Chapter 14 In Brief

Amazon in motion: Changing politics, development strategies, peoples, landscapes, and livelihoods

Caminhão sem placa e carregado com toras de madeira (Foto: João Paulo Machado /Amazônia Real)

THE AMAZON WE WANT
Science Panel for the Amazon

Amazon in motion: Changing politics, development strategies, peoples, landscapes, and livelihoods

Susanna Hecht[a], *Rebecca Abers*[b], *Eduardo Assad*[c], *Denise Humphreys Bebbington*[d], *Eduardo Brondizio*[e], *Francisco Costa*[f], *Ana María Durán Calisto*[g], *Philip Fearnside*[h], *Rachael Garrett*[i], *Sebastian Heilpern*[j], *David McGrath*[k], *Gustavo Oliveira*[l], *Henrique Pereira*[m], *Miguel Pinedo-Vazquez*[n], *Marianne Schmink*[o]

Key Messages & Recommendations

1) The Amazon has been treated as an experimental laboratory for modernization and development policies and politics since World War II. The undifferentiated green on maps belies the complexity of regional economies, accelerated dynamics of land use change, rapid urbanization, and structural changes that have accompanied Amazonian integration into national and international politics and economies. The current context includes accelerated globalization and international commodity demand, expanding environmental concerns, and planetary change.
2) Modernization policies and large-scale regional planning initially unfolded under mostly authoritarian Pan-Amazonian regimes, emphasizing national integration as well as Cold War politics. This stimulated early infrastructure investment (1960s) as well as state and private colonization programs to physically occupy the Amazon and serve as alternatives to agrarian reform in more settled and contested areas. In addition, a series of targeted and highly subsidized regional corporate economic programs and growth poles were advanced to promote mining, hydrocarbons, energy, agroindustry, and livestock. These settlements often impinged on Indigenous peoples and local communities (IPLCs)' territories.
3) The idea of "modernization" emphasized deep structural change supported by an understanding of nature as an inert platform or as an obstacle to development, valuable only as a source of raw materials and prone to tropical diseases. This was the basis for development policies and planning in the Amazon that were largely indifferent to its ecologies, and perceived the Amazon as a demographic void.

[a] University of California Los Angeles, Luskin School of Public Policy, P.O. Box 951656, Los Angeles CA 90095, USA; Graduate Institute for International Development Studies, Chemin Eugène-Rigot 2A, 1202 Genève, Switzerland, sbhecht@ucla.edu

[b] University of Brasília, Political Science Department, Campus Universitário Darcy Ribeiro, Brasília DF 70910-900, Brazil

[c] Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), Parque Estação Biológica, PqEB s/nº, Brasília DF 70770-901, Brazil

[d] Clark University, Dept. of International Development, Community and Environment, 950 Main Street, Worcester MA 01610, USA

[e] Indiana University Bloomington, Dept. of Anthropology, Student Building 130, 701 E. Kirkwood Ave., Bloomington IN 47405, USA

[f] Federal University of Pará, Centre for Advanced Amazonian Studies (NAEA) and Postgraduate Program in Economics, Rua Agusto Corrêa, 01, Guamá, Belém PA 66075-110, Brazil

[g] Yale School of Architecture, 180 York St, New Haven CT 06511, USA; Estudio A0, Mariscal Foch E7-81, Quito 170143, Ecuador

[h] National Institute for Research in Amazonia (INPA), Department of Environmental Dynamics, Av. André Araújo 2936, Petrópolis, Manaus AM 69067-375, Brazil

[i] ETH Zurich, Rämistrasse 101, 8092 Zürich, Switzerland

[j] Cornell University, E145 Corson Hall, Ithaca NY 14853, USA

[k] Earth Innovation Institute, 2111 San Pablo Avenue #2739, Berkeley CA 94702-9991, USA; Graduate Program on Society, Nature and Development, Federal University of Western Pará, Av. Mendonça Furtado 2946, Fátima, Santarém PA 68040-470, Brazil

[l] Department of Global and International Studies, University of California Irvine, 579 Social Science Tower, Irvine CA 92697, USA

[m] Federal University of Amazonas, Av. General Rodrigo Octavio Jordão Ramos, 1200, Coroado I, Manaus AM 69067-005, Brazil

[n] Columbia University, The Earth Institute, 535 W 116th Street, New York NY 10027, USA; Earth Innovation Institute (EII), 2111 San Pablo Avenue #2739, Berkeley, CA 94702-9991, USA; and Universidad Intercultural de la Amazonia (UNIA), San Jose Km. 0.5, Pucallpa 25004, Peru

[o] University of Florida, Center for Latin American Studies, 319 Grinter Hall, Gainesville FL 32611, USA, schmink@latam.ufl.edu

4) Yet, the Amazon was not empty. It has been inhabited for at least 12,000 years and is currently occupied by a diversity of people with multiple livelihood strategies. However, land-use in the Amazon is increasingly dominated by simplified monocultural systems, and mineral, hydrocarbon, and timber extraction, largely export-oriented.
5) Amazonians live in ranches, farms, mining camps, Indigenous and traditional territories, forests, and villages, but most live in the region's cities. Complex dynamics of circular migration, multi-sited households, and polyvalent income strategies involving state transfers and intra-family remittances underlie vibrant rural-urban interactions and widespread forest/river dependence in the Amazon.
6) Erratic public policies, limited technical support, uncertain tenure, violence, and money laundering from illicit activities, combined with the volatility of small farm prices, have contributed to the emergence of multiple forms of clandestine economies[1]. Rural instabilities and contested land rights have also been instrumental in fueling migration throughout the region.
7) The insights and interests of local people, both urban and rural, native and migrant, are often overlooked. These groups are generating alternative approaches to manage and restore landscapes, elaborating new marketing systems and forms of governance. These systems can serve as the models for a necessary shift in the approach to and practices of sustainable development in the Amazon.

Abstract This chapter presents the major ideas, actors, and practices that have shaped the Amazon's current development and deforestation dynamics. Outlining general periods of macro policy, it traces the evolution of today's complex interactions among diverse livelihoods, conservation, and production systems, both legal and clandestine. It highlights how Amazonians have continuously adapted to changing circumstances while fighting to advance their own proposals for conservation and equity in development.

