bolivia, 1985.

51. Moreover, Andean colonists culturally define themselves as farmers. Land in this conceptualization is, foremost, the substrate needed for production, so that forest clearance is obviously the first step to secure livelihood. Andean communities pursue the explicit aim of establishing a commercial agricultural productive system geared toward creating surplus, ideally emulating private commercial farmers, such as the Mennonites, as a strategy toward improving their living conditions.

52. P. L. Ibsich, "Biodiversity Conservation in Bolivia—History, Trends and Challenges," in A. Romero and S. E. West, eds., *Environment issues in Latin America and the Caribbean* (Dordrecht, The Netherlands: Springer, 2005), 55–71.

53. M. Baudoin Weeks, "¿Hacia dónde va la conservación en Bolivia?," *Ecología en Bolivia* 39, no. 2 (2004): 1–3.

54. Fundación Amigos de la Naturaleza, *Atlas Socioambiental de las Tierras Bajas y Yungas de Bolivia*, 2nd ed. (Santa Cruz de la Sierra, Bolivia: Editorial FAN, 2016); N. Araujo, R. Müller, C. Nowicki, and P. L. Ibsich, eds., *Prioridades de Conservación de la Biodiversidad de Bolivia*,

SERNAP, FAN, TROPICO, CEP, NORDECO, GEF II, CI, TNC, WCS, Universidad de Eberswalde (Santa Cruz, Bolivia: Editorial FAN, 2010).

55. Müller et al., note 13, p. 34.

56. MMAyA and ABT, note 30.

57. T. Killeen, E. Chavez, M. Peña-Claros, M. Toledo, L. Arroyo, J. Caballero, L. Correa, R. Guillén, R. Quevedo, M. Saldias, L. Soría, Y. Usilar, I. Vargas, and M. Steininger, "The Chiquitano Dry Forest, the Transition Between Humid and Dry Forest in Eastern Lowland Bolivia," in R. T. Pennington and J. A. Ratter, eds., *Neotropical Savannas and Seasonally Dry Forests: Plant Diversity, Biogeography and Conservation* (Boca Raton, FL: Taylor & Francis, 2006), 213–33.

58. International Model Forest Network, <http://www.imfn.net/international-model-forest-network> (accessed 20 September 2018); R. Vides-Almonacid and H. Justiniano, "Ecological Integrity and Sustainable Development in the Chiquitano Dry Forest, Bolivia," in UNESCO, ed., *Adapting to Change The State of Conservation of World Heritage Forests in 2011* (Paris, France: UNESCO), 91–95.

59. The Gran Chiquitania is a region primarily defined based on cultural historical criteria; it broadly coincides with the provinces of Guarayos, Ñuflo Chávez, Velasco, Chiquitos, Ángel Sandoval and parts of the German Busch province.

60. M. K. Steininger, C. J. Tucker, P. Ersts, T. J. Killeen, Z. Villegas, and S. B. Hecht, "Clearance and Fragmentation of Tropical Deciduous Forest in the Tierras Bajas, Santa Cruz, Bolivia," *Conservation Biology* 15 (2001): 856–66; Ibsich, note 52.

61. See also D. J. Redo, *Understanding and Mapping Land-Use and Land-Cover Change along Bolivia's Corridor Biocénico*. PhD Thesis. Texas A&M University, Department of Geography, College Station, TX.

62. MMAyA and ABT, note 30.

63. G. Y. Caballero Leiva, *Historia y proyección organizativa de la Zona de Colonización—San Martín, Municipio—San Ignacio de Velasco (1990—2011)* (Santa Cruz, Bolivia: Centro de Investigación y Promoción del Campesinado—CIPCA, 2013); Fundación Amigos de la Naturaleza, *Atlas Socioambiental de las Tierras Bajas y Yungas de Bolivia*, 2nd ed. (Santa Cruz de la Sierra, Bolivia: Editorial FAN, 2016); A. J. Kopp, *Las colonias menonitas en Bolivia - Antecedentes, asentamientos y propuestas para un diálogo* (La Paz, Bolivia: Fundación Tierra, 2015). A. C. de la Vega-Leinert, "Peasant Systems at the Agricultural Frontier of the Velasco Province, Chiquitania, Bolivia," *Geöko* 38 (2017): 203–30.

64. D. Redo, "Deforestation Dynamics and Policy Changes in Bolivia's Post-Neoliberal Era," *Land Use Policy* 28, no. 1 (2011): 227–41; FCBC, note 44.

65. Informal and illegal mechanisms of land acquisition are difficult to assess, but are a common topic of concern among different actors involved, who accuse each other of partaking in land trafficking. TIERRA, *Provincia Velasco El derecho a la tierra en la Chiquitania* (La Paz, Bolivia: Fundación Tierra, 2003).

66. This organization comprises subnational authorities of the ZICOSUR region in Argentina, Bolivia, Brazil, Chile, Paraguay, and Peru. ZICOSUR, *ZICOSUR—Áreas de gestión compartida—Integración política regional en los territorios*, <http://zicosur.co/wp-content/uploads/2018/05/areasgestioncompartida.pdf> (accessed November 2018).

67. European Commission, *The EU Biodiversity for Life Flagship Initiative* (Luxemburg: Publication Office of the European Union, 2014).

68. M. Turzi, "The Soybean Republic," *Yale Journal of International Affairs*, 6, no. 2 (2011): 59–68.

69. A. C. Soterroni et al., "Future Environmental and Agricultural Impacts of Brazil's Forest Code," *Environmental Research Letters* 13 (2018): 074021

70. G. Tejada, E. Dalla-Nora, D. Cordoba, R. Laforzezza, A. Ovandoa, T. Assis, and A. P. Aguiar, "Deforestation Scenarios for the Bolivian Lowlands," *Environmental Research* 144 (2016): 49–63.

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