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ARTICLE

Tropical deforestation and Indigenous resistance over the *longue durée* in South America

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Abstract

The destruction of tropical forests is an environmental issue of global significance. This process has deep historical roots, with recent scholarship exploring the role of European colonisation and capitalist expansion in driving tropical deforestation from the sixteenth century onwards. Less attention, however, has been given to how Indigenous resistance has impeded deforestation over this time period. Here we analyse how non-state Indigenous groups obstructed Spanish and Portuguese political control and commodity frontiers in tropical South America. Drawing on archival sources, together with Indigenous Guaraní and Paiter Suruí philosophy and oral history, we assess this phenomenon in two biomes, the Atlantic and Amazon Rainforests. The results highlight that over the *longue durée*, Indigenous resistance has assisted in the conservation of South American tropical forests, acting as a significant—but under-recognised—factor in both regional and global environmental history. This history is of particular importance given the increased recognition of the role of Indigenous peoples in conserving tropical forests as carbon sinks in the twenty-first century.

Keywords: environmental history; tropical rainforests; capitalism; Atlantic Rainforest; Amazon Rainforest; Indigenous history; commodity frontiers

> So you have dared to enter this forest, which was never yours? Do you not know that this is our homeland, passed down from our parents and ancestors? … Are you so poor that you must take your riches from our forest, robbing the leaves of our trees to make a drink?[1]

[1]Translation by the authors of the Spanish text in Martin Dobrizhoffer, 'Relación de la Expedición al Mbaéverá' ('Relation of the Expedition to Mbaéverá'), in *Tres Encuentros con América* (*Three Encounters with America*) (El Arte, 1967), Portal Guaraní, accessed 2 February 2024, http://www.portalguarani.com/1673_martin_dobrizhoffer/14966_relacion_de_la_expedicion_al_mbaevera_martin_dobrizhoffer_.html. Dobrizhoffer was present in South America between 1749 and 1767. For an alternative (somewhat antiquated) English translation of the original Latin text, see Martin Dobrizhoffer, *An Account of the Abipones, an Equestrian People of Paraguay*, vol. 1 (1784; repr., John Murray, 1822), 2, 86–7.

These words were ascribed by the Jesuit missionary Martin Dobrizhoffer to an anonymous Guaraní warrior in the eighteenth-century Atlantic Rainforest of South America, allegedly delivered during an Indigenous attack on Spanish yerba mate collectors.[2] While it is impossible to know how much poetic licence Dobrizhoffer took with this speech, it does resonate with themes raised by contemporary Guaraní thinkers, such as the threat posed to the Atlantic Rainforest by colonisation and the centrality of this biome to the Guaraní way of life.[3] As Dobrizhoffer notes, this particular attack was successful in its aims, expelling Spanish colonists from this region of the forest for a number of years.[4] In this article, we argue that acts of resistance such as this one, carried out by Guaraní and other Indigenous forest-dwelling peoples, had a cumulative ecological impact of global significance, by obstructing tropical deforestation over the long term in South America.

Tropical deforestation is one of the most pressing environmental issues of the twenty-first century, with the survival of tropical forest biomes being an essential component of the global campaign to prevent runaway climate change. The escalation of land-use change in tropical forests has been identified as an indicator of the so-called 'Great Acceleration', part of a series of human-driven planetary changes that have arguably intensified over the last seven decades.[5] Recent scholarship has traced the historical origins of commodity-driven tropical deforestation back considerably further, to the sixteenth century, with the onset of European colonisation and the capitalist world-market.[6] However, the potential role of Indigenous resistance in obstructing and shaping deforestation patterns over this historical period, and the legacies this has left for current patterns of deforestation and forest cover, has received relatively little attention.[7] Recent research is increasingly recognising the importance of Indigenous tropical forest territories across the Americas, Africa, and Asia as key sites of biodiversity and carbon sequestration, and of Indigenous peoples in these regions as key players in the fight against climate change.[8]

With this in mind, this article first maps the relationship between the capitalist world-economy and tropical deforestation in South America since 1500, then analyses how Indigenous resistance has affected these deforestation patterns in two biomes: the Atlantic and Amazon Rainforests of South America. These latter two sections focus on the long-term impacts of Indigenous resistance during the colonial period in these two biomes, while also assessing how these Indigenous struggles continue in both these forest regions today. Sven Beckert et al.'s recent, agenda-setting study of global commodity frontiers alluded to the importance of local resistance in imposing

[2]Yerba mate (*Ka'a miri* in Guaraní) is a plant native to the Atlantic Rainforest that was used by Guaraní peoples as a brewed stimulant and subsequently transformed into a regional commodity by Spanish colonists (Juan Carlos Garavaglia, *Mercado Interno y Economía Colonial* (*Internal Market and Colonial Economy*) (Prohistoria, 2008), 40).

[3]See, for example, Timóteo Verá Tupã Popygua, *Yvyrupa: A Terra Uma Só* (*Yvyrupa: One Earth Only*) (Hedra, 2017).

[4]Dobrizhoffer, *An Account of the Abipones*, 85–7.

[5]John R. McNeill and Peter Engelke, *The Great Acceleration: An Environmental History of the Anthropocene since 1945* (Harvard University Press, 2016), 103–54.

[6]Jason W. Moore, *Capitalism in the Web of Life: Ecology and the Accumulation of Capital* (Verso, 2015); Rafael de Bivar Marquese and Leonardo Marques, 'Ouro, Café e Escravos: o Brasil e "Assim Chamada Acumulação Primitiva"' ('Gold, Coffee and Slaves: Brazil and "So-Called Primitive Accumulation"'), in *Os Tempos Plurais da Escravidão no Brasil: Ensaios de História e Historiografia* (*The Plural Times of Slavery in Brazil: Essays in History and Historiography*) (Intermeios, 2020), 105–32.

[7]We utilise the following non-official UN description of Indigenous peoples: They are the descendants 'of those who inhabited a country or a geographical region at the time when people of different cultures or ethnic origins arrived. The new arrivals later became dominant through conquest, occupation, settlement or other means' (United Nations Permanent Forum on Indigenous Issues, 'Indigenous Peoples, Indigenous Voices Factsheet', United Nations Department of Economic and Social Affairs, accessed 18 September 2024, https://www.un.org/esa/socdev/unpfii/documents/5session_factsheet1.pdf).

[8]Jocelyne S. Sze et al., 'Reduced Deforestation and Degradation in Indigenous Lands Pan-Tropically', *Nature Sustainability* 5 (2022): 120–30; Wayne Walker et al., 'Forest Carbon in Amazonia: The Unrecognized Contribution of Indigenous Territories and Protected Natural Areas', *Carbon Management* 5, no. 5–6 (2014): 479–85; Yuanwei Qin et al., 'Forest Conservation in Indigenous Territories and Protected Areas in the Brazilian Amazon', *Nature Sustainability* 6 (2023): 295–305; Linda Etchart, 'The Role of Indigenous Peoples in Combating Climate Change', *Palgrave Communications* 3 (2017): article no. 17085.

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constraints on capitalist expansion.[9] This article takes the next step, providing a detailed analysis of this phenomenon in tropical South America, acknowledging Indigenous forest-dwelling groups as significant actors on both a regional and global scale.

Due to the five-century-long history of European colonisation on the continent, tropical South America offers an ideal region to analyse the relationship between local deforestation processes and the capitalist world-economy over the *longue durée*.[10] South America is also at the centre of global debates about the relationship between Indigenous peoples and tropical forests. Some researchers argue that Indigenous agriculture in the Amazon and Atlantic Rainforests caused significant deforestation before European colonisation, with the subsequent mass death of Indigenous populations being a key driver of forest regrowth, potentially even contributing to global climatic shifts in the seventeenth century.[11] However, other studies have contested this position, demonstrating that precolonial Indigenous swidden and other agroforestry practices in South America caused far less deforestation than colonial commodity frontiers, and in various cases appear to have increased forest cover and biodiversity.[12] We align with the latter position, and argue that an exclusive focus on factors such as Indigenous demographic collapse can obscure the role that Indigenous resistance has played in conserving South American forests. In other words, Indigenous peoples have conserved South America's forests not by dying, but by living.

We define 'resistance' as the sum of the activities carried out by Indigenous peoples to maintain their political and territorial autonomy, along with their ways of life.[13] In the cases studied here, this includes violent conflict, labour withdrawal, mass flight into the forest, economic sabotage, and tactical temporary alliance-making. While colonial documentation only occasionally recorded Indigenous groups justifying these acts in explicitly conservationist terms, collectively these acts made an important contribution to long-term forest conservation, by obstructing Iberian occupation of various territories.[14] We focus on Spanish and Portuguese colonisation in the Amazon and Atlantic Rainforests, with Indigenous struggles against Iberian gold mining acting as one of the article's major historical through-lines.

The investigation utilises unpublished texts and maps from a variety of archives in the Americas and Europe, including the Archivo y Biblioteca Nacionales de Bolivia, the Arquivo Público do Estado do Pará, the Biblioteca Nacional do Rio de Janeiro, the Archivo Nacional de Asunción, the Archivo General de Indias, the National Archives at College Park, Maryland, and the Archivum Romanum Societatis Iesu. With one of the co-writers of this article being Nhandeva Guaraní (from the Atlantic Rainforest) and another being Paiter Suruí (from the Amazon Rainforest), we then put this material into dialogue with Guaraní and Paiter Suruí cosmology and

[9]Sven Beckert et al., 'Commodity Frontiers and the Transformation of the Global Countryside: A Research Agenda', *Journal of Global History* 16, no. 3 (2021): 443–6.

[10]Fernand Braudel used *la longue durée* (the long-term) to describe historical processes that have played out across multiple temporal and geographical scales, including the development of capitalism (*Civilisation and Capitalism 15th–18th Century. Volume III: The Perspective of the World* (Williams Collins Sons & Co Ltd, 1984), 620–3).

[11]See the discussion of the 'Orbis spike' in Simon L. Lewis and Mark M. Maslin, 'Defining the Anthropocene', *Nature* 519 (2015): 171–80. See also Alexander Koch et al., 'Earth System Impacts of the European Arrival and Great Dying in the Americas after 1492', *Quaternary Science Reviews* 207 (March 2019): 13–36.

[12]Rebecca Hamilton et al., 'Non-Uniform Tropical Forest Responses to the "Columbian Exchange" in the Neotropics and Asia-Pacific', *Nature Ecology & Evolution* 5 (August 2021): 1174–84; Patrick Roberts et al., 'Tropical Forests as Key Sites of the "Anthropocene": Past and Present Perspectives', *PNAS* 118, no. 40 (2021): 1–7; Mark Robinson et al., 'Uncoupling Human and Climate Drivers of Late Holocene Vegetation Change in Southern Brazil', *Scientific Reports* 8, no. 1 (2018): article no. 7800.

[13]For a classic Peruvian study of Indigenous resistance that uses a related definition, see Stefano Varese, *Witness to Sovereignty: Essays on the Indian Movement in Latin America* (IWGIA, 2006), 196–207.

[14]On colonial 'territorialization', see João Pacheco de Oliveira, 'Uma Etnologia dos "Índios Misturados"? Situação Colonial, Territorialização e Fluxos Culturais' ('An Ethnology of "Mixed Indians?" The Colonial Situation, Territorialization and Cultural Fluxes'), *Mana* 4, no. 1 (1998): 47–77.

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oral history.[15] In doing so, we hone in on the negative space in the colonial archives, cross-referencing archival documents with Indigenous perspectives to identify where and why European colonists and their financial backers were unable to achieve their goals. Following Ann McGrath and Lynette Russell's lead, we seek to bridge the artificial disciplinary divide between Indigenous history and global history.[16] Key themes of global history, such as the expansion of capitalism and the retreat of the world's forests, can be seen in a new light if we recognise Indigenous resistance not just as a survival strategy, but also as a fundamentally disruptive material force with a planetary political and ecological impact.