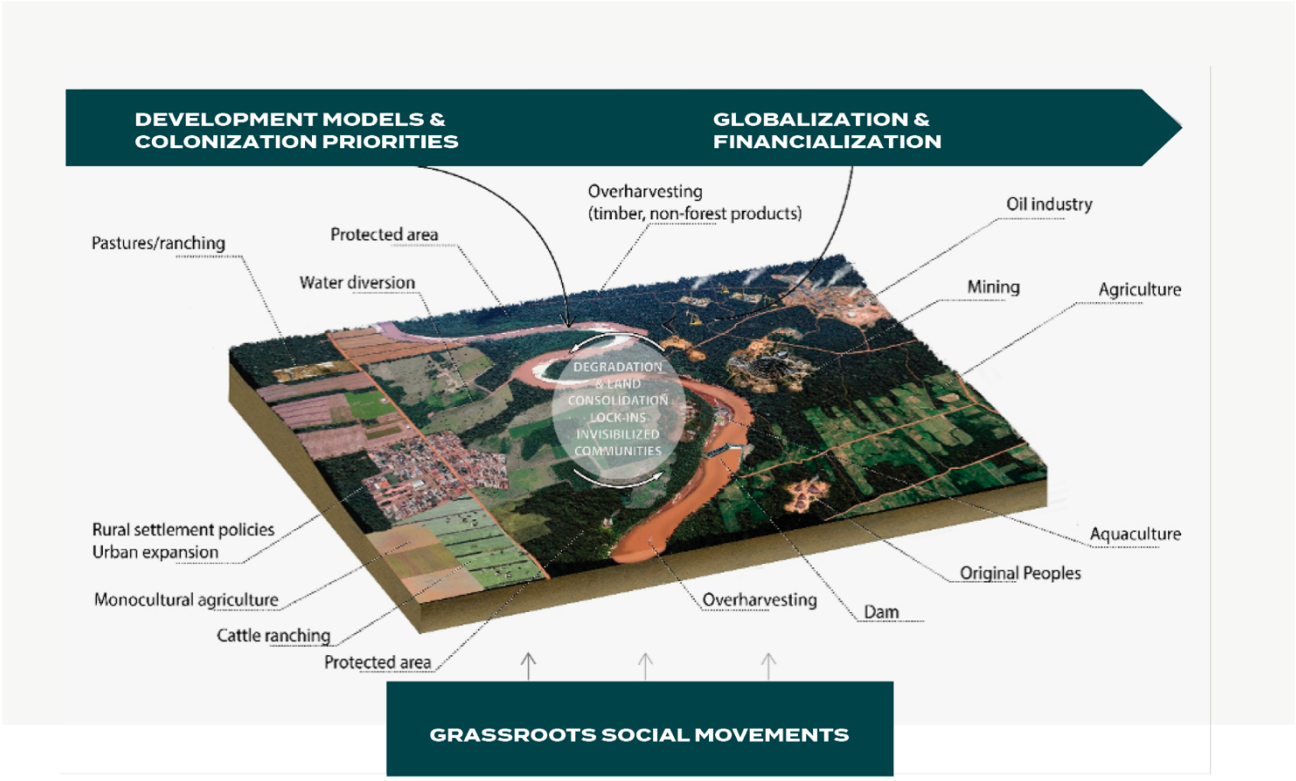

Figure 14.1 Amazonian landscapes are shaped by development policies, globalization, financialization, and grassroots social movements

The modernization imperative: Development planning, programs, and processes The notion of modernization in the Amazon presumed a shift from traditional organizational forms of society and institutions — strongly oligarchic and unequal — into modern economic, social, and political structures. This required strong state intervention in the economy, and the coordination of banking, investment, and infrastructure through regional planning programs and agencies that would override local coteries in favor of national political control, and usually, external interest groups[2–4]. Most Amazonian populations were ignored by this approach.

The vast forest appeared to Brazilian and other Amazonian military strategists and planners as a demographic void that could be transformed, tamed, and integrated into a modern state[5–9]. State-led programs to develop "empty lands" produced continuing struggles over control, access, and resource management among local populations, the state, large scale corporations, and recent arrivals.

Between the 1960's and 1990's, state-led development in the Pan-Amazon emphasized territorial integration and occupation via infrastructure development, large-scale transfers of public land to private owners (see Chapter 15), and colonization programs, leading to explosive deforestation and widespread social conflict. Eventually, environmental problems, human rights abuses, inequities and invisibilities in investment, and severe corruption led to global outcry, international disinvestment, and national movements that were instrumental in the region's transition to democracy[10–13].

Democratization and its fluctuations Indigenous people and local communities (IPLCs), and allies from labor movements, urban environmentalists, and entrepreneurial groups, successfully pushed for conservation approaches, laws, and institutions that recognized the important role of historical Amazonian populations in both creating the Amazon's ecological complexity as well as in protecting forested landscapes[14–19]. New ways of thinking about the role of Amazonian forests focused on global and regional climate dynamics, environmental services, expanded ecological economics, recognition of the rights of nature, and concerns over environmental justice[20–22]. This period saw new constitutions, the creation of national environmental agencies, and the emergence of the idea of socio-environmentalism.

Neoliberalism and extractive economies Yet, while socio-environmentalism increasingly influenced Amazonian policy, macro-development economic policies associated with the "Washington consensus" or neoliberalism worked counter to these approaches through their deregulatory stances, limitations on state actions, privatization, extensive national opening to international investment, political decentralization, and tariff-free trade. During the early post-authoritarian period of the 1990s, extreme fiscal instability and political volatility, triggered by Neoliberal policies and required by international lending organizations, led to the revamping of strict neoliberal approaches (see Chapter 17). The subsequent model, known as "Neo-extractivism," maintained trade reforms, privatization, and export orientation, but engaged more in social policy, including anti-poverty initiatives such as conditional cash transfers (*Bolsa Família, Bolsa Verde*).

Global commodities markets have played a significant role in the Amazon since colonial times, but in earlier phases were not predicated on large-scale deforestation or land degradation as with today's export-led development[23] (Figure 14.2). This expansion coincided with a commodity boom, new technologies to access natural resources, new production technologies, and strong demand, especially from Asian countries. Sustained high prices for a diversity of commodities (ore, gold, timber, hydrocarbons, meat, *coca,* and oil seeds) lifted Amazonian economies into the top ranks of global producers. Combined with a long history of land speculation, commodity prices fueled illegal land grabbing and deforestation, since deforested land was long perceived to be more profitable than standing forests and better at guaranteeing land claims[24–28].

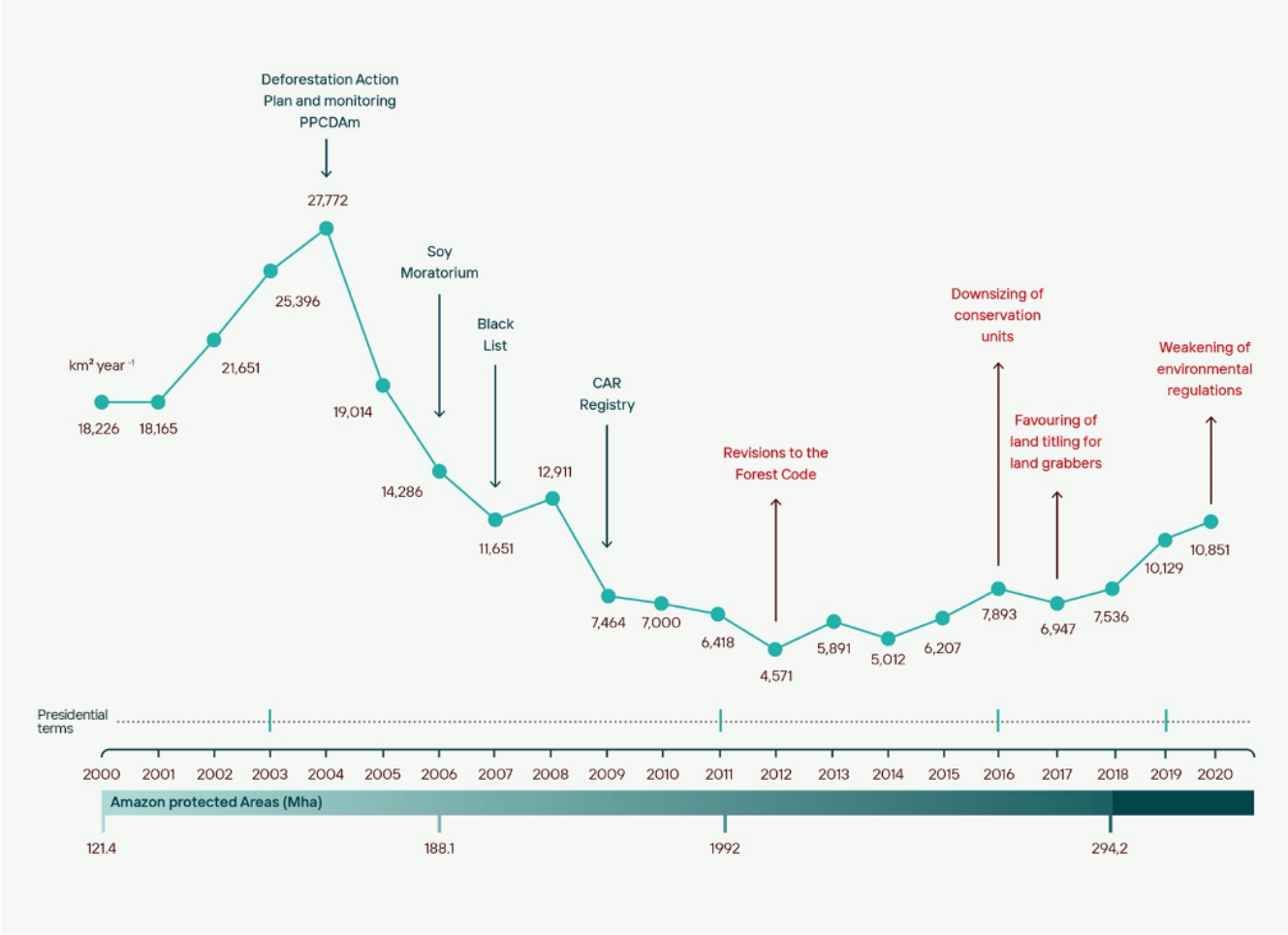

Figure 14.2 Deforestation in the Brazilian Amazon in response to policy changes, 2000-2020.