Capitalism and tropical deforestation in South America

Between 1950 and 2020, more than 8 million square kilometres of tropical forest were estimated to have been cleared, an area larger than Australia.[17] This period saw both the intensification and extensification of commercial agricultural, livestock-raising, mining, and tree plantation land use in tropical forests.[18] However, widening our historical frame of analysis can help us trace the political and economic pathways that have led to the current global ecological crisis. According to environmental historian Michael Williams' calculations, more than 4 million square kilometres of tropical forest had already been cleared between 1700 and 1950.[19] While commodity-driven tropical deforestation has increased dramatically in the last seven decades, the emergence of this socioeconomic relationship to tropical forests can be traced back five centuries earlier. Karl Marx noted in the first volume of *Capital* that 'the modern life-history of capital can be dated from the creation of modern world-trade and a world-market in the sixteenth century'.[20] The modern life-history of tropical deforestation is tightly linked to this process of colonial and capitalist expansion.

There have been extensive debates about the origins of global capitalism and its environmental impacts, with Andreas Malm, for example, identifying the advent of fossil fuel usage in Britain in the late eighteenth century as a crucial pivot point.[21] The Industrial Revolution and the Great Acceleration both escalated capitalist deforestation in the tropics. However, as scholars associated with world-systems analysis such as Giovanni Arrighi and Jason W. Moore have identified, the Iberian powers, backed by Genoese, southern German, and Flemish capital, had already established several key components of this system in the Americas in the sixteenth century, such as large-scale ore extraction and tropical plantations supported by European credit systems.[22] We broadly align with this position, arguing that a capitalist world-economy had emerged since the

[15]We analyse this process as part of broader world-historical trends rather than through the specific lens of Indigenous 'ethnohistory'. On ethnohistory, see James Axtell, 'Ethnohistory: An Historian's Viewpoint', *Ethnohistory* 26, no. 1 (1979): 1–13.

[16]Ann McGrath and Lynette Russell, 'History's Outsiders? Global Indigenous Histories', in *The Routledge Companion to Global Indigenous History*, ed. Ann McGrath and Lynette Russell (Routledge, 2022), 1–30.

[17]This estimate is based on a composite of two sets of figures, with those from 1950–95 drawn from Michael Williams, *Deforesting the Earth: From Prehistory to Global Crisis: An Abridgement* (The University of Chicago Press, 2006), 372. Figures from 1996–2020 are from Food and Agricultural Organization (FAO), 'Global Forest Resources Assessment 2020: Main Report' (Rome, 2020), 18–19.

[18]Philip G. Curtis et al., 'Classifying Drivers of Global Forest Loss', *Science* 361, no. 6407 (2018): 1108–11.

[19]Williams, *Deforesting the Earth*, 372.

[20]Authors' translation. Karl Marx, *Das Kapital. Kritik der Politischen Oekonomie. Buch I: Der Produktionsprocess des Kapitals* (*Capital: A Critique of Political Economy. Book I: The Process of Production of Capital*) (Otto Meissner, 1867), 106–7.

[21]Andreas Malm, *Fossil Capital: The Rise of Steam-Power and the Roots of Global Warming* (Verso, 2016).

[22]Giovanni Arrighi, *The Long Twentieth Century: Money, Power, and the Origins of Our Times* (Verso, 2010), 126–7; Moore, *Capitalism in the Web of Life*, 183–5; Jason W. Moore, '"Amsterdam Is Standing on Norway" Part I: The Alchemy of Capital, Empire and Nature in the Diaspora of Silver, 1545–1648', *Journal of Agrarian Change* 10, no. 1 (2010): 33–68. See also Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Philip II*, vol. 1 (University of California Press, 1996), 211, 393–4, 444–5, 480.

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sixteenth century, with evolving cycles of accumulation, spearheaded by a series of European capitalist agents (the Genoese and the Dutch, followed by the British and then the United States), driving intensifying waves of deforestation on commodity frontiers in the tropics.[23] Nevertheless, we also contend that world-systems analysis has tended to neglect the historical impact of Indigenous actions, particularly those of non-state Indigenous groups during the colonial period, on the periphery of the capitalist world-economy.[24] In this article we open a dialogue between South American Indigenous forest history and world-systems analysis, to situate these histories of Indigenous resistance in a global historical and environmental framework.

An analysis of historical deforestation in the tropical rainforests of South America illustrates some of the key phases in the development of the capitalist world-economy. While the Amazon Rainforest captures contemporary headlines, the Atlantic Rainforest of modern-day Brazil, Paraguay, and Argentina is also a major biodiversity hotspot, and was approximately one-fifth of the size of the Amazon when Europeans arrived in South America. Today, less than 17% of the Atlantic Rainforest remains.[25] Figure 1 provides a provisional, two-stage visualisation of deforestation in South American tropical rainforests, depicting clearing between 1500 and 1950, then clearing between 1950 and 2020. Satellite photography dating back to the 1970s, along with US and Brazilian government surveys from the 1950s, gives us a solid scientific baseline for identifying forest cover in 1950.[26] To trace forest cover changes prior to 1950, we have assessed a mixture of archival texts and maps, while also synthesising secondary historical studies. To account for the limitations and biases in colonial maps and texts, we have triangulated these sources with Indigenous perspectives and the aforementioned satellite data.

As Figure 1 indicates, if we focus on the Amazon, we can see a series of smaller deforestation fronts in that biome before 1900, such as colonial sugar and coffee plantations in the Guianas; gold mining in eighteenth-century Mato Grosso; and cotton crops in nineteenth-century Maranhão.[27] A mosaic of isolated clearings for cattle raising and agriculture appeared in the Brazilian Amazon before 1950, in conjunction with the first rubber boom (1879–1912) and earlier colonial-era commodity cycles. Nearly all rubber production in the Amazon depended upon wild trees rather than plantations, and was therefore selectively extractive, with the majority of Amazonian cacao and Brazil nut production following the same pattern.[28] This meant that overall, although these industries commodified various forest plant species and had a devastating effect on Indigenous

[23]The concept of the commodity frontier, as developed by Jason W. Moore, provides a useful tool to analyse the opening of new mining and farming zones in tropical rainforests. Moore, *Capitalism in the Web of Life*, 63; Arrighi, *The Long Twentieth Century,* 10, 14; Marquese and Marques, 'Ouro, Café e Escravos'.

[24]Immanuel Wallerstein, *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century* (Academic Press, 1974), 338; Arrighi, *The Long Twentieth Century,* 65, 159.

[25]Fundación Vida Silvestre Argentina and World Wildlife Fund (WWF), *State of the Atlantic Forest: Three Countries, 148 Million People, One of the Richest Forests on Earth* (WWF, 2017), 6, 15; L. Patricia C. Morellato and Celio F.B. Haddad, 'Introduction: The Brazilian Atlantic Forest', *Biotropica* 32, no. 4b (2000): 787.

[26]Amazonian Georeferenced Socio-Environmental Information Network (RAISG), *Desmatamento na Amazônia (1970–2013)* (*Deforestation in the Amazon (1970–2013)*) (ISA - Instituto Socioambiental, 2015); José Augusto Pádua, 'Nature and Territory in the Making of Brazil', in *New Environmental Histories of Latin America and the Caribbean*, ed. Claudia Leal, José Augusto Pádua, and John Soluri (RCC Perspectives, 2013), 37. See also the Central Intelligence Agency map, 'Southeast Brazil: Vegetation', 1959, Record Group 263, no. 20254, US National Archives and Records Office, College Park, Maryland.

[27]Leonardo Marques, 'A Fronteira do Ouro e a Degradação do Outro nos Confins do Brasil Colonial (Capitania do Mato Grosso, Século XVIII)' ('The Gold Frontier and the Degradation of the Other in the Confines of Colonial Brazil (Mato Grosso Captaincy, Eighteenth Century)'), in *História dos Mercadorias: Trabalho, Meio Ambiente e Capitalismo Mundial (Séculos XVI–XIX)*, (*History of Commodities: Work, Environment and World Capitalism (Sixteenth to Nineteenth Centuries*), ed. Leonardo Marques and Alexsander Gebara (Casa Leiria, 2023), 552; Felipe Souza Melo and Diego de Cambraia Martins, 'Reassessing the Productivity of Enslavement on Large-Scale Plantations and Small Farms in Brazilian Cotton Production (c.1750–c.1810)', *Historical Research* 20 (2023): 5–6.

[28]Barbara Weinstein, *A Borracha na Amazônia: Expansão e Decadência, 1850–1920* (*Rubber in the Amazon: Expansion and Decadence, 1850–1920*), trans. Lólio Lourenço de Oliveira (HUCITEC, 1993), 24; Victor L. Caetano Andrade et al., 'Growth

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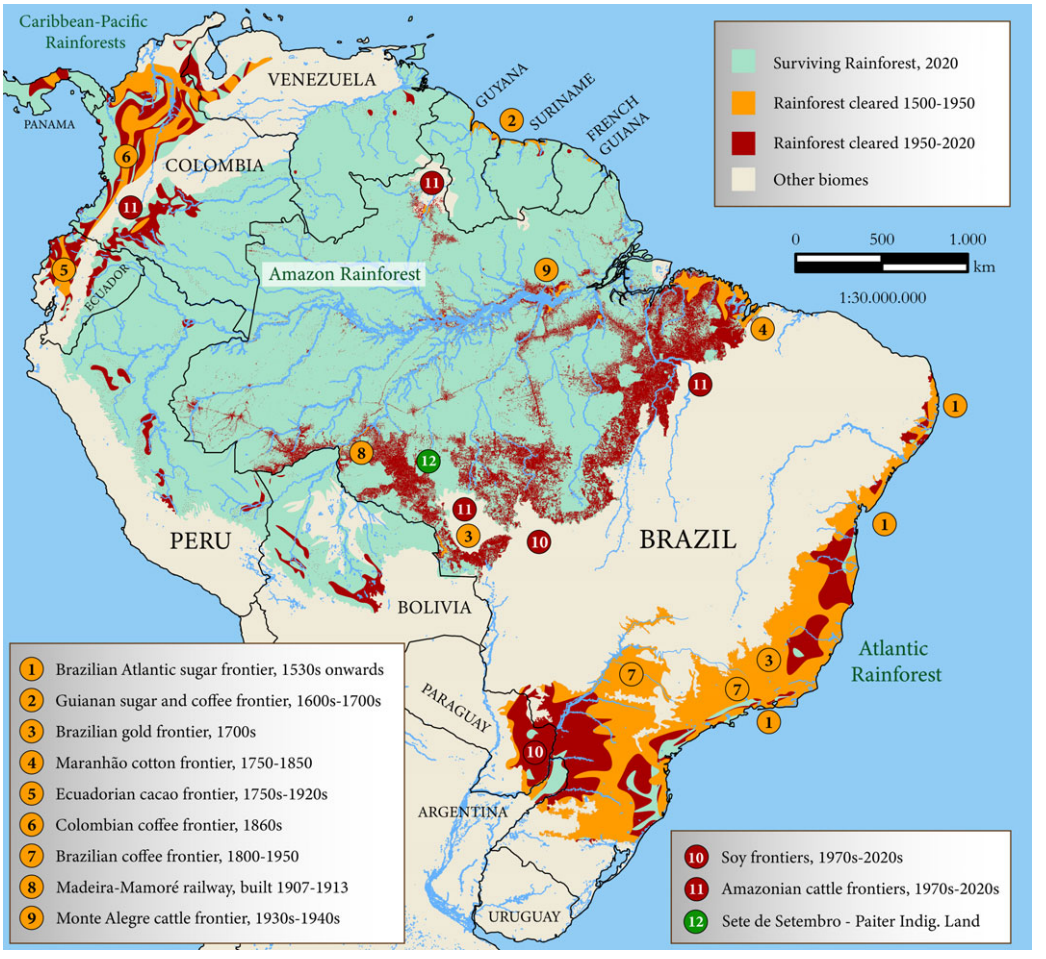

Figure 1. Deforestation in tropical and subtropical South American rainforests, 1500–2022.[29]

populations in many areas of the Amazon, they did not cause large-scale deforestation in themselves. Within this broader context, a 1937 land tax chequebook (*talonário*) reveals a minor cattle-ranching frontier emerging in the savanna area around Monte Alegre on the Amazon River in Pará (maximum property size, 1,058 hectares).[30] Another 1944 *talonário* lists smaller agricultural sites established to feed workers on major rubber, cacao, and Brazil nut extraction zones in Pará at Altamira (maximum agricultural property size, 150 hectares). In addition,

Rings of Brazil Nut Trees (Bertholletia Excelsa) as a Living Record of Historical Human Disturbance in Central Amazonia', *PLoS ONE* 14, no. 4 (2019): 1–18.

[29]Note that Figure 1 visualises tropical and subtropical rainforest but does not depict tropical or subtropical dry forests. Further references for Figure 1: For the Amazon Rainforest after 1970, we drew primarily on the RAISG database. See 'Cartographic Data', accessed 5 April 2024, https://www.raisg.org/en/maps/#descargas. For the Amazon and the Atlantic Rainforest before 1950, we also drew on the map collections at the Archivo y Biblioteca Nacional de Bolivia, the Casa de la Libertad (in Bolivia), the Biblioteca Nacional de Rio de Janeiro, and the Gotha Perthes Collection (Erfurt, Germany). See also Calaway Homer Dodson and Alwyn Howard Gentry, 'Biological Extinction in Western Ecuador', *Annals of the Missouri Botanical Garden* 78, no. 2 (1991): 283; Janina Kleemann et al., 'Deforestation in Continental Ecuador with a Focus on Protected Areas', *Land* 11, no. 268 (2022): 4, 8.

[30]'Talonário de Imposto Territorial: N.50, Monte Alegre' ('Land Tax Chequebook: N.50, Monte Alegre'), 1937, Arquivo Público do Estado do Pará, Poder Executivo, Departamento de Agricultura (hereafter APEP, PE, DA), no. 1–4, 6–7, 9, 11, 13, 19, 23, 25, 30, 47, 62.

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infrastructure projects linked to the rubber boom, such as the Madeira-Mamoré railway, also caused patches of localised deforestation.[31] Assessed as a whole, this data nevertheless indicates that while the Mato Grosso, Maranhão, and Pará fronts in Brazil were significant for influencing the main *direction* of deforestation, the majority of full-scale clearing in the Amazon Rainforest has occurred since 1950.[32]

The picture changes, however, if we zoom out to include the Atlantic Rainforest, revealing a massive earlier wave of deforestation. This article builds on Arrighi and Moore's work by offering an overview of the evolving export and credit systems driving this deforestation in South America from the sixteenth century to the present day. This process started in the sixteenth century with sugar cultivation along the Brazilian coast (funded in many cases by Flemish and, later, Dutch capital); expanded in the seventeenth and eighteenth centuries with the opening of the Brazilian gold frontier in Minas Gerais (spurred on by British capital); and advanced rapidly westward in the nineteenth and early twentieth century via the coffee frontier of Rio de Janeiro and São Paulo (servicing the US consumer market).[33] As Figure 1 visualises, the strongest deforestation front in South America has been in Brazil, where the majority of the Atlantic Rainforest was cleared before 1950, and where the largest share of the Amazon Rainforest has been cleared since 1950. A smaller scale, but still noteworthy, pre-twentieth century deforestation front is also visible in the Pacific and Caribbean forests of Ecuador, Colombia, and Venezuela, where cacao and coffee plantations drove earlier waves of clearing.[34] Livestock farming, particularly cattle ranching, has also been a constant deforestation driver across all South American tropical rainforests in both the colonial and post-independence eras.[35]

Debt chains linking colonial empires and independent states in South America to the leading agents of capitalism in Europe and North America have also influenced long-term deforestation rhythms in both the Atlantic and Amazon Rainforests. The debts of the Hapsburg monarchs to south German bankers (the Fuggers and Welsers), then to the Genoese from 1557, drove Spanish ore extraction efforts in the Americas, including the search for gold in the Amazon.[36] From its independence in 1822 onwards, Brazil was increasingly indebted to British banks, with subsequent British investments in Brazilian railways extending the coffee frontier into the western Atlantic Rainforest after 1870.[37] In line with this pattern, from the 1970s onwards, the US oversaw a period

[31]'Talonário de Imposto Territorial: N.01, Altamira' ('Land Tax Chequebook: N.01, Altamira') 1944, APEP, PE, DA, no. 2–8, 10.

[32]RAISG, *Desmatamento na Amazônia*, 5.

[33]Eddy Stols, 'The Expansion of the Sugar Market in Western Europe', in *Tropical Babylons: Sugar and the Making of the Atlantic World, 1450–1680*, ed. Stuart B. Schwartz (University of North Carolina Press, 2004), 262–3; Marquese and Marques, 'Ouro, Café e Escravos'; Warren Dean, *With Broadax and Firebrand: The Destruction of the Atlantic Rainforest* (University of California Press, 1995).

[34]Luis Alberto Ramírez Méndez, 'El Cultivo del Cacao Venezolano a Partir de Maruma' ('Venezuelan Cacao Cultivation from Maruma'), *Historia Caribe* 10, no. 27 (2015): 69–101; José Rojas-López, 'La Producción de Cacao en la Venezuela de la Segunda Mitad del Siglo XVIII: ¿Grandes o Modestas Plantaciones?' ('The Production of Cacao in Venezuela in the Second Half of the Eighteenth Century: Large or Modest Plantations?'), *Derecho y Reforma Agraria* 38 (2012): 89–109; Juan Maiguashca, 'La Incorporación del Cacao Ecuatoriano al Mercado Mundial entre 1840 y 1925, Según los Informes Consulares' ('The Incorporation of Ecuadorian Cacao in the World Market between 1840 and 1925, According to Consular Reports'), *Procesos. Revista Ecuatoriana de Historia* (2012): 67–98.

[35]Dean, *Broadax and Firebrand*, 74–6, 111–14, 204–7; Shawn Van Ausdal, 'Pasture, Profit, and Power: An Environmental History of Cattle Ranching in Colombia, 1850–1950', *Geoforum* 40, no. 5 (2009): 707–19; Susanna B. Hecht and Alexander Cockburn, *The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon* (The University of Chicago Press, 2010), 70, 118; RAISG, *Amazonia under Pressure* (ISA - Instituto Socioambiental, 2021), 63.

[36]David Graeber, *Debt: The First 5,000 Years* (Melville House, 2011), 317–19; Giovanna Montenegro, *German Conquistadors in Venezuela: The Welser's Colony, Racialized Capitalism, and Cultural Memory* (University of Notre Dame Press, 2022), 3, 262; Arrighi, *The Long Twentieth Century*, 126–9; Moore, 'Amsterdam Part I', 44–6.

[37]Marcelo de Paiva Abreu, 'Brazil as a Debtor, 1824–1931', *The Economic History Review* 59, no. 4 (2006): 765, 769; Marcelo de Paiva Abreu, 'British Business in Brazil: Maturity and Demise (1850–1950)', *Revista Brasileira de Economia* 54, no. 4 (2000): 391–2.

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of global financial expansion (the neoliberal era) during which Bretton Woods organisations such as the International Monetary Fund (IMF) and the World Bank took on a new, augmented role in global monetary regulation.[38] These institutions provided loans for the Brazilian military government, which had taken power in a US-supported coup in 1964, to launch a colossal infrastructure scheme in the Amazon, combining road and dam construction with cattle-ranching and mining megaprojects such as Jari and Grande Carajas.[39]

To pay off its subsequent international debts, Brazil became increasingly dependent on export-led growth via commodities such as soy, beef, sugar, and coffee, along with gold and other minerals. This economic boom has driven continued deforestation in the Atlantic Rainforest and has opened a gigantic new beef and soy frontier in the Amazon.[40] Today, Indigenous territories, such as those of the Tupi-Mondé corridor, which includes the Sete de Setembro Indigenous Land of the Paiter Suruí community, form some of the last remaining barriers preventing runaway deforestation on the southern edge of the Amazon (see Figure 1).[41] These territories are of critical importance to the global carbon cycle, with Wayne Walker et al.'s recent study calculating that Indigenous territories in the Amazon store 32.8% of the biome's aboveground carbon.[42] As the following analysis demonstrates, however, Indigenous resistance had already played an important role in constraining and redirecting deforestation patterns during previous centuries.

Deforestation and Indigenous resistance in the Atlantic Rainforest

In the Atlantic Rainforest, our research indicates two general regional trends. In the Brazilian section of the forest, where Portuguese colonists appropriated Indigenous labour to assist in the opening of both the sugar frontier and the Minas Gerais gold-mining frontier, deforestation advanced rapidly. Nevertheless, even within this region, localised resistance by Macro-Jê groups impeded deforestation in the eastern forests of Minas Gerais. In the western section of the Atlantic Rainforest, known as the Paraná Forest ecoregion, Indigenous resistance occurred on an even larger scale, with Macro-Jê and Guaraní-speaking Indigenous groups successfully obstructing colonisation for several centuries, contributing to a far slower deforestation process.[43]

In the sixteenth century, groups from the Tupi-Guaraní linguistic subfamily (a branch of the Tupian language family) predominated in most of the major river valleys and along large stretches of the coast within the Atlantic Rainforest, practising manioc and maize swidden farming that supported substantial populations. Within this subfamily, Guaraní-speakers predominated south and west of Cananeia in modern-day São Paulo state, on the Brazilian coast, while Tupinambá speakers predominated to the north and east.[44] Interspersed with these Guaraní- and Tupinambá-speaking populations were a range of other groups from the Macro-Jê linguistic

[38]Arrighi, *The Long Twentieth Century*, 69; Jürgen Renn, *The Evolution of Knowledge: Rethinking Science for the Anthropocene* (Princeton University Press, 2020), 389–90.

[39]Luis C. Barbosa, 'The World-System and the Destruction of the Brazilian Amazon Rain Forest', *Review (Fernand Braudel Center)* 16, no. 2 (1993): 215–40; Carlo Edoardo Altamura and Claudia Kedar, 'Friends or Foes? Brazil, the IMF and the World Bank, 1961–1967', *Financial History Review* 28, no. 2 (2021): 205–36; Hecht and Cockburn, *The Fate of the Forest*, 113.

[40]Ernst Langthaler, 'Great Accelerations: Soy and Its Global Trade Network, 1950–2020', in *The Age of the Soybean*, ed. Claiton Marcio da Silva and Claudio de Majo (White Horse Press, 2022), 70; Stephen G. Bunker, *Underdeveloping the Amazon: Extraction, Unequal Exchange, and the Failure of the Modern State* (The University of Chicago Press, 1985), 86; Ricardo de Oliveira Bordonal et al., 'Sustainability of Sugarcane Production in Brazil. A Review', *Agronomy for Sustainable Development* 38, no. 13 (2018): 13; Barbosa, 'The World-System', 224–5.

[41]Beto Borges, 'Prefácio' ('Preface'), in *Histórias do Começo e do Fim do Mundo: O Contato do Povo Paiter Suruí* (*Histories of the Beginning and the End of the World: The Contact of the Paiter Surui People*) (Ikoré, 2016), 6.

[42]Walker et al., 'Forest Carbon', 480.

[43]Fundación Vida Silvestre Argentina and WWF, *State of the Atlantic Forest*, 15; Aziz Ab'Sáber, *Os Domínios de Natureza no Brasil: Potencialidades Paisagísticas* (*The Dominions of Nature in Brazil: Landscape Potentialities*) (Atelié Editorial, 2003), 46.