McKay (2017)[29] summarizes the current extractive system as having four features; (1) large volumes of materials extracted, destined for export with little or no processing; (2) value-chain concentration and sectoral disarticulation; (3) intense environmental degradation; and (4) deterioration of labor opportunities and/or conditions.

Structural changes at the political, social, and economic levels that currently frame Amazonian dynamics also involve (1) new forms of finance for both development and conservation, (2) a rise in clandestine economies, (3) the expansion of access and energy infrastructure, and 4) urbanization.

Amazonian financialization South American development banks and state-owned commercial banks have decreased their role in providing loans and investment capital for agriculture, agroforestry, mining, timber, and even infrastructure. New actors (i.e., private banks, hedge funds, sovereign wealth funds, pension funds, and new financial instruments) play an increasingly large role in the region's production, consumption, and conservation practices.

There has also been a notable shift in international development finance away from the Inter-American Development Bank and the World Bank towards the China Development Bank and the China Export-Import Bank[30], partially due to the limited socio-environmental conditionalities placed on their loans.

This may destabilize perceived gains from former financiers' adoption of best practices for environmental protection and social responsibility[31,32].

Perhaps the most notable change is the creation of new instruments for generating financial dividends from conservation itself through payments for environmental services like greenhouse gas sequestration, estimated to be worth USD 21 billion annually in the Brazilian Amazon. In 2008, the USD 1.1 billion Amazon Fund was established, the world's largest deforestation control financial instrument at the time, and a lynchpin of the strategy of mobilizing finance and trade mechanisms for reducing emissions from deforestation and forest degradation (REDD or REDD+; see Chapters 25 and 29). This investment, along with the advancement of new land rights, forms of conservation, and marketing regimes, had significant effects in controlling of deforestation from 2004 to 2012[19,33–37].

Clandestine economies Clandestine economies emerge alongside, and converge with, regulated, lawful, and formalized economies, as is the case of illegal land acquisitions laundered through livestock (see Chapter 15). Gold moves rapidly into formal circuits, and *coca* operates through a complex parallel economy. For workers, these economies supplement household income generated from agriculture, urban or rural waged labor, petty commerce, urban formal and informal work, conditional cash transfers, pensions, and remittances.

Gold Hundreds of thousands of families across the Pan Amazon are engaged in small-scale mining, often unregulated, and the trend is increasing given high gold prices and the economic impacts of the COVID-19 pandemic. Politically-active miners defend informal mining's easy access and redistributive character, in contrast to large-scale formal mining, which often involves international mining companies and national subsidies[12,38,39]. Invasions of miners into protected areas and IPLCs lands have sparked widespread conflict and violence, as for example in the Yanomami, Kayapó, and Munduruku Indigenous areas and in many protected reserves[40].

The Global Initiative Against Transnational Organized Crime (2017)[41] notes that illegal gold mining is rapidly spreading across the Amazon, particularly in Venezuela, Colombia, and the Guyanas. Extracting gold requires a combination of forest removal, soil pit mining, river bank blasting, and the use of liquid mercury in processing, posing a major threat to Amazonian land and aquatic biodiversity, water quality, forest carbon stocks, human health, and ecosystem resilience[42]. Mercury toxicity in Amazonian waterways now constitutes one of the largest threats to Amazonian fisheries, livelihoods, and diets (see Chapter 21).

Land grabbing Land grabbing often involves deforestation to demonstrate "productive use" and justify a land title. Forest clearing also discourages other potential claimants from invading the area, and eliminates access to forest resources by those who might depend on them[43] (see Chapter 15). Throughout the Amazon, land clearing, often along new roads, has been used to capture state resources and as a speculative asset. The recent relaxation of enforcement and the granting of amnesty for areas already cleared have functionally decriminalized deforestation caused by land grabbing[44–46]. Recent uses of geolocation to "ratify" holdings as part of false titles is now widespread. IPLCs' territories, undesignated lands, and collective holdings are targets in Brazil, Peru, and Colombia[44,47–53] (see Chapter 18).

Logging Illegal logging is rampant in the Brazilian Amazon, and supplies more timber than legal logging[54–57] (see Chapter 29). Much of the timber that appears in official statistics as coming from areas being deforested legally or from legal forest management is actually being "laundered" from illegal logging[58]. In Colombia, 47% of sold wood is illegal[59]. In Brazil, the current federal administration reversed regulations that outlawed suspicious timber shipments, making such exports legal and further intertwining illegal with legal processes.

Coca Coca leaf chewing is a traditional practice that can alleviate hunger, cold, and fatigue. A crop that can be flexibly produced, and has a global market estimated at over USD 100 billion per year[60,61], coca

generates considerable employment as well as revenue, is locally processed, and integrates well into agroforestry systems. The instability of farming systems, erratic policy, and the explosion of cocaine use in the developed world beginning in the 1970s drive this economy and related violence.

As a means of money laundering, investment, and land speculation, coca often works in tandem with livestock, land claiming, and speculation[60,62]. Expanding use of herbicides for coca eradication has contaminated legal croplands, marginalized producers, triggered displacement and migration into both forests and urban areas, exacerbated political tensions, threatened Indigenous areas and conservation zones, and poisoned non-target plants and animals[63].

Infrastructure Rising global demand for commodities (see Chapters 15 and 17), and the imperative of regional and global integration and geopolitics, drive large-scale infrastruc3ture development (Figure 14.3)[64,65,66,67,68]. Infrastructure programs are rarely assessed for their potential effects[52,69–71] or evaluated for their economic viability[52,72–74]. The purported labor benefits of these large, expensive projects are often exaggerated, as international contractors often arrive with their own work crews. This sector has been rife with scandal in Amazonian countries.

Roads Roads have become primary sites of land speculation and drivers of deforestation (see Chapter 19) in the Amazon. Road paving, or the mere announcement of plans for it, causes an immediate increase in the price of land along a highway[12], stimulating land speculation. Initial occupation can also occur as large areas are appropriated by landgrabbers (*grileiros*), who then subdivide the claims and sell the land in smaller parcels; alternatively, land consolidators may use multiple names to acquire larger holdings. Areas along rivers are increasingly targets for clearing via claiming. This has been well documented in Colombia, and is widespread in Ecuador.

Ports Nearly 100 major industrial river ports have been built on the Brazilian Amazon's major rivers over the past two decades, and more than 40 are planned. Many have been internationally financed and built by commodity companies with little government oversight. These ports have transformed the region, opening it to agribusiness and reducing transport costs for export commodities. However, this boom in port infrastructure often comes at the expense of the environment, traditional riverine communities, and riparian ecologies[75–78].

Dams The construction of dams and hydroelectric plants remains a major development strategy across the region, while the deep social and environmental consequences are largely ignored (see Chapters 19 and 20). Documented social effects include displacement of local populations, loss of livelihoods from fisheries, changes in aquatic ecologies, CO_2 and methane releases, and water contamination[70,79]. In May of 2021, the Brazilian congress passed new legislation that largely eliminated environmental licensing requirements for major infrastructure projects, including dams.

Export dependency and precarious states Pan-Amazonian states have become increasingly dependent on exports of low value-added products (see Chapter 29). While gross domestic product (GDP) has increased across the Amazon, inequality and precarity remain central issues and were exacerbated by the COVID-19 pandemic.

Amazonian states suffer from continuing political instability, with frequent policy reversals or shifts in emphasis that increase volatility in prices, policy, and implementation. Causes of instability include impeachments, "self-coups", denial of election results, suspected voting fraud, suicides, and political intransigence within general accusations of corruption. Moreover, the lack of transparency, poor delivery of promised services, and favoritism in many contract and bidding processes demoralizes regulatory institutions, heightens distrust of government, and promotes illegality[80–82].

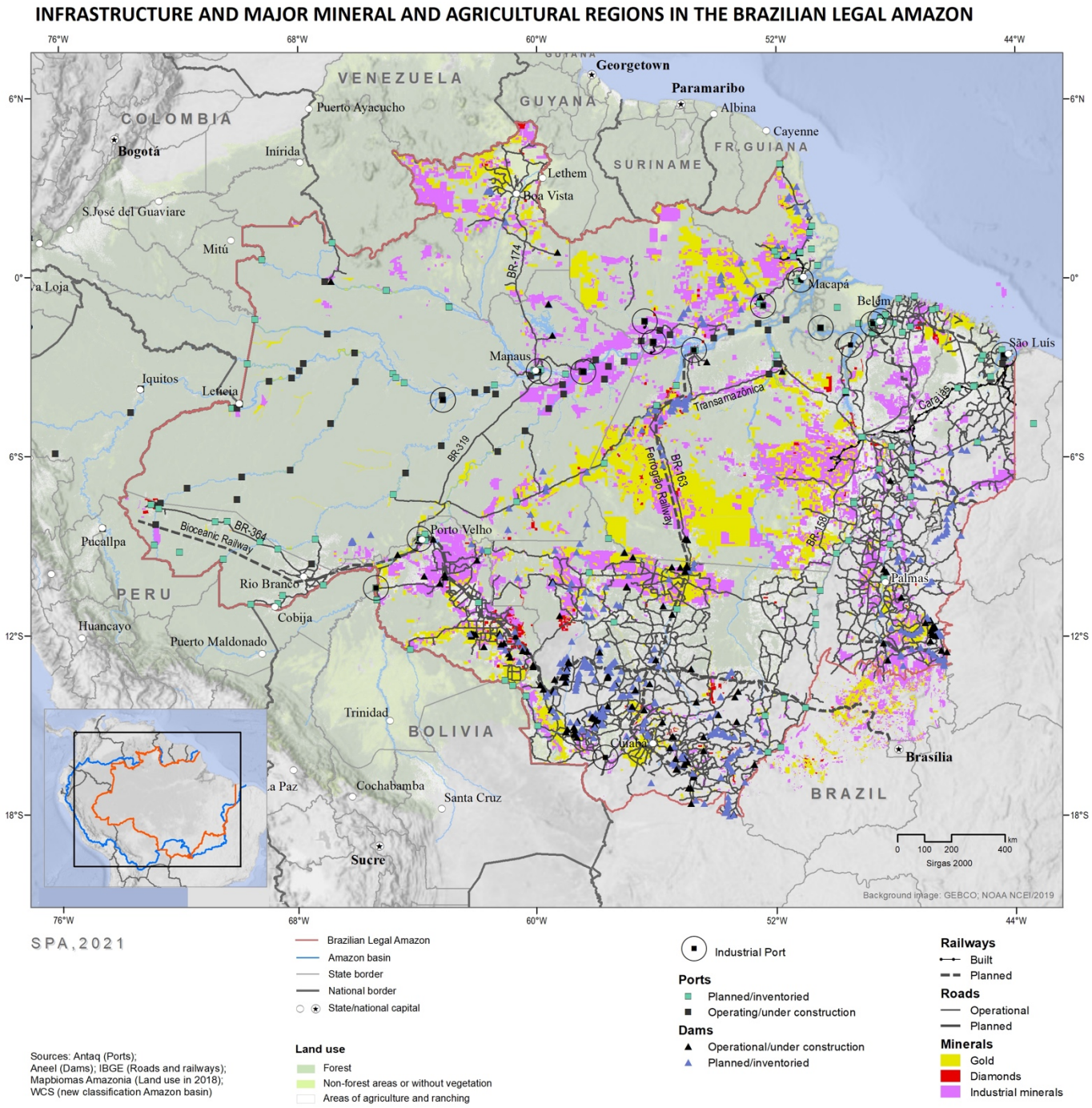

Figure 14.3 Map of infrastructure and major mineral and agricultural regions.

In spite of the current "commodity consensus" policy framework, new innovative economies based on traditional Amazonian crops (e.g., *açai*, *guarana*, cacao) and introduced coffee have gained force. However, these remain largely niche crops, whose value and value chains are quite different from large-scale commodity dynamics (see Chapter 29).

Amazonian people on the ground In the midst of these powerful processes, the diverse people who live in the Amazon continue to respond as best they can to increasingly precarious options for making a living. They draw on Indigenous cosmologies and practices dating back millennia, as well as unique cultural identities and systems of management of natural resources that have evolved in each Amazonian country and locality, while adapting to rapidly-changing new drivers and processes that increasingly constrain their possibilities[83–87].

The settlement patterns of Amazonian populations are highly complex and dynamic, including diverse patterns of migration by peoples internal and external to the region, as well as between urban and rural areas (Figure 14.4)[68,66,88,89]. The region's population is highly concentrated in urban areas, including large numbers of Indigenous peoples[25,90]. There are thousands of planned and unplanned settlements in the Amazon, ranging from formalized private colonization, corporate planned cities, and state-led colonization, to informal settlements, boom town explosions, landless occupations, and do-it-yourself de facto agrarian reforms[91,92]. However, high populations densities do not always lead to forest loss and can drive forest transitions or maintain forests[19,93].

The rural urban continuum Persistent poverty among Amazonian residents has contributed to mobility and migration, a regular re-engagement with cities and markets, and for many, intensified rural-urban links and exchanges of commercial and subsistence goods, often through the use of complex informal social and market networks of kinship, clientelism, and patronage[93–96]. Rural conflict, violence, and in some cases climate change, also contribute to this complex reengagement with a new kind of urbanism and rurality.

Living and livelihoods in the urban-rural matrix Even when forested, rural areas in the Amazon, especially those near towns, can have high population densities, and strong relations to family or small-scale agriculture, agroforestry, fishing, and forest livelihoods[97–101]. Rural-based extractive activities are important sources of employment and income for urban residents, who move to cities to seek income, state services, urban amenities, and transportation arrangements[96,102]. Substantial numbers of Brazilian families depend on conditional cash transfer programs as well as remittances that have to be collected in urban centers.

Multi-sited households and family networks shape the urban and rural landscapes of the region, supporting well-established patterns of circulation and exchange across short and long distances[96,102–104]. Incomes come from different combinations of agricultural and resource-based activities, urban employment, and niche-market opportunities. The role of remittances is increasingly important, both from cities to rural areas (and the reverse) and from abroad, particularly from large diasporic communities in Ecuador, Colombia, and Venezuela.

Multi-strata and multi-species peri-urban and urban agroforests and fisheries, supported by local ecological knowledge and practices, are increasingly important for food security, medicines, religious materials, and petty commerce under the conditions of precarity and low wages[18,105–112]. Agro-urban ecosystems can also provide environmental services, and assist in moderating heat island effects, pollution, and water infiltration[113–115]. Peri-urban areas are becoming important for local food supplies. Urban-rural connections could be enhanced with better participation in local actions to support linkages for both urban and rural agroecological and production activities (see Chapter 34).