[44]Aryon Dall'Igna Rodrigues, *Línguas Brasileiras: Para o Conhecimento das Línguas Indígenas* (*Brazilian Languages: For the Knowledge of Indigenous Languages*) (Edições Loyola, 1986), 21–37; Freg J. Stokes, 'The Hummingbird's Atlas: Mapping

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family, including the ancestors of the contemporary Kaingang, Xokleng, Krenak, Maxakali, and Pataxó peoples.[45] While Tupinambá, Guaraní, and Macro-Jê groups engaged in a diverse range of farming, foraging, and hunting practices, all of these groups were politically decentralised, with no identifiable states existing in the Atlantic Rainforest in 1500.[46]

After the European invasion, Indigenous labour played a critical role in establishing the Brazilian sugar and gold frontiers, with these frontiers, in turn, initiating the largest wave of deforestation in colonial South America. During the seventeenth century, Portuguese colonists fanned out from São Paulo in long-distance slave raids and mineral prospecting expeditions known as *bandeiras*. These raids accumulated a population of enslaved Indigenous workers on the São Paulo plateau who cultivated wheat to feed the administrators, soldiers, and workers on the nearby sugar plantations of Rio de Janeiro.[47] Environmental historian Warren Dean calculates that Brazil's early sugar frontier in Rio, Bahia, and Pernambuco cleared 2200 km^2 in the Atlantic Rainforest.[48] In the late seventeenth century, as the sugar frontier stagnated, Paulista colonists pushed inland, using predominantly Indigenous soldiers, porters, and guides to discover the first gold-mining sites in Minas Gerais.[49] Following the Methuen Treaty of 1703, the majority of Brazilian gold then flowed through Portugal to England, to cover the deficit in the Anglo-Portuguese balance of trade.[50]

According to Dean's estimates, gold mining itself cleared around 4000 km^2 of forest in Minas Gerais.[51] In the eighteenth century, the Minas Gerais gold frontier became one of the principal motors of the transatlantic slave trade, with close to 2 million African workers transported to Brazil during this period.[52] This primary mining frontier thus generated a market of workers and administrators that were fed via the opening of secondary livestock and agricultural frontiers. These secondary frontiers, in turn, possibly cleared another 26,000 km^2 of forest in the eighteenth century (see Figure 2).[53]

While Portuguese control over Indigenous labour played a crucial role in opening the gold-mining frontier in the eastern Atlantic Rainforest, the successful resistance of Guaraní and Macro-Jê groups played an equally important role in slowing down deforestation in the Paraná Forest. Although Spanish colonists from Paraguay initially colonised the Guayra region within the forest in the sixteenth century, constant uprisings by their Indigenous subjects made it impossible for them to consolidate their settlements.[54] The Paraguayan governor Hernando Arias de Saavedra lamented in 1607 that the Indigenous populations of Guayra 'only served how and when they

Guaraní Resistance in the Atlantic Rainforest during the Emergence of Capitalism, 1500–1768' (PhD diss., University of Melbourne, 2022), 71–4.

[45]Francisco Silva Noelli, 'Novas Perspectivas para a Cartografia Arqueológica Jê no Brasil Meridional' ('New Perspectives on Jê Archaeological Cartography in Southern Brazil'), *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* 12, no. 1 (2017): 57–84; Hal Langfur, *The Forbidden Lands: Colonial Identity, Frontier Violence, and the Persistence of Brazil's Eastern Indians, 1750–1830* (Stanford University Press, 2006), 23–4.

[46]Pierre Clastres, *Society against the State* (Zone Books, 1987); Carlos Fausto, 'Fragmentos de História e Cultura Tupinambá: Da Etnologia como Instrumento Critico de Conhecimento Etno-historico' ('Fragments of Tupinambá History and Culture: Ethnology as a Critical Instrument for Ethno-historic Knowledge') in *Historia dos Índios no Brasil* (*History of the Indians in Brazil*), ed. Manuela Carneiro da Cunha (Schwarcz Ltda., 2008), 381–96.

[47]John Manuel Monteiro, *Negros da Terra: Indios e Bandeirantes nas Origines de São Paulo* (*Blacks of the Land: Indians and Bandeirantes in the Origins of São Paulo*) (Companhia das Letras, 1994), 75–8, 85, 177–80.

[48]Dean, *Broadax and Firebrand*, 80.

[49]*Atas da Câmara Municipal da Vila de São Paulo, 1679–1700* (*Acts of the Municipal Chamber of the Town of São Paulo, 1679–1700*), vol. VII (Prefeitura Municipal, 1915), 505; André João Antonil, *Cultura e Opulência do Brasil* (*Culture and Opulence of Brazil*) (1711; repr., P55, 2021), 211.

[50]Nuno Palma, 'Money and Modernization in Early Modern England', *Financial History Review* 25, no. 3 (2018): 247.

[51]Dean, *Broadax and Firebrand*, 98–9.

[52]Marquese and Marques, 'Ouro, Café e Escravos', 118.

[53]Dean, *Broadax and Firebrand*, 115.

[54]Louis Necker, *Indios Guaranies y Chamanes Franciscanos* (*Guaraní Indians and Franciscan Shamans*), vol. 7 (Biblioteca Paraguaya de Antropologia, 1990), 218–22.

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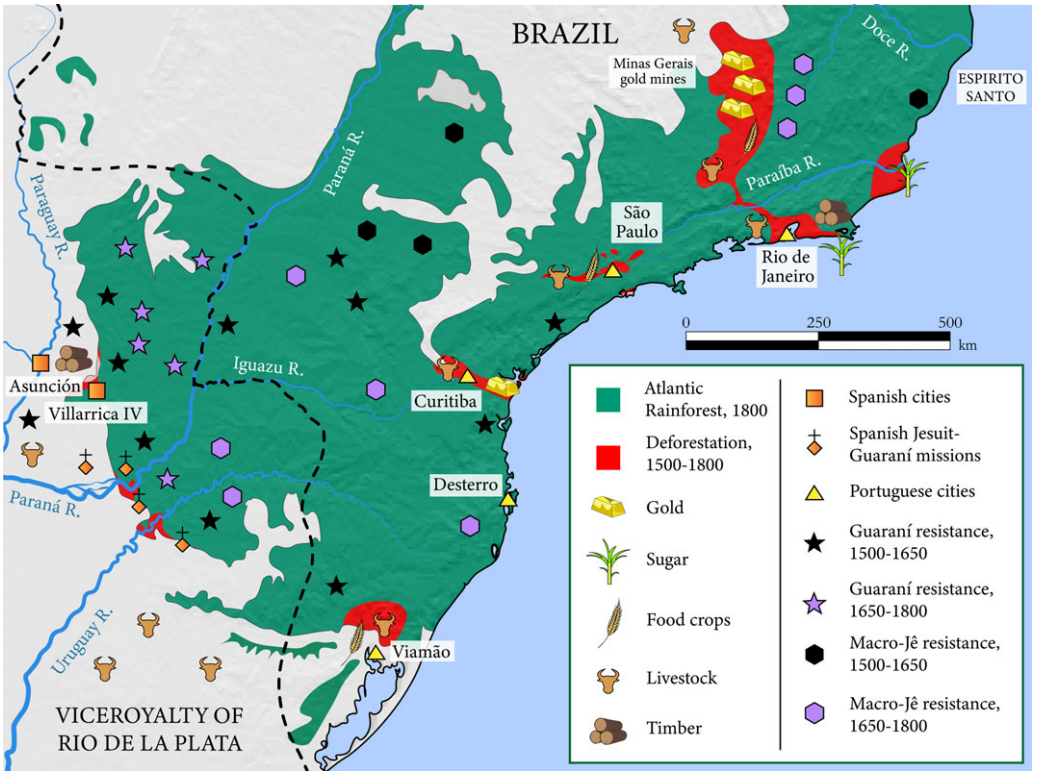

Figure 2. Deforestation, commodity frontiers and Indigenous resistance in the southern Atlantic Rainforest, 1500–1800. Note: The references for this figure can be found in footnotes 47 to 62.

want to because the Spanish don't have the force to be able to conquer nor subject them'.[55] This instability left the Spanish vulnerable to the Portuguese *bandeiras*, obliging them to withdraw from the forest in the mid-seventeenth century.[56]

Acting both autonomously and in alliance with Spanish Jesuit missionaries, Guaraní and Macro-Jê Indigenous groups then defeated numerous *bandeiras* themselves, creating an independent buffer zone in the forest outside of Iberian control. Autonomous Indigenous forces beat back the Portuguese slave raiders in the late 1620s, forcing the *Bandeirantes* to redirect their attacks against the Spanish Jesuit missions amongst the Guaraní.[57] After retreating to the forest edge, the Guaraní-Jesuit forces inflicted a decisive defeat on the Portuguese at the battle of Mbororé on the Uruguay River in 1641, imposing a limit on Portuguese raids.[58]

In the eighteenth century, autonomous Indigenous groups employed violent ambushes and psychological warfare (such as the case mentioned by Dobrizhoffer in the introduction to this

[55]Hernando Arias de Saavedra, 'Cartas y Memoriales de Hernandarias de Saavedra' ('Letters and Memorials of Hernandarias de Saavedra'), 5 May 1607, in *Revista de la Biblioteca Nacional. Tomo I.* (Biblioteca Nacional, 1937), 152.

[56]Garavaglia, *Mercado Interno*, 137; Branislava Susnik, *Los Aborigines del Paraguay II: Etnohistoria de los Guaranies, Epoca Colonial* (*The Aboriginals of Paraguay II: Guaraní Ethnohistory, Colonial Epoch*) (Museo Etnografico Andrés Barbero, 1979), 254.

[57]Justo Mancilla and Simón Masseta, 1629, in *Manuscritos da Coleção de Angelis I: Jesuítas e Bandeirantes no Guairá (1594–1640)* (*Manuscripts of the Angelis Collection I: Jesuits and Bandeirantes in Guairá (1594–1640)*) (Biblioteca Nacional, 1951), 319.

[58]Claudio Ruyer, 1641, in *Manuscritos da Coleção de Angelis III: Jesuítas e Bandeirantes no Tape (1615–1641)* (*Manuscripts of the Angelis Collection III: Jesuits and Bandeirantes in Tape (1615–1641)*) (Biblioteca Nacional, 1969), 353, 356; Guillermo Wilde, *Religión y Poder en las Misiones de Guaraníes* (*Religion and Power in the Guaraní Missions*), 2nd edn (Paradigma Indicial, Sb, 2016), 128.

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article) to obstruct Spanish attempts to recolonise the forest.[59] By 1735, attacks by independent Indigenous forces in the Paraná Forest 'had begun to gravely endanger the government of Paraguay', according to the Spanish colonist Pedro Cavallero Villasanti.[60] Occasional retaliations occurred, such as in 1825, when the newly independent Paraguayan government burnt a large stand of coconut trees to flush out hostile Mbayá (Kadiwéu) Indigenous forces on the far-western edge of the Paraná Forest.[61] However, the overall deforestation rate in nineteenth-century Paraguay was minimal compared to neighbouring Brazil, where the coffee frontier was advancing rapidly.[62] Much of the Paraná Forest was only cleared in the twentieth century, culminating with the expansion of the Brazilian soy frontier (and Brazilian migration) across the border into Paraguay from the 1970s onwards. Notably, this soy frontier detoured around the Argentinean province of Misiones, where a significant remnant of the Paraná Forest still survives, overlaying a key area of historical Guaraní and Macro-Jê resistance.[63]

In areas where Indigenous resistance was defeated, coerced Indigenous labour aided colonisation. The enormous concentration of gold in the eastern portion of the Atlantic forest undoubtedly acted as a major pull factor for Portuguese colonists, and contributed to heavier colonial-era deforestation in this region. However, these colonists were only able to discover and extract this gold through their appropriation of Indigenous knowledge systems, following a pattern seen across the colonial world.[64] The colonisation of the South American interior was made possible by the enslavement of Guaraní and other Indigenous women, in a violent strategy that appropriated their bodies (both through manual labour and sexual assault) and their knowledge. Paulista colonists appropriated the agricultural knowledge of Tupinambá and Guaraní women to plant manioc and maize along their expedition routes, while also exploiting Indigenous canoeing skills to negotiate the biome's extensive network of waterfall-strewn rivers.[65]

In the western Atlantic Rainforest, where Guaraní groups were able to maintain their autonomy, the Guaraní conception of the forest, not just as a bundle of resources but as a 'body-territory', has contributed to the biome's conservation. A key element of Guaraní cosmology is that human relationships with other species and the surrounding environment are overlapping and enmeshed, forming the concept of the body-territory. As Sandra Benites notes, the body of the earth itself is the body of a woman, Nhandecy eté, the First Mother. Nhandecy eté showed Guaraní women the routes through the forest, and these women continue to tread lightly on her body as

[59]'Expediente sobre las Hostilidades y Daños que Afectuan los Indios Infieles de la Nación Montes. Beneficio de la Yerba' ('File on the Hostilities and Damage Caused by the Pagan Indians of the Forest-Dweller Nation. Yerba Profits'), 1699–1733, Archivo Nacional de Asunción, Sección Historia, Vol. 43, No. 8, fol. 67–102v; Dobrizhoffer, *An Account of the Abipones,* 85–7.

[60]Pedro Cavallero Villasanti in Maria Laura Salinas, ed., *Cartas Anuas de la Provincia Jesuítica del Paraguay 1714–1720. 1720–1730. 1730–1735. 1735–1743. 1750–1756. 1756–1762* (*Annual Letters from the Jesuit Province of Paraguay 1714–1720. 1720–1730. 1730–1735. 1735–1743. 1750–1756. 1756–1762*), vol. 102 (CEADUC, Biblioteca de Estudios Paraguayos, 2016), 563, 565.

[61]Johann Rudolph Rengger, *Reise nach Paraguay in den Jahren 1818 bis 1826* (*A Journey to Paraguay from 1818 to 1825*) (H.R. Sauerlænder, 1835), 339.

[62]Stokes, 'The Hummingbird's Atlas', 287–91.

[63]Sylvain Souchaud, *Geografía de la Migración Brasileña en Paraguay* (*The Geography of Brazilian Migration in Paraguay*) (Fondo de Población de las Naciones Unidas, 2007), 98–104; Bartomeu Melià, *Camino Guaraní: De Lejos Venimos, Hacia Más Lejos Caminamos* (*Guaraní Pathway: We Have Come from Faraway, and We Will Walk Further*) (CEPAG, 2016), 184–5, 200–1; Jó Klanovicz, 'Between Brazil and Paraguay: An Envirotech History of Global Soyfarming', in *The Age of the Soybean*, ed. Claiton Marcio da Silva and Claudio de Majo (White Horse Press, 2022), 248.

[64]On the appropriation of Indigenous knowledge in other contexts, see: Naomi Roht-Arriaza, 'Of Seeds and Shamans: The Appropriation of the Scientific and Technical Knowledge of Indigenous and Local Communities', *Michigan Journal of International Law* 17, no. 4 (1996): 920–65; Silvia Rivera Cusicanqui, *Ch'ixinakax Utxiwa: On Decolonising Practices and Discourses* (Polity, 2020), 47–70.

[65]Sérgio Buarque de Holanda, *Monções* (Companhia das Letras, 2022); Luis Felipe de Alencastro, *O Trato dos Viventes: Formação do Brasil no Atlantico Sul* (*The Trade in the Living: The Formation of Brazil in the South Atlantic*) (Companhia das Letras, 2000), 92–3.

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they follow these ancestral pathways today.[66] The strength of such cosmological knowledge lies in its resilience despite colonial transformations, and it continues to provide a framework for Guaraní people to defend the areas of forest where they live today. The collective character of this knowledge also contributes to its resilience, as seen in the *potirõ/nhopytyvõ* (roughly translatable as 'mutual help') regimes among various Guaraní-speaking groups. *Potirõ/nhopytyvõ* systems come in a variety of forms, including collective assistance amongst community members to construct houses in Guaraní villages, coupled with regulations concerning the sharing of food during group celebrations. These collectivist practices continue to form a barrier against the development of more individualistic, capitalist conceptions of social and ecological relations in many Guaraní communities.[67]

Explanations for deforestation patterns in the Atlantic Rainforest that focus exclusively on the geographical distribution of resources or the motivations of European colonists can thus lose sight of the historical impact of Indigenous labour and Indigenous resistance, along with the importance of Indigenous cosmologies in maintaining this resistance. Even in Minas Gerais, at the heart of the gold-mining frontier, Indigenous resistance shaped the course of deforestation on a local scale. To the east of the principal gold-mining region, a number of predominantly Macro-Jê-speaking Indigenous groups, known in the colonial period as the Botocudo/Aimoré, Coropó, Coroado, Goitacá, and Puri, vigorously resisted incursions by mining prospectors throughout the eighteenth century.[68] In 1700, construction of a road began between Minas Gerais and the Espirito Santo coast, cutting through the territory of these Indigenous peoples, the ancestors of the contemporary Krenak and Maxakali groups, amongst others. In 1702, the Portuguese crown cancelled the roadbuilding project, and instead prohibited colonists from circulating through this region, in order to direct gold exports through Rio de Janeiro, where they could be more effectively taxed.[69] This royal decision was influenced indirectly by Macro-Jê resistance, which prevented the development of any potential alternative gold routes and customs ports in Espirito Santo. Even after the Portuguese government switched tack and gave military support to the colonisation of the eastern forests after 1808, violent Macro-Jê resistance hindered settlement of the region into the late 1820s.[70] Geographical surveys from the 1880s indicate that this was still the least deforested part of Minas Gerais over half a century later.[71]

One rebuttal to the argument that Macro-Jê resistance influenced the direction of the trade routes from Minas Gerais to the coast would be that Espirito Santo had no port that could have rivalled Rio de Janeiro, with Rio's prominence built on its pre-existing sugar plantations. However, even here it is worth remembering that in the mid-sixteenth century, when attempts *were* made to establish a captaincy with sugar plantations in Espirito Santo, Indigenous forces sacked the colony,

[66]Sandra Benites, 'Nhandecy Eté: Walking across the Womb of the Atlantic Rainforest', Wombs of the Atlantic Rainforest, accessed 7 June 2023, https://pt.wombsoftheatlanticrainforest.org/sandra-benites.

[67]Interview conducted by Anita Ekman with Carlos Papá, 31 November 2023, Rio de Janeiro, Brazil (typed notes in possession of the authors); Jürgen Renn, 'Survey: The Place of Local Knowledge in the Global Community', in *The Globalization of Knowledge in History*, ed. Jürgen Renn (Edition Open Access, 2017), 369–97; Bartomeu Melià, 'Potirõ: Las Formas del Trabajo entre los Guaraní Antiguos "Reducidos" y Modernos' ('Potirõ: Forms of Work amongst the Old Mission Guaraní and the Modern Guaraní'), *Revista Complutense de Historia de América* 22 (1996), 183–208.

[68]Langfur, *The Forbidden Lands*, 23–24.

[69]Langfur, *The Forbidden Lands*, 35; Dean, *Broadax and Firebrand*, 104, 152; Marco Aurélio da Costa and Francisco Javier Rios, 'The Gold Mining Industry in Brazil: A Historical Overview', *Ore Geology Reviews* 148 (2022): 5.

[70]João VI, 'Carta Regia a Pedro Maria Xavier de Ataide e Melo' ('Royal Letter to Pedro Maria Xavier de Ataide e Melo'), 13 May 1808, Biblioteca Nacional do Rio de Janeiro (hereafter BNRJ), Manuscritos—II-36, 05, 047; Gregorio Pinto et al., 'Quando os Habitantes da Ponte-Nova' ('When the Inhabitants of Ponte-Nova'), 13 March 1826, BNRJ, Manuscritos—II-36, 06, 025.

[71]Francisco Angelo de Almeida, 'Provincia de Minas, Comarca de Piracicaba. Descripçao Geographica, Phisica e Historia da Itabira de Matto Dentro' ('Minas Province, Piracicaba District. Geographic, Physical and Historical Description of Itabira of the Inner Forest'), 1 June 1881, BNRJ, Manuscritos—II-36, 8, 3 n.3; Manuel de Sousa Lima, 'Provincia de Minas Geraes. Mar de Hespanha' ('Minas Gerais Province. Mar de Hespanha', 16 July 1881, BNRJ, Manuscritos—II-36, 8, 2, n. 1.

hampering its subsequent development.[72] Portuguese colonists subsequently shifted their attention to Guanabara Bay, where they inflicted a famous defeat on allied French-Tupinambá forces and founded Rio de Janeiro in 1567.[73] The capacity at a local level to overcome Indigenous resistance directly affected where Portuguese colonists established their initial settlements and transport routes, but the battles that the colonists lost, the cities they failed to found, and the roads they failed to build have all faded from historical memory.

Sustained waves of Indigenous resistance, in interaction with environmental constraints, economic imperatives, and the decisions of colonists, have therefore shaped the direction of even the most aggressive deforestation fronts in the Atlantic Rainforest. As a result, the majority of the Paraná Forest, as well as a large section of forest in the Krenak and Maxakali homelands of eastern Minas Gerais, survived well into the twentieth century. However, the majority of these remaining forests have been swallowed by expanding commodity frontiers over the last seventy years, during the Great Acceleration.[74] Overall, Indigenous resistance has impeded and redirected, rather than halted, deforestation in the Atlantic Rainforest. The global economic forces driving this process at times seem unstoppable, but Indigenous campaigns to protect the surviving remnants of the Atlantic Rainforest and communicate the cosmological importance of this biome to the wider world continue today.[75]

Deforestation and Indigenous resistance in the Amazon

In contrast to the Portuguese gold frontier in the Atlantic Rainforest, Spanish attempts to extract gold from the Amazon Rainforest were a spectacular failure. These expeditions are often dismissed as quixotic pursuits, as epitomised by the legend of El Dorado, in which the gold of the Amazon was said to emanate from a single city deep in the jungle.[76] However, as the modern-day gold rush in the Amazon attests, there *are* significant gold deposits within this biome, even if they are not concentrated in a single mythical site. Brazil, for example, is exporting as much gold today as it was during the eighteenth-century gold rush, with much of this new gold coming from the Brazilian Amazon.[77] This raises two questions: why were the Spanish unable to take control of the decentralised Indigenous networks that distributed Amazonian gold in the sixteenth century; and why was this pattern so different to that seen in the Portuguese section of the Atlantic Rainforest? To address these questions, we focus on examples of Indigenous resistance to Spanish colonisation in the Amazon Rainforest, then compare them with Indigenous resistance against Portuguese and Brazilian colonisation in the Amazon.

It is crucial here to distinguish between Tahuantinsuyu, the Inca Empire, which the Spanish conquered in four decades, and the neighbouring non-state societies in the Amazon basin, which successfully resisted Spanish incursions for centuries. While there was also fierce opposition to Spanish invasion in the Andean highlands, Francisco Pizarro's capture of Tahuantinsuyu's ruler, Atahualpa, in 1532, gave the invaders a critical edge in the conflict. Pizarro took advantage of Atahaulpa's position of authority to seize control of the Inca state, using the Indigenous polity's

[72]José Teixeira de Oliveira claims that the revolt was organised by an alliance of Aimorés, Goitacás, and Tupiniquins and occurred between 1546 and 1547. José Teixeira de Oliveira, *História do Estado do Espírito Santo* (*History of the State of Espírito Santo*), 3rd edn, vol. 8 (Arquivo Público do Estado do Espírito Santo, 2008), 54, 58.

[73]Joseph de Anchieta, 1565 and 1570, *Cartas, Informações, Fragmentos Historicos e Sermões do Padre Joseph de Anchieta, S. J., (1554–1594)* (*Letters, Information, Historical Fragments and Sermons of Father Joseph de Anchieta, S. J., (1554–1594)*) (Publicações da Academia Brasileira, 1933), 245–54, 257–8.

[74]Melià, *Camino Guaraní* (*Guaraní Pathway*), 184–5, 200–1; Fundación Vida Silvestre Argentina and WWF, *State of the Atlantic Forest*, 27.

[75]See Popygua, *Yvyrypa*; Benites, 'Nhandecy Eté'; Ailton Krenak, *Ideas to Postpone the End of the World* (House of Anansi Press, 2020).

[76]John Hemming, *Red Gold: The Conquest of the Brazilian Indians* (Harvard University Press, 1978), 185.

[77]Da Costa and Rios, 'The Gold Mining Industry', 14–17, 19; RAISG, *Amazonia under Pressure*, 30.