Urban socioenvironmental issues Vast majorities of Amazonian municipalities have less than 10% of their sewage treated[116]. Such issues are becoming more complex, with increasing patterns of climate-related flooding overwhelming the infrastructure that does exist, and hammering settled areas near

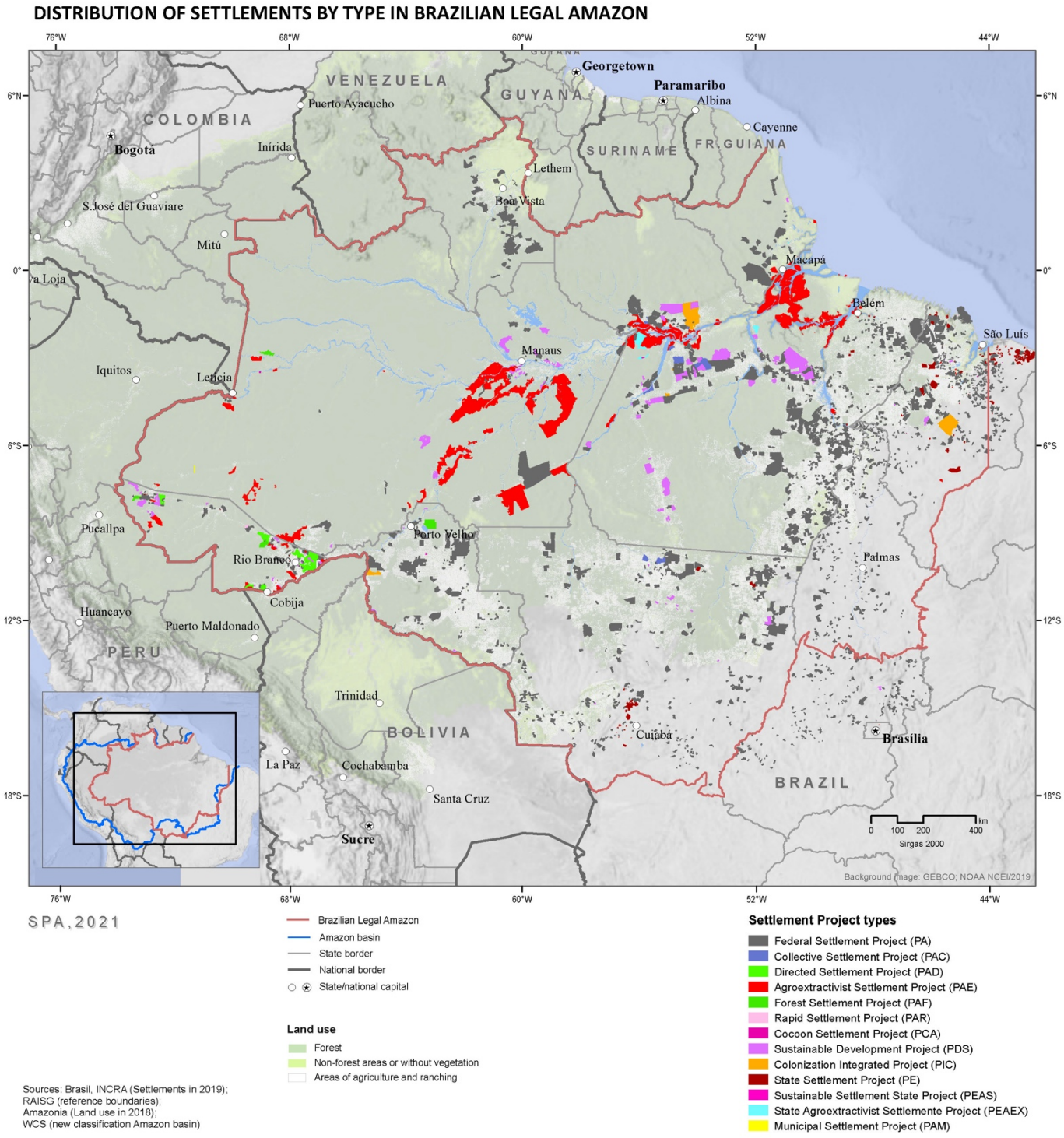

Figure 14.4 Distribution of settlements by type in Brazil's Legal Amazon region; source: Yanai, 2017 [127].

storm- and flood-vulnerable waterways. Strong droughts can undermine rural production, while heat island temperatures make urban areas more than 5°C degrees hotter than adjacent nonurban areas[113]. As urban areas grow, pollution is becoming more extreme, causing increased outbreaks of waterborne and mosquito-borne diseases, in addition to mercury and oil contamination and industrial pollution[117–120] (see Chapter 21). Air quality concerns are becoming more important as vast fires proliferate in the dry season[121,122]. These increased the vulnerability of local populations to COVID-19 and other respiratory illnesses.

Amazonian urban areas also experience significant crime and violence, reflecting the dynamics of poverty, inequality, and clandestine economies. The Amazonian capitals of Manaus, Belém, and Macapá are among the 50 most violent cities in the world (41 of which are in Latin America)[123].

Social movements, development paradigms, and governance According to Global Witness (2020)[124], Amazonian countries lead the world in the frequency of murders of human rights activists, Indigenous rights leaders, and forest guardians. National and subnational governments have generally resisted creating more robust participatory institutions (or undermined those which do exist) through which affected communities can engage in informed consent around big infrastructure projects[125,126].

In the absence of effective participatory structures, local and especially Indigenous movements have sometimes made headway through large scale public protest. Amazonian movements have influenced political institutions through the concept of *Buen Vivir* (Good Living), and the rights of nature (the Pachamama) enshrined in the constitutions of Ecuador, Bolivia, Colombia, and Peru. Insurgent movements and demonstrations roiled Colombia, Brazil, Peru, Bolivia, and Ecuador extensively in 2020 and 2021. In addition, Indigenous groups increasingly turn to international organizations and trans-basin organizing to pressure governments to respect human rights, citizenship, and territories in a context of increasing violence and land grabbing.

Conclusions The complexity of Amazonian forests, peoples, and cultures has been widely undervalued and diminished in the name of modernization, civilization, religion, taming the wild, and national sovereignty, among others. As nation states made their mark on Amazonian lands, gridding them out, creating new settlements, and punching roads through forests, Amazonian countries have reinvented resource dependency as national economic strategies, and now key elements of their foreign exchange. This has been achieved through the expansion of mining, fossil fuel extraction, monoculture agriculture, and infrastructure to support the export and flight of national wealth, the creation and deepening of inequalities, and the destruction of natural capital. Large clandestine economies of plundered timber, stolen lands, illegal gold, and coca production, alongside continuing streams of migration, seasonal labor, and a bricolage of urban and rural livelihood tactics, frame the contours of precarity for much of the region's population. The politics of prevailing forms of destruction lock out alternative ideas and practices that regional populations advance. Those groups have defended a concept of development based on "multiple" and "hybrid" modernities and multiple kinds of worlds, sustained by systems of local knowledge, different relations to nature, social innovation, equity, and environmental services. This approach represents a necessary alternative to the current systems of plunder that dominate the region.