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hierarchical structure against it.[78] From the 1570s onwards, while there was extensive Indigenous resistance in the Andean highlands, it predominantly took the form of class conflict *within* the Spanish colonial state, and lies outside the scope of this study.[79] The Spanish exploration of Inca silver-mining areas on the Andean altiplano led to the discovery of Potosí in 1545, with the gargantuan flow of silver from this site allowing the Hapsburg crown to pay its mounting debts to first south German, then Genoese bankers.[80]

Simultaneously, the Spanish ventured into the Amazon Rainforest to discover the sources of the gold that Indigenous intermediaries transported to the Andes.[81] Here, however, the Spanish encountered a mosaic of non-state Indigenous peoples who had successfully resisted Inca expansion in the fifteenth and early sixteenth centuries. In the sixteenth century, the Amazon Rainforest contained a plethora of linguistic groups, including the Tupian, Macro-Jê, Arawak, and Carib language families, amongst others.[82] There has been considerable debate about the possible presence of 'chiefdoms' with characteristics comparable to 'small states' along the Amazon basin's central and lower riverways on the eve of the European invasion.[83] Even so, societies in the Amazon Rainforest that were potentially more stratified, such as the Omagua, were decimated during the first two centuries of contact with the Spanish and Portuguese, with decentralised Indigenous groups in the biome mounting the most successful resistance to the invaders.[84]

Faced with Spanish aggression, non-state Indigenous groups in the western Amazon engaged in both violent resistance and flight from mining sites, preventing the Spanish from gaining full control of their labour supply or transport networks. The Spanish had to abandon their gold mines in the Quijos valley of modern-day eastern Ecuador in the 1570s, after local Indigenous groups razed the settlements of Archidona and Avila.[85] In the late sixteenth and early eighteenth centuries, Western Ava Guaraní and Yuracaré groups in the forested Yungas on the southern edge of the Amazon threatened the operation of the Potosí silver mines and blocked access to the lowlands.[86]

[78]Martín de Murua, *Historia General del Piru* (*General History of Peru*): *Facsimile of J. Paul Getty Museum Ms. Ludwig XIII 16* (1616; repr., Getty Publications, 2008), 126–45; John Hemming, *The Conquest of the Incas* (Harcourt Brace & Company, 1970), 27–118; Karen Spalding, 'The Crisis and Transformations of Invaded Societies: Andean Area (1500–1580)', in *The Cambridge History of the Native Peoples of the Americas. Volume III: South America, Part 1* (Cambridge University Press, 1999), 908–12.

[79]The Andean insurrections of 1780–1782 were emblematic examples of class conflict under later Spanish rule. See Sinclair Thomson, *We Alone Will Rule: Native Andean Politics in the Age of Insurgency* (University of Wisconsin Press, 2002). On post-independence Indigenous resistance in the Bolivian Andes, see Silvia Rivera Cusicanqui, *'Oprimidos Pero No Vencidos': Luchas del Campesinado Aymara y Qhechwa, 1900–1980* (*'Oppressed but Not Defeated': Aymara and Qhechwa Peasant Struggles* (La Mirada Salvaje, 2010).

[80]Jason W. Moore, '"This Lofty Mountain of Silver Could Conquer the Whole World": Potosí and the Political Ecology of Underdevelopment, 1545–1800', *The Journal of Philosophical Economics* IV, no. 1 (2010): 58–103; Juan de Matienzo, *Gobierno del Perú* (*Government of Peru*) (1567; repr., Compañia Sud-Americana de Billetes de Banco, 1910), 66.

[81]Michael A. Uzendoski, 'The Horizontal Archipelago: The Quijos/Upper Napo Regional System', *Ethnohistory* 51 (2004): 345.

[82]Rodrigues, *Línguas Brasileiras* (*Brazilian Languages*).

[83]Anna C. Roosevelt, 'The Rise and Fall of the Amazon Chiefdoms', *L'Homme* 33, no. 126/128, 'La Remontée de l'Amazone' (1993): 260; Michael J. Heckenberger, James B. Peterson, and Eduardo Góes Neves, 'Village Size and Permanence in Amazonia: Two Archaeological Examples from Brazil', *Latin American Antiquity* 10, no. 4 (1999): 353–76.

[84]On the Omagua, see Juan Baptista Sanna, 'El Dia Dies de Diziembre Llego a Este Pueblo de los Yurimaguas', 26 December 1707, Archivo General de Indias (hereafter AGI), Quito 158, fol. 212–13; Samuel Fritz, *Journal of the Travels and Labours of Father Samuel Fritz in the River of the Amazons between 1686 and 1723* (Hakluyt Society, 1922).

[85]Uzendoski, 'The Horizontal Archipelago', 323–4; Anne Christine Taylor, 'The Western Margins of Amazonia from the Early Sixteenth to the Early Nineteenth Century', in *The Cambridge History of the Native Peoples of the Americas. Volume III: South America, Part 2* (Cambridge University Press, 1999), 216.

[86]Alonso Ramos, 'Memorial del Padre Alonso Ramos' ('Memorial of Father Alonso Ramos'), 15 March 1604, Archivo y Biblioteca Nacionales de Bolivia (hereafter ABNB), Correspondencia a la Audiencia de Charcas, Ficha 469, fol. 1v; Pablo de Meneses, 'Carta de Don Pablo de Meneses' ('Letter of Don Pablo de Meneses'), 2 March 1615, ABNB, Correspondencia a la Audiencia de Charcas, Ficha 716, fol. 1; Matienzo, *Gobierno del Perú*, 128, 167.

At the Zamora gold mines to the south of the Quijos Valley, continuous attacks by Jivaro/Shuar groups between 1582 and 1616 expelled the Spanish.[87] After these military failures, the Spanish crown turned to Jesuit missionaries to regain control of the Zamora gold-mining frontier. An unpublished 1689 letter by the Jesuit missionary Francisco Viva laid out plans for a new incursion, noting that:

> Close to our Missions there is the nation of the Jivaros, in revolt for the last 90 years, in their hills is so much gold, that they say without doubt here and in Spain, that in all the Indies they have not discovered a richer land ... His Majesty has continuously rushed out decrees to pacify the aforementioned Jivaros, and even though many have attempted to conquer them, none have succeeded.[88]

However, the Jesuits of the Maynas missions were also unable to suppress the Jivaros, with these groups continuing to defend their autonomy in subsequent centuries.[89] The gold supplies of this region were not a figment of Viva's imagination, with contemporary Shuar/Jivaro groups in Ecuador engaged in an ongoing campaign against the modern Mirador and San Carlos Panantza gold and copper mining projects. The Mirador mine alone holds an estimated 110,000 kilograms in gold reserves, roughly equivalent to the 112,000 kilograms of documented gold extracted from Minas Gerais between 1741 and 1750, at the height of the Brazilian gold rush.[90] Colonial Spanish miners could have accessed a significant portion of the east Ecuadorian gold reserves via both alluvial and hard-rock mining, had they not been obstructed by Shuar/Jivaro resistance. This gold frontier, in turn, could have opened a significant new deforestation frontier in the western Amazon, just as the Brazilian gold frontier drove a wedge into the Atlantic Rainforest that was soon filled by food crops, livestock, and coffee plantations. However, with Indigenous resistance preventing the Spanish from consolidating political control over the western Amazon, various plans to establish new cacao, coca, and coffee plantations failed.[91] This pattern continued into the eighteenth century, with Ashaninka groups achieving a wholesale expulsion of Franciscan missionaries from the central forest zone of what is now Peru in the 1740s, as part of a general trend whereby Spanish frontiers on the edge of the Amazon actually retracted in many areas when compared with earlier Inca boundaries.[92]

As Figure 3 shows, by 1800 a clear distinction had emerged between the deforestation rates within the Spanish and Portuguese territories of South America. In both the western Atlantic Rainforest and the western Amazon, the zones of successful Indigenous resistance against the Spanish were still heavily forested. In Brazil, by contrast, significant tracts of the Atlantic Rainforest had already been devastated, and Portuguese colonists had used the techniques they

[87]Kris Eugene Lane, 'Mining the Margins: Precious Metals Extraction and Forced Labor Regimes in the Audiencia of Quito, 1534–1821' (PhD diss., University of Minnesota, 1996), 18–24.

[88]Francisco Viva, 'Propuesta del P. Fra.co Viva hecha en la Ciudad de Pasto al P. Diego Fra.co Altamirano Visitador del Nuevo Reyno en Diciembre de 1689' ('Proposal of Father Fra.co Viva Made in the City of Pasto to F. Diego Fra.co Altamirano, Visitador of the New Kingdom in December 1689'), December 1689, Archivum Romanum Societatis Iesu, Nova Regni et Quitensis 15-I (hereafter ARSI, Quitensis 15-I) fol. 231v.

[89]Francismar Alex Lopes de Carvalho, *Missionizing on the Edge: Religion and Power in the Jesuit Missions of Spanish Amazonia* (Brill, 2022), 105.

[90]Cintia Quiliconi and Pablo Rodriguez Vasco, 'Chinese Mining and Indigenous Resistance in Ecuador' (Carnegie Endowment for International Peace, 2021), 1–2; John J. TePaske, *A New World of Gold and Silver: Europe, Africa and the Americas, 1500–1830*, ed. Kendall W. Brown (Brill, 2010), 66.

[91]See the cacao and coca plantation proposals in Francisco de Viedma, 'Expediente Promovido en Virtud del Plantio del Cacao' ('File on Cacao Cultivation'), Cochabamba, 4 January 1791, ABNB, Moxos y Chiquitos, Ficha 622, fol. 12v; and Matienzo, *Gobierno del Perú*, 89–105, 198.

[92]Marques de Villa Garcia, 'Da quenta a V.M. de Todo el Progresso' ('Report to Your Majesty on All Progress'), 16 August 1744, AGI, Lima 983, fol. 1-25v; Stefano Varese, *La Sal de los Cerros: Notas Etnográficas e Históricas sobre los Campa de la Selva del Perú* (*The Salt of the Hills: Ethnographic Notes and Histories about the Campa of the Peruvian Rainforest*) (Universidad Peruana de Ciencias y Tecnología, 1968), 60–85; Taylor, 'The Western Margins', 209, 221.

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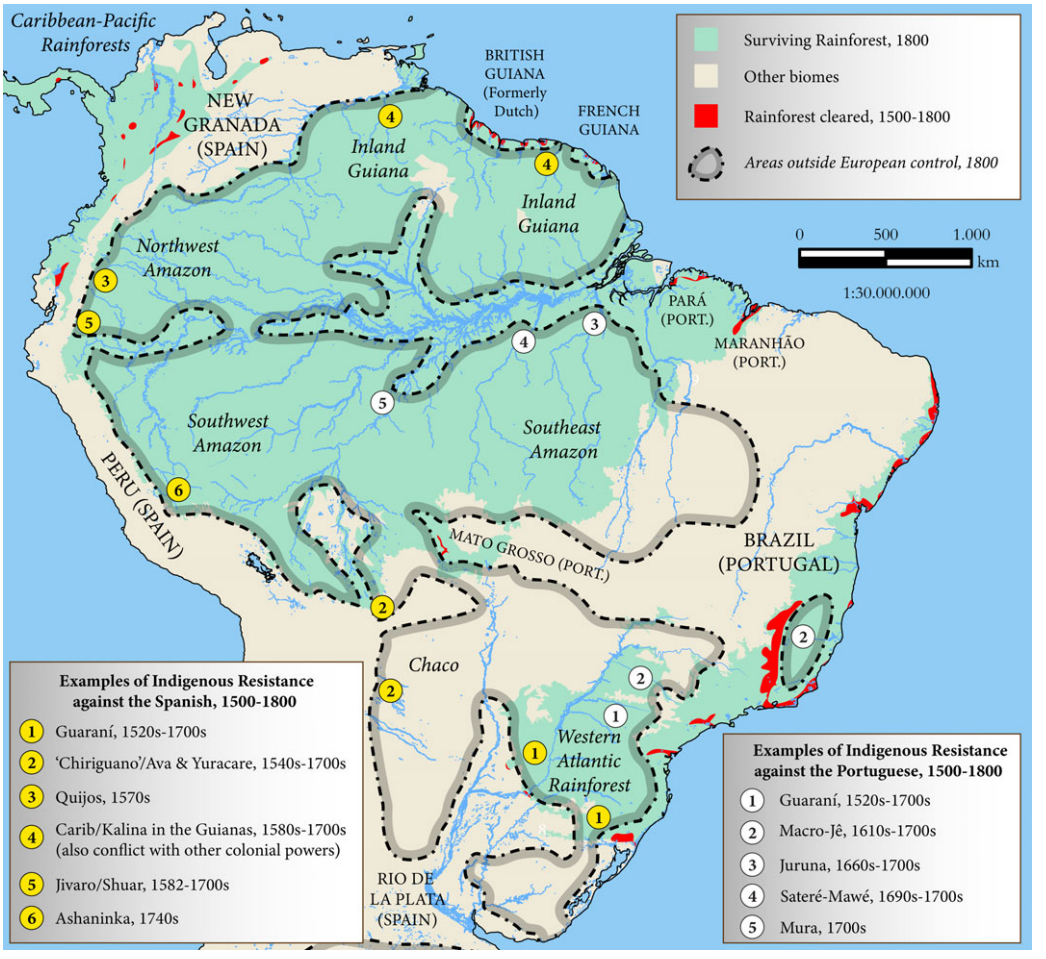

Figure 3. Examples of Indigenous resistance in the Amazon and Atlantic Rainforests before 1800.
Note: The references for this figure can be found in footnotes 47 to 115.

had acquired in this forest as a springboard to attack the Amazon. On the southern and eastern edges of the forest, Portuguese commodity frontiers were already causing significant deforestation, such as the gold mines of Mato Grosso and the cotton frontier of Maranhão.[93] This divergence has continued into the twenty-first century, with Mato Grosso and Maranhão forming the two spearheads of the Brazilian deforestation arc in the Amazon.[94] The rate of Amazonian deforestation in the former Spanish colonies, by comparison, while still worryingly high, has been consistently lower than that in Brazil. By 2013, Brazil had cleared 17.63% of its share of the Amazon Rainforest, more than double the accumulated Amazonian deforestation rate across the Spanish-speaking countries of 7.98%.[95]

We argue that the contrasting Iberian encounters with non-state Indigenous groups made a significant contribution to this long-term divergence in deforestation levels. The Spanish Empire's

[93]Marques, 'A Fronteira do Ouro', 534, 536; Boxer, *The Golden Age of Brazil, 1695–1750: Growing Pains of a Colonial Society* (University of California Press, 1962), 256.