References

1. Gootenberg, P. Chicken or eggs?: Rethinking illicit drugs and 'Development'. *Int. J. Drug Policy* 102985 (2021).
2. León, A. C., Araújo, I., Rezende, G. & Sobrinho, F. L. A. Planejamento regional no Brasil: a experiencia da SUDAM. *Obs. Rev. Eletrônica Geogr.* **7**, 2–21 (2015).
3. Furtado, C. *Obstacles to development in Latin America*. (Estados Unidos, 1970).
4. Furtado, C. & others. *Economic development of Latin America*. (Cambridge University Press, 1977).
5. Becker, B. K., Miranda, M. & Machado, L. O. *Fronteira Amazônica: questões sobre a gestão do território*. (Editora UnB, 1990).
6. da Costa Freitas, J. M. *A escola geopolítica brasileira: Golbery do*

Couto e Silva, Carlos de Meira Mattos e Therezinha de Castro. vol. 405 (Biblioteca do Exército Editora, 2004).
7. Bunker, S. G. *Underdeveloping the Amazon: Extraction, unequal exchange, and the failure of the modern state*. (University of Chicago Press Books, 1985).
8. Stepan, A. C. *The military in politics: changing patterns in Brazil*. (Princeton University Press, 1974).
9. Silva, G. *Aspectos geopolíticos do Brasil*. (Biblioteca do Exército Editora, 1957).
10. Hagopian, F. & Mainwaring, S. P. *The third wave of democratization in Latin America: advances and setbacks*. (Cambridge University Press, 2005).
11. Hochstetler, K. & Keck, M. E. *Greening Brazil: Environmental activism in state and society*. (Duke University Press, 2007).
12. Schmink, M. & Wood, C. H. *Contested frontiers in Amazonia*. (Columbia University Press, 1992).
13. Hecht, S. B. & Cockburn, A. *The fate of the forest: developers, destroyers, and defenders of the Amazon*. (Verso, 1989).
14. Balée, W. & Erickson, C. *Time and complexity in historical ecology: studies in the neotropical lowlands*. (Columbia University Press, 2006).
15. Nepstad, D. *et al.* Inhibition of Amazon deforestation and fire by parks and indigenous lands. *Conserv. Biol.* **20**, 65–73 (2006).
16. Levis, C. *et al.* How people domesticated Amazonian forests. *Front. Ecol. Evol.* **5**, 171 (2018).
17. Maezumi, S. Y. *et al.* The legacy of 4,500 years of polyculture agroforestry in the eastern Amazon. *Nat. plants* **4**, 540–547 (2018).
18. Vogt, N. D., Pinedo-Vasquez, M., Brondízio, E. S., Almeida, O. & Rivero, S. Forest Transitions in Mosaic Landscapes: Smallholder's Flexibility in Land-Resource Use Decisions and Livelihood Strategies From World War II to the Present in the Amazon Estuary. *Soc. Nat. Resour.* **28**, 1043–1058 (2015).
19. Brondízio, E. S. *et al.* Making place-based sustainability initiatives visible in the Brazilian Amazon. *Curr. Opin. Environ. Sustain.* **49**, 66–78 (2021).
20. Conklin, B. A. & Graham, L. R. The shifting middle ground: Amazonian Indians and eco-politics. *Am. Anthropol.* **97**, 695–710 (1995).
21. Fearnside, P. M. Brazil's Amazonian forest carbon: the key to Southern Amazonia's significance for global climate. *Reg. Environ. Chang.* **18**, 47–61 (2018).
22. Nogueira, E. M., Yanai, A. M., de Vasconcelos, S. S., de Alencastro Graça, P. M. L. & Fearnside, P. M. Brazil's Amazonian protected areas as a bulwark against regional climate change. *Reg. Environ. Chang.* **18**, 573–579 (2018).
23. Svampa, M. *Neo-extractivism in Latin America: socio-environmental conflicts, the territorial turn, and new political narratives*. (Cambridge University Press, 2019).
24. Hecht, S. B. The logic of livestock and deforestation in Amazonia. *Bioscience* **43**, 687–695 (1993).
25. Campbell, J. M. Speculative accumulation: property-making in the Brazilian Amazon. *J. Lat. Am. Caribb. Anthropol.* **19**, 237–259 (2014).
26. Fearnside, P. M. Amazon dams and waterways: Brazil's Tapajós Basin plans. *Ambio* **44**, 426–439 (2015).
27. Gómez, C. J. L., Sánchez-Ayala, L. & Vargas, G. A. Armed conflict, land grabs and primitive accumulation in Colombia: micro processes, macro trends and the puzzles in between. *J. Peasant Stud.* **42**, 255–274 (2015).
28. da Silva, S. S. *et al.* Dynamics of forest fires in the southwestern Amazon. *For. Ecol. Manage.* **424**, 312–322 (2018).
29. McKay, B. M. Agrarian extractivism in Bolivia. *World Dev.* **97**, 199–211 (2017).
30. Ray, R., Gallagher, K. P. & Sanborn, C. A. *Development Banks and Sustainability in the Andean Amazon*. (Routledge, 2019).
31. Friends of the Earth. *China Development Bank's overseas investments: An assessment of environmental and social policies and practices*. https://foe.org/resources/china-development-banks-overseas-investments-an-assessment-of-environmental-and-social-policies-and-practices/ (2012).
32. Dussel, E. P., Armony, A. C. & Cui, S. Building development for a new era. 226 (2018).
33. Vadjunec, J. M., Schmink, M. & Gomes, C. V. A. Rubber tapper citizens: emerging places, policies, and shifting rural-urban identities in Acre, Brazil. *J. Cult. Geogr.* **28**, 73–98 (2011).
34. Duchelle, A. E. *et al.* Linking forest tenure reform, environmental compliance, and incentives: lessons from REDD+ initiatives in the Brazilian Amazon. *World Dev.* **55**, 53–67 (2014).
35. Hecht, S. B. Forests lost and found in tropical Latin America: the woodland 'green revolution'. *J. Peasant Stud.* **41**, 877–909 (2014).
36. Schmink, M., Hoelle, J., Gomes, C. V. A. & Thaler, G. M. From contested to 'green'frontiers in the Amazon? A long-term analysis of São Félix do Xingu, Brazil. *J. Peasant Stud.* **46**, 377–399 (2019).
37. West, T. A. P. & Fearnside, P. M. Brazil's conservation reform and the reduction of deforestation in Amazonia. *Land use policy* **100**, 105072 (2021).
38. Bebbington, A. J. & Bury, J. *Subterranean Struggles*. (University of Texas Press, 2013).
39. Bebbington, A. J. & Bebbington, D. H. Mining, movements and sustainable development: Concepts for a framework. *Sustain. Dev.* **26**, 441–449 (2018).
40. Siqueira-Gay, J. & Sánchez, L. E. The outbreak of illegal gold mining in the Brazilian Amazon boosts deforestation. *Reg. Environ. Chang.* **21**, 1–5 (2021).
41. Global Initiative Against Transnational Organized Crime. *Case Study: Illicit Gold Mining in Peru. Available at: https://globalinitiative.net/wp-content/uploads/2017/11/tgiatoc-case-study-peru-1878-web-lo-res.pdf*. (2017).
42. Diringer, S. E. *et al.* Deforestation due to artisanal and small-scale gold mining exacerbates soil and mercury mobilization in Madre de Dios, Peru. *Environ. Sci. Technol.* **54**, acs.est.9b06620 (2019).
43. Fearnside, P. M. The roles and movements of actors in the deforestation of Brazilian Amazonia. *Ecol. Soc.* **13**, (2008).
44. Brito, B., Barreto, P., Brandão Jr, A., Baima, S. & Gomes, P. H. Stimulus for land grabbing and deforestation in the Brazilian Amazon. *Environ. Res. Lett.* **14**, 64018 (2019).
45. Parola, G. & Toffoletto, L. Land-grabbing in and by Brazil: victim and buyer. *Rev. Direito Econômico e Socioambiental* **10**, 3–29 (2019).
46. Sosa Varrotti, A. P. & Gras, C. Network companies, land