[94]RAISG, *Desmatamento na Amazônia*, 8; Marques, 'A Fronteira do Ouro', 552; Melo and Martins, 'Brazilian Cotton Production', 5–6.

[95]The Spanish-speaking total includes rates of 7.3% in Bolivia, 9.9% in Colombia, 10.7% in Ecuador, 9.1% in Peru, and 3.3% in Venezuela. RAISG, *Desmatamento na Amazônia*, 6.

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South American labour management systems, such as the *encomiendas*, the *mita*, and the early *reducciones* during the period of the Toledo reforms, were adapted to the organisation of labour within the former Inca state.[96] The Spanish struggled, in contrast, when confronted with mobile Indigenous forest-dwelling societies that continuously resisted being corralled into work sites. Groups that were more decentralised and prone to internal conflict, such as the Shuar/Jivaro, the Ashaninka, the Kalina/Caribs, and the Guaraní, were able to resist the Spanish more effectively.

The Portuguese better adapted to stateless Indigenous modes of movement, in particular Tupian agricultural and warfare strategies, to extend their sphere of influence in both the Atlantic and Amazon Rainforests. In both biomes, Portuguese colonists appropriated Tupian riverine navigation techniques, mobile styles of warfare, and linguistic networks, along with Indigenous women's botanical knowledge and labour.[97] Crucially, these colonists learnt from Tupi women in the Atlantic Rainforest how to cultivate and process manioc, a root crop that facilitated mobility.[98] The subsequent transfer of manioc to Africa assisted the Portuguese in establishing long-range slave raiding networks on both sides of the Atlantic.[99] Fernand Braudel noted the parallels between the mobile *Bandeirantes* in Brazil and the French fur trappers in Canada, who also advanced inland rapidly along Indigenous transport routes.[100] However, we would note that whereas the French lost Canada to Great Britain in 1762, the Portuguese successfully interlinked their inland Indigenous networks with coastal plantation slavery and an alliance with the British, a distinctive combination that cemented their presence in Brazil.[101]

Nevertheless, along the southern tributaries of the Amazon, as in eastern Minas Gerais, noteworthy cases of resistance by a variety of Indigenous groups impeded Portuguese expansion, such as the Juruna on the Xingu river, the Sateré-Mawé on the Tapajós river, and the Mura on the Madeira River.[102] As with the Macro-Jê resistance in Minas Gerais and Espirito Santo, this Indigenous resistance in the Amazon ensured that while the Portuguese advanced inland more rapidly than the Spanish, significant areas of forest still escaped their grasp.

In the seventeenth and eighteenth centuries, the Spanish finally found a way to break through the lines of resistance on the western edge of the Amazon and incorporate a number of lowland stateless Indigenous groups via the Jesuit mission system.[103] However, the constant threat of

[96]*Mita* is a Quechua word referring to corvée-style labour drafts adapted from the Inca system. Carlos Sempat Assadourian, *El Sistema de la Economia Colonial: Mercado Interno, Regiones y Espacio Economico* (*The System of the Colonial Economy: Internal Market, Regions and Economic Space*) (Instituto de Estudios Peruanos, 1982), 15, 170, 192; Jeremy Ravi Mumford, 'La Reducción Toledana en el Perú y el Alto Perú, 1569–1575', in *Reducciones: La Concentración Forzada de las Poblaciones Indígenas en el Virreinato del Perú* (*Reductions: The Forced Concentration of Indigenous Populations in the Viceroyalty of Peru*) (Pontificia Universidad Católica del Perú, Fondo Editorial, 2017), 67–102.

[97]Rafael Chambouleyron, 'Rivers and Land Grants in the Colonial Amazon Region (Late Seventeenth and First Half of the Eighteenth Century', in *Rivers and Shores: 'Fluviality' and the Occupation of Colonial Amazonia*, ed. Raphael Chambouleyron and Luis Costa e Sousa (Baywolf Press, 2019), 114; Wania Alexandrino Viana, *Gente de Guerra, Fronteira e Sertão: Índios e Soldados Na Capitania Do Pará (Primeira Metade Do Século XVIII)* (*People of War, Frontier and Backcountry: Indians and Soldiers in the Captaincy of Pará (First Half of the Eighteenth Century)*) (Livraria da Física, 2021), 278; Heather F. Roller, *Amazonian Routes: Indigenous Mobility and Colonial Communities in Northern Brazil* (Stanford University Press, 2014).

[98]Lara de Melo de Santos, 'A História Atlântica da Farinha de Mandioca' ('The Atlantic History of Manioc Flour') (Masters diss., Universidade Federal Fluminense, Niterói, 2022).

[99]Alencastro, *O Trato dos Viventes,* 294.

[100]Fernand Braudel, *Civilisation and Capitalism 15th–18th Century. Volume I: The Structures of Everyday Life, The Limits of the Possible* (Williams Collins Sons & Co Ltd, 1985), 62–3.

[101]Braudel, *Civilization and Capitalism. Volume III: The Perspective of the World,* 50.

[102]Curt Nimuendajú, 'The Mura and Piraha', 'The Maue and Arapium', and 'Tribes of the Lower and Middle Xingú River', in *Handbook of South American Indians. Volume 3: The Tropical Forest Tribes*, ed. Julian Steward (United States Government Printing Office, 1948), 218–19, 245–6, 255–7.

[103]While there were also Jesuit missions in the Portuguese sections of the Amazon and Atlantic Rainforest, they did not accrue the same level of political influence or autonomy as the Spanish Jesuit missions. See Pasquale Petrone, *Aldeamentos Paulistas* (*Paulista Villages*) (EDUSP, 1995), 162–3; Carlos Zeron, 'From Farce to Tragedy: António Vieira's Hubris in a War of Factions', *Journal of Jesuit Studies* 2, no. 3 (2015): 387–420; Francismar Alex Lopes de Carvalho, 'Between Captivity and

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Indigenous rebellion and flight also forced the missionaries to concentrate the majority of their *reducciones* outside the forest, at sites such as the Orinoco *llanos* (plains), the *llanos* of Moxos, and the Pampas transition zone on the southern edge of the Atlantic Rainforest.[104] Spanish Jesuit missions within the forest, such as the Maynas missions in the western Amazon and the early Guaraní missions in Guayra, were notably less successful, with mobile Indigenous populations constantly abandoning the *reducciones* and returning to their previous ways of life.[105] The differences between Spanish and Portuguese forest colonisation strategies began to diminish in the eighteenth century, with the decline of the *bandeiras*, the expulsion of the Jesuits, the attempted rationalisation of colonial policy, and the centralisation of power in both states.[106] Nevertheless, before the mid-eighteenth century, contrasting Iberian interactions with non-state Indigenous societies contributed to the eastern Portuguese sections of both the Amazon and Atlantic Rainforests becoming more thoroughly integrated into the expanding capitalist world-economy.[107] Successful Indigenous resistance to Spanish advances delayed this process in the western Amazon and Atlantic rainforests, with a consequent divergence in deforestation rates.

One counterargument here would be that geographical features, such as the Andes mountain range, constituted the principal barrier to economic development and deforestation in the western Amazon. However, in areas where the Spanish were able to utilise the pre-existing Inca road system, the geographical impediment caused by the Andes was reduced significantly, as the rapid Spanish takeover of the Inca Empire attests.[108] It was only when moving into the Amazonian lowlands, beyond the reach of Incan infrastructure, that the advance of Spanish colonists slowed down. If either the Incas before 1530 or the Spanish after this date had been able to suppress lowland autonomous Indigenous groups and extend the Inca transport network, Spanish colonists would have been better placed to overcome the geographic obstacles of the western Amazon and exploit this region economically. In a significant boost for the survival prospects of the western Amazonian forests, both empires failed in the face of sustained, decentralised Indigenous resistance.

Geographic determinism alone also fails to explain the low deforestation levels in the Guianas, with this region being accessible from the Atlantic Ocean and criss-crossed by Indigenous gold distribution networks that attracted attention from various European states in the early colonial period.[109] Here, the violent conflicts and geopolitical manoeuvring between multiple colonial forces and local, decentralised Indigenous groups contributed to subsequent territorial fragmentation, with this section of the Amazon Rainforest today split between five nation-states (Venezuela, Guyana, Suriname, France, and Brazil).[110] Tellingly, the English navigator and privateer Walter Raleigh imagined a gold-producing offshoot of the Inca state in the Guianas, with

Conversion: Spanish Jesuits, Portuguese Carmelites, and Indigenous Peoples in Eighteenth-Century Amazonia' (Baywolf Press, 2010), 133–62.

[104]See 'Mapa Descripción de las Provincias de las Naciones Chiriguana, Mataguayas i Yejoses' ('Map Description of the Provinces of the Chiriguana, Mataguaya and Yejos Nations'), 1797 (reproduced 1868), ABNB, Ruck 249.1, Gráfico 35, fol. 114; Francisco Vásquez Trujillo, 'Relación del Glorioso Martyrio de los Sanctos Padres Roque Gonçalez, Alonso Rodrigo y Juan del Castillo' ('Relation of the Glorious Martyrdom of the Saintly Fathers Roque Gonçalez, Alonso Rodrigo and Juan del Castillo'), 1629, ARSI, Paraquarie 11, Doc. 50, fol. 181; Neil L. Whitehead, *Lords of the Tiger Spirit: A History of the Caribs in Colonial Venezuela and Guyana, 1498–1820* (Foris Publications, 1988), 106.

[105]Fritz, *Journal of the Travels*, 74–5, 100, 111, 117; Daisy Ripodas Ardanaz, 'Movimientos Shamanicos de Liberación entre los Guaranies (1545–1660)' ('Shamanic Liberation Movements amongst the Guaraní (1545–1660), *Teología* 50 (1987): 265.

[106]Lopes de Carvalho, 'Between Captivity and Conversion', 135; Jeffrey Erbig Jr., *Where Caciques and Mapmakers Met: Border Making in Eighteenth-Century South America* (University of North Carolina Press, 2020).

[107]Arrighi, *The Long Twentieth Century,* 203; Marquese and Marques, 'Ouro, Café e Escravos', 116.

[108]Hemming, *Conquest of the Incas*, 101.

[109]Whitehead, *Lords of the Tiger Spirit*, 53.

[110]According to the classification used by the RAISG, the forests of Eastern Venezuela, Guyana, Suriname, and French Guiana lie outside the Amazon River basin, but are included in the Amazon Rainforest biome. RAISG, *Amazonia under Pressure*, 9.