grabbing, and financialization in South America. *Globalizations* 1–16 (2020).
47. Simmons, C. S., Walker, R. T., Arima, E. Y., Aldrich, S. P. & Caldas, M. M. The amazon land war in the south of Pará. *Ann. Assoc. Am. Geogr.* **97**, (2007).
48. Grajales, J. Land grabbing, legal contention and institutional change in Colombia. *J. Peasant Stud.* **42**, (2015).
49. HRW. Human Rights Watch. World Report 2019. Events of 2018. (2019).
50. Azevedo-Ramos, C. & Moutinho, P. No man's land in the Brazilian Amazon: Could undesignated public forests slow Amazon deforestation? *Land use policy* **73**, 125–127 (2018).
51. Reydon, B. P., Fernandes, V. B. & Telles, T. S. Land governance as a precondition for decreasing deforestation in the Brazilian Amazon. *Land use policy* **94**, 104313 (2020).
52. Ferrante, L. & Fearnside, P. M. The Amazon's road to deforestation. *Science (80-.).* **369**, 634.1-634 (2020).
53. Ferrante, L., Gomes, M. & Fearnside, P. M. Amazonian indigenous peoples are threatened by Brazil's Highway BR-319. *Land use policy* **94**, 104548 (2020).
54. Greenpeace. *State of Conflict: An Investigation into the Landgrabbers, Loggers and Lawless Frontiers in Pará State, Amazon*. (2003).
55. Butler, R. . Illegal logging remains rampant in Brazil. *Mongabay* (2013).
56. Brindis, D. Illegal timber from Brazilian Amazon sold all over the world. Greenpeace. (2014).
57. Imazon. *Amazon Institute of People and the Environment. Activities Report 2017*. https://imazon.org.br (2017).
58. Brancalion, P. H. S. *et al.* Fake legal logging in the Brazilian Amazon. *Sci. Adv.* **4**, eaat1192 (2018).
59. EIA. *Condenando el Bosque. Ilegalidad y falta de gobernanza en la Amazonía colombiana*. (2019).
60. Gootenberg, P. Cocaine histories and diverging drug war politics in Bolivia, Colombia, and Peru. *A Contracorriente una Rev. Estud. Latinoam.* **15**, 1–35 (2017).
61. Gootenberg, P. & Dávalos, L. M. *The origins of cocaine: Colonization and failed development in the Amazon Andes*. (Routledge, 2018).
62. Negret, P. J. *et al.* Emerging evidence that armed conflict and coca cultivation influence deforestation patterns. *Biol. Conserv.* **239**, 108176 (2019).
63. Arenas-Mendoza, H. A. The fumigations with glyphosate in Indigenous territories in Colombia. *Veredas do Direito* **16**, 11 (2019).
64. ANTAQ. PNIH - Plano Nacional de Integração Hidroviária. *Agência Nacional de Transportes Aquaviários* http://web.antaq.gov.br/portalv3/PNIH.asp.
65. ANNEL. Agencia Nacional de Energia Elétrica. Sistema de Informações Geográficas do Setor Eléctrico - SIGEL. *Usinas (UTE) e pequenas centrais hidreléctricas (PCH)* https://sigel.aneel.gov.br/portal/home/ (2019).
66. MAPBIOMAS. Mapbiomas Amazonia. *Annual maps of land cover, land use and land use changes between 1985 to 2018 in the Pan-Amazon.* https://amazonia.mapbiomas.org/en (2020).
67. IBGE. Logística dos Transportes. *Instituto Brasileiro de Geografia e Estatística* https://www.ibge.gov.br/geociencias/cartas-e-mapas/redes-geograficas/15793-logistica-dos-transportes.html?=&t=downloads.
68. Venticinque, E. *et al.* An explicit GIS-based river basin framework for aquatic ecosystem conservation in the Amazon. *Earth Syst Sci Data* 651–661 https://knb.ecoinformatics.org/view/doi%3A10.5063%2FF1BG2KX8#snapp_computing.6.1 (2016).
69. Bebbington, A. J. *et al.* Opinion: Priorities for governing large-scale infrastructure in the tropics. *Proc. Natl. Acad. Sci.* **117**, 21829–21833 (2020).
70. Fearnside, P. M. Environmental and social impacts of hydroelectric dams in Brazilian Amazonia: Implications for the aluminum industry. *World Dev.* **77**, 48–65 (2016).
71. Fearnside, P. M. Impacts of Brazil's Madeira River Dams: Unlearned lessons for hydroelectric development in Amazonia. *Environ. Sci. Policy* **38**, (2014).
72. Armenteras, D., Rudas, G., Rodriguez, N., Sua, S. & Romero, M. Patterns and causes of deforestation in the Colombian Amazon. *Ecol. Indic.* **6**, 353–368 (2006).
73. Arima, E. Y., Walker, R. T., Sales, M., Souza Jr., C. & Perz, S. G. The fragmentation of space in the Amazon Basin. *Photogramm. Eng. Remote Sens.* **74**, 699–709 (2008).
74. Suárez, E., Zapata-Ríos, G., Utreras, V., Strindberg, S. & Vargas, J. Controlling access to oil roads protects forest cover, but not wildlife communities: a case study from the rainforest of Yasuní Biosphere Reserve (Ecuador). *Anim. Conserv.* **16**, 265–274 (2013).
75. Silva, D. O., Guerrero, A. F. H., Guerrero, C. H. & Toledo, L. M. de. The causality of nutrition and food insecurity of quilombola communities with the construction of the BR-163, highway, Pará, Brazil. *Rev. Nutr.* **21**, 83s--87s (2008).
76. Leal, A., de Sá, M. E. R., Nascimento, N. S. F. & de Sousa Cardoso, W. Produção mineral no estado do Pará e reflexos na (re) produção da miséria: Barcarena, Marabá e Parauapebas. *Rev. Políticas Públicas* **16**, 157–167 (2012).
77. Alves, R. J., Rocha, L. C., Pontes, A., Costa, M. & Campos, P. Estudo socioeconômico de comunidades da área do polo industrial de Barcarena, Pará, Brasil. *Enciclopédia Biosf.* **11**, (2015).
78. Barbosa, J. A. & Moreira, E. C. P. Impactos socioambientais da expansão do agronegócio da soja na região de Santarém – pa e a crise dos instrumentos de governança ambiental. *Rev. Jurídica da FA7* **14**, 73–87 (2017).
79. Andrade, R. One river and 40+ dams: The China factor in the Amazonian Tapajós waterway. in *The Political Economy of Hydropower in Southwest China and Beyond* 275–293 (Springer, 2021).
80. Bulte, E. H., Damania, R. & Lopez, R. On the gains of committing to inefficiency: corruption, deforestation and low land productivity in Latin America. *J. Environ. Econ. Manage.* **54**, 277–295 (2007).
81. Campos, N., Engel, E., Fischer, R. D. & Galetovic, A. Renegotiations and Corruption in Infrastructure: The Odebrecht Case. *SSRN Electron. J.* (2019).
82. Fogel, B. Brazil: Corruption as a Mode of Rule: Tracing the roots of corruption in Brazil from Vargas to Bolsonaro reveals a political strategy that has long been woven into the fabric of Brazilian politics. *NACLA Rep. Am.* **51**, 153–158 (2019).

83. Athayde, S., Silva-Lugo, J., Schmink, M., Kaiabi, A. & Heckenberger, M. Reconnecting art and science for sustainability: Learning from indigenous knowledge through participatory action-research in the Amazon. *Ecol. Soc.* **22**, (2017).
84. Brondízio, E. S. Agriculture intensification, economic identity, and shared invisibility in Amazonian peasantry: caboclos and colonists in comparative perspective. *Amaz. Peasant Soc. a Chang. Environ.* **26**, 181–214 (2004).
85. Cepek, M. L. *Life in oil: Cofán survival in the petroleum fields of Amazonia*. (University of Texas Press, 2018).
86. Penfield, A. Extractive pluralities: the intersection of oil wealth and informal gold mining in Venezuelan Amazonia. in *Indigenous Life Projects and Extractivism* 75–93 (Palgrave Macmillan, Cham, 2019).
87. Vadjunec, J. M., Schmink, M. & Greiner, A. L. New Amazonian geographies: emerging identities and landscapes. *J. Cult. Geogr.* **28**, 1–20 (2011).
88. RAISG. Amazonian Network of Georeferenced Socio-Environmental Information. https://www.amazoniasocioambiental.org/en/ (2020).
89. INCRA. Incra nos Estados - Informações gerais sobre os assentamentos da Reforma Agrária. https://painel.incra.gov.br/sistemas/index.php (2017).
90. Sobreiro, T. Urban-Rural livelihoods, fishing conflicts and indigenous movements in the middle Rio Negro region of the Brazilian Amazon. *Bull. Lat. Am. Res.* **34**, 53–69 (2014).
91. Perz, S. G. *et al.* Intraregional migration, direct action land reform, and new land settlements in the Brazilian Amazon. *Bull. Lat. Am. Res.* **29**, 459–476 (2010).
92. Simmons, C. *et al.* Doing it for themselves: direct action land reform in the Brazilian Amazon. *World Dev.* **38**, 429–444 (2010).
93. Tritsch, I. & Le Tourneau, F.-M. Population densities and deforestation in the Brazilian Amazon: New insights on the current human settlement patterns. *Appl. Geogr.* **76**, 163–172 (2016).
94. Peluso, D. M. & Alexiades, M. N. *Indigenous urbanization and Amazonia's post-traditional environmental economy*. *Traditional dwellings and settlements review* (JSTOR, 2005).
95. Pinedo-Vasquez, M., Zarin, D. J., Coffey, K., Padoch, C. & Rabelo, F. Post-boom logging in Amazonia. *Hum. Ecol.* **29**, 219–239 (2001).
96. Eloy, L., Brondízio, E. S. & do Pateo, R. New perspectives on mobility, urbanisation and resource management in riverine Amazônia. *Bull. Lat. Am. Res.* **34**, 3–18 (2014).
97. Sears, R. R., Padoch, C. & Pinedo-Vasquez, M. Amazon forestry tranformed: Integrating knowledge for smallholder timber managemet in eastern Brazil. *Hum. Ecol.* **35**, 697–707 (2007).
98. Brondízio, E. *The Amazon caboclo and the açai palm: forest farmers in the global market. Advances in Economic Botany* vol. 16 (The New York Botanical Garden Press, 2008).
99. Brondízio, E. S. *et al.* Small farmers and deforestation in Amazonia. in *Amazonia and Global Change* (eds. Keller, M., Bustamante, M., Gash, J. & Dias, P.) (Wiley Blackwell, 2009).
100. Pinedo-Vasquez, M. & Padoch, C. Urban, rural and in-between: Multi-sited households mobility and resource management in the Amazon flood plain. *Mobil. Migr. Indig. Amaz. Contemp. ethnoecological Perspect.* **11**, 86–96 (2009).
101. Brondízio, E. S., Siqueira, A. D., Vogt, N. & Padoch, C. Forest resources, city services: Globalization, household networks, and urbanization in the Amazon Estuary. in *The Social Lives of Forests: Past, Present, and Future of Woodland Resurgence* 348–361 (University of Chicago Press, 2011).
102. Padoch, C. *et al.* Urban forest and rural cities: multi-sited households, consumption patterns, and forest resources in Amazonia. *Ecol. Soc.* **13**, (2008).
103. Parry, L., Day, B., Amaral, S. & Peres, C. A. Drivers of rural exodus from Amazonian headwaters. *Popul. Environ.* **32**, 137–176 (2010).
104. Nasuti, S., Eloy, L., Raimbert, C. & Le Tourneau, F.-M. Can rural-urban household mobility indicate differences in resource management within Amazonian communities? *Bull. Lat. Am. Res.* **34**, 35–52 (2015).
105. Emperaire, L. *et al.* Localized production using Geographical Indications in the Amazon: the ecological stakes related to producing the cassava flour of Cruzeiro do Sul. *Cah. Agric.* **21**, 25–33 (2012).
106. Madaleno, I. Urban agriculture in Belém, Brazil. *Cities* **17**, 73–77 (2000).
107. dos Santos Pereira, H., Vinhote, M. L. A., Zingra, A. F. C. & Takeda, W. M. A multifuncionalidade da agricultura familiar no Amazonas: desafios para a inovação sustentável. *Terceira margem Amaz.* **1**, (2015).
108. Perrault-Archambault, M. & Coomes, O. T. Distribution of agrobiodiversity in home gardens along the Corrientes River, Peruvian Amazon. *Econ. Bot.* **62**, 109–126 (2008).
109. Manzi, M. & Coomes, O. T. Managing Amazonian palms for community use: a case of aguaje palm (Mauritia flexuosa) in Peru. *For. Ecol. Manage.* **257**, 510–517 (2009).
110. Coomes, O. T., Takasaki, Y., Abizaid, C. & Barham, B. L. Floodplain fisheries as natural insurance for the rural poor in tropical forest environments: evidence from Amazonia. *Fish. Manag. Ecol.* **17**, 513–521 (2010).
111. Coomes, O. T. *et al.* Farmer seed networks make a limited contribution to agriculture? Four common misconceptions. *Food Policy* **56**, 41–50 (2015).
112. Vogt, N. *et al.* Local ecological knowledge and incremental adaptation to changing flood patterns in the Amazon delta. *Sustain. Sci.* **11**, 611–623 (2016).
113. de Souza, D. O. & dos Santos Alvalá, R. C. Observational evidence of the urban heat island of Manaus City, Brazil. *Meteorol. Appl.* **21**, 186–193 (2014).
114. Fernández, F. J., Alvarez-Vázquez, L. J., García-Chan, N., Martínez, A. & Vázquez-Méndez, M. E. Optimal location of green zones in metropolitan areas to control the urban heat island. *J. Comput. Appl. Math.* **289**, 412–425 (2015).
115. Livesley, S. J., McPherson, E. G. & Calfapietra, C. The urban forest and ecosystem services: impacts on urban water, heat, and pollution cycles at the tree, street, and city scale. *J. Environ. Qual.* **45**, 119–124 (2016).
116. Mansur, A. V *et al.* An assessment of urban vulnerability in the Amazon Delta and Estuary: a multi-criterion index of flood exposure, socio-economic conditions and infrastructure. *Sustain. Sci.* **11**, 625–643 (2016).
117. Howard, J. *et al.* Total mercury loadings in sediment

from gold mining and conservation areas in Guyana. *Environ. Monit. Assess.* **179**, 555–573 (2011).
118. Bourdineaud, J.-P. *et al.* Mercurial exposure of residents of Santarém and Oriximiná cities (Pará, Brazil) through fish consumption. *Environ. Sci. Pollut. Res.* **22**, 12150–12161 (2015).
119. Webb, J., Coomes, O. T., Ross, N. & Mergler, D. Mercury concentrations in urine of amerindian populations near oil fields in the peruvian and ecuadorian amazon. *Environ. Res.* **151**, 344–350 (2016).
120. Arrifano, G. P. F. *et al.* Large-scale projects in the amazon and human exposure to mercury: The case-study of the Tucuruí Dam. *Ecotoxicol. Environ. Saf.* **147**, 299–305 (2018).
121. Irga, P. J., Burchett, M. D. & Torpy, F. R. Does urban forestry have a quantitative effect on ambient air quality in an urban environment? *Atmos. Environ.* **120**, 173–181 (2015).
122. Butt, E. W. *et al.* Large air quality and human health impacts due to Amazon forest and vegetation fires. *Environ. Res. Commun.* **2**, 95001 (2020).
123. Seguridad Justicia y Paz. *Metodología del ranking 2020 de las 50 ciudades más violentas del