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the illusory 'imperial city' of Manoa as its capital. As with the Inca Empire before it, Raleigh claimed that this prosperous realm was ripe for European conquest.[111]

The reality in the Guianas, however, was entirely different, with loosely organised Arawak and Carib (Kalina) groups controlling the distribution networks radiating out from gold-producing sites. Throughout the seventeenth and eighteenth centuries, these groups pursued shifting alliances with European colonists attracted by the promise of gold, playing Spanish, Dutch, English, French, and Portuguese forces off against each other. These colonial powers were able to establish footholds in the region and conduct slave raids into the interior, but none of them was able to assert complete territorial control or gain sustained access to local gold flows.[112] Indigenous resistance was directly acknowledged by colonists in the region as a major economic and military impediment: as a 1599 Dutch report noted, the 'Spanish also said that upwards there was much gold but that they dared not come there on account of war with the aforesaid Charibus [Caribs]'.[113]

In the seventeenth and eighteenth centuries, African workers from plantations on the Atlantic Amazonian coast escaped into the forest, forming maroon communities (in British, Dutch, and French Guiana) and *quilombos* (in Portuguese Brazil) that also impeded inland colonisation. Maroon groups such as the Saramaka in Suriname, who incorporated both African and Indigenous members, formed an ongoing obstacle to the expansion of the Dutch plantation system, and continue to campaign against logging and gold mining in their territories today.[114] While the environmental impact of quilombo and maroon groups requires more detailed research, as a preliminary observation, it is worthy of note that the Guiana Shield region still hosts a large number of Indigenous, maroon, and quilombo communities, while also having the lowest deforestation rate in the Amazon.[115]

Although Brazil has been at the historical forefront of deforestation in South America, contemporary Indigenous organisations in the country have attempted to challenge this trend. Following the end of the military dictatorship (1964–85), Indigenous campaigns led to the introduction of a relatively progressive constitution in 1988, which assisted in the creation of new Indigenous territories.[116] The consolidation and expansion of these territories in the 1990s and 2000s contributed significantly to the 70% drop in the Amazonian deforestation rate in Brazil during President Lula Inácio da Silva's first two terms in office (2003–10).[117] These campaigns in South America have occurred within the broader context of a global Indigenous rights movement that in recent decades has emphasised the role of Indigenous forest dwellers in combating climate change.[118] Increasingly, Indigenous groups from South America and other tropical forest regions,

[111]Walter Raleigh, *The Discovery of Guiana, and the Journal of the Second Voyage Thereto* (1596; repr., Cassel & Company, 1887), 24, 30–4, 113–14.

[112]Whitehead, *Lords of the Tiger Spirit*, 85–91; Joyce Lorimer, ed., *English and Irish Settlement on the River Amazon, 1550–1646* (Hakluyt Society, 1990); James Andrew Whitaker, 'Amerindians in the Eighteenth Century Plantation System of the Guianas', *Tipití: Journal of the Society for the Anthropology of Lowland South America* 14, no. 1 (2016): 33.

[113]Quoted in Whitehead, *Lords of the Tiger Spirit*, 84. See also Joseph Gumillas, 'Las Nuevas Misiones de este Río Orinoco' ('The New Missions of the Orinoco River'), 31 October 1735, ARSI, Quitensis 15-I, fol. 253.

[114]Richard Price, *Rainforest Warriors: Human Rights on Trial* (University of Pennsylvania Press, 2011), 4–11; Rafael de Bivar Marquese, 'A Tale of Two Coffee Colonies: Environment and Slavery in Suriname and Saint-Domingue, ca. 1750–1790', *Comparative Studies in Society and History* 64, no. 3 (2022): 733.

[115]RAISG, *Desmatamento na Amazônia*, 37–43; John R. McNeill, *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620–1914* (Cambridge University Press, 2010), 10, 195.

[116]Interviews conducted by Freg J. Stokes and Anita Ekman with Marcos Tupã and Altino Wera Mirim, 31 January 2019, Jaexaa Porã, Brazil (handwritten notes in possession of the authors). See also Manuela Carneiro da Cunha, 'Índios na Constituição' ('Indians in the Constitution'), *Novos Estudos* 37, no. 3 (2018): 429–43.

[117]This refers to deforestation in 2013 when compared to the 1996–2005 average. Doug Boucher et al., 'Brazil: The World's Biggest Reductions in Deforestation and Emissions', in *Deforestation Success Stories: Tropical Nations Where Forest Protection and Reforestation Policies Have Worked* (Union of Concerned Scientists, 2014), 13.

[118]Etchart, 'The Role of Indigenous Peoples'.

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such as the Dayak people of Borneo in Indonesia, have used a common conceptual framework to defend their land rights and advocate for forest conservation.[119]

The experience of the Paiter Suruí in the Brazilian Amazon during the last century offers another insight into this dramatic recent history. During the rubber boom in the early twentieth century, the Paiter remained hostile to outside interlopers, a position which they maintained into the 1960s, when they killed multiple agricultural colonists invading their territory. In 1969, they made official contact with Brazilian government representatives, inaugurating a traumatic period of transformation in which around half the community lost their lives to diseases, while the majority of those who survived converted to evangelical Protestantism.[120] Important traditions, such as the Mapimaí, a festival in which two halves of a clan, one living in the forest and the other in the village, would exchange gifts, are now only rarely performed. Despite these changes in their cosmology, the Paiter have maintained a strong connection with the rainforest, with clan leaders reorganising their way of life to protect the forest from the advancing cattle and soy frontiers. Since the 1970s, the Paiter have established their settlements along the borders of their designated territory, to prevent the entrance of outside colonists. They have also engaged in agroforestry projects, such as Brazil nut harvesting, to provide an alternative income source to more destructive practices such as logging, mining, or ranching.[121]

The success of groups such as the Paiter in slowing down recent deforestation in Brazil is all the more notable given the previous political and geographical factors that have contributed to Brazil's higher historical deforestation rate. Nevertheless, major challenges remain. Across the Amazon, contemporary miners are exploiting the gold reserves that eluded the Spanish in the sixteenth century. Both small-scale, illegal mining and large-scale, legal mining are opening new deforestation frontiers and exposing Indigenous communities to mercury and cyanide poisoning. From the lands of the Shuar in Ecuador to those of the Yanomami and Paiter in Brazil, the 500-year Indigenous struggle against mining, ranching, and other forms of exploitative commodity extraction in the Amazon continues.[122]

Final considerations

Tropical deforestation is one of the ultimate *longue durée* historical processes, with incremental factors building up over centuries, before sudden political, economic, environmental, and technological shifts drive rapid bursts of destruction. This process has been marked by long-range path-dependencies in which the outcomes of past struggles between colonisers and Indigenous populations have acted like a ratchet, either blocking or releasing the forces of ecological destruction. In the current epoch, the runaway effects of climate change and the Great Acceleration threaten to wipe out the areas of rainforest that earlier Indigenous resistance helped preserve. The Amazon Rainforest is a case in point, with a network of natural white sand savanna clearings to the north of the Amazon River identified as a fire-vulnerable 'Achilles heel' that could engulf the surrounding moist evergreen forests as temperatures increase.[123] Combined with the

[119]Yuve Kukuh Sesar, Reza Triarda, and Juliansyah Rahmat Maulana, 'Developing Transnational Indigenous Solidarity: The Case of Borneo Dayak Forum', *Global Focus* 1, no. 1 (2021): 4–22.

[120]Betty Mindlin, *Nós Paiter: Os Suruí de Rondônia* (*We Paiter: The Suruí of Rondônia*) (Vozes, 1985), 17–24, 132–43; Angela Pappiani and Inimá Lacerda, *Histórias do Começo e do Fim do Mundo: O Contato do Povo Paiter Suruí* (*Histories of the Beginning and the End of the World: The Contact of the Paiter Suruí People*) (Ikoré, 2016).

[121]Interviews conducted by Uraan Anderson Surui and Freg J. Stokes, 8 March 2024, Terra Indigena Sete de Setembro, Brazil (handwritten notes in possession of the authors).

[122]Sara Villén-Pérez et al., 'Brazilian Amazon Gold: Indigenous Land Rights under Risk', *Elementa: Science of the Anthropocene* 8, Art. 31 (2020): 1–5; David Cleary, *Anatomy of the Amazon Gold Rush* (Macmillan, 1990), xviii; Quiliconi and Vasco, 'Chinese Mining', 22; Marques, 'A Fronteira do Ouro', 525.

[123]Bernardo M. Flores and Milena Holmgren, 'White-Sand Savannas Expand at the Core of the Amazon after Forest Wildfires', *Ecosystems* 24 (2021): 1624–37.

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advance of the Brazilian deforestation arc from the south and east, this could soon dry out the Amazon irreversibly, converting most of the biome into open savanna.[124] To avoid reaching these tipping points, ongoing campaigns to defend and consolidate Indigenous forest territories are essential, with these campaigns potentially having a similar ecological ratchet effect in the future as Indigenous resistance had in the past. The preservation and transmission of Indigenous cosmologies, offering perspectives on human relations with nature different from the views prevailing within the capitalist world-system, will continue to play an important role in these ongoing struggles.

Global histories of capitalism often focus on European powers or, less commonly, incorporate analysis of Indigenous states such as the Inca Empire. Addressing a notable blind spot in world-systems analysis, this article has shown that non-state Indigenous populations also played a major role in constricting and shaping commodity circulation and extractive frontiers in South America. While specific local circumstances must always be taken into account, this analytical framework could also be applied to forms of Indigenous political resistance in the tropical rainforests of Africa and Asia. To analyse this phenomenon, researchers must look at political actions beyond the bounds of the state, honing in on the silences, ellipses, and failed projects hidden in colonial archives.

We have cross-referenced these archival documents with Guaraní and Paiter oral histories and cosmological insights, alongside contemporary deforestation data, so that new knowledge can emerge from the dialogue between these contrasting ontologies. This methodological approach reveals that while commodity frontiers on the edge of the expanding capitalist world-economy in South America have been a powerful force for environmental transformation, they have also encountered frequent obstacles in the form of both direct and indirect Indigenous opposition. In the Atlantic Rainforest, resistance by Macro-Jê and Guaraní-speaking groups prevented Spanish and Portuguese colonists from taking political control of both the Paraná Forest and a significant swathe of the forest in eastern Minas Gerais until the nineteenth century, with major deforestation not occurring in these areas until the twentieth century. Direct violent opposition, labour withdrawal, and flight, underpinned by a cosmological framework opposing colonisation, all played a role in this process.

While the Portuguese accessed the gold of Minas Gerais by appropriating the knowledge and labour of Tupinambá, Guaraní, and Macro-Jê groups, the Spanish failed to gain control of Indigenous gold distribution networks in the Amazon. The Spanish state's early structural focus on labour management within the former Inca Empire, and its corresponding inability to exert sustained control over neighbouring, mobile, non-state Indigenous groups in the western Amazon, was a significant factor in this failure. Spanish, English, Dutch, French, and Portuguese colonists were all unable to capture the various gold-producing sites in the Guianas, where Indigenous communities impeded the economic exploitation of the forest hinterlands. Even on the southeast edge of the Brazilian Amazon, where the deforestation front advanced most rapidly, the resistance of groups such as the Paiter directly resulted in the conservation of critical forest corridors during the last half century. In all these locations, as elsewhere in the American tropics, the long-term interplay between Indigenous actions and the protection offered by the forest itself has hobbled numerous European economic projects.

Episodes of resistance by stateless Indigenous peoples have often been analysed in isolation, rather than as an ongoing, structural component of world history. To address this issue, historians must take Indigenous cosmologies and actions seriously as forces with global ecological and political consequences. The fact that Indigenous populations have restricted and shaped commodity frontiers and capital flows in the past will make them key agents of change and land care as we seek to charter a more just course through the current planetary ecological crisis. As this

[124]Nico Wunderling et al., 'Recurrent Droughts Increase Risk of Cascading Tipping Events by Outpacing Adaptive Capacities in the Amazon Rainforest', *PNAS* 119, no. 32 (2022): 1–11.

article has argued, the modern-day capacity of Indigenous tropical forest territories to absorb carbon dioxide and harbour biodiversity, rather than being a product of external economic or geographic factors alone, is directly linked to local histories of political resistance.

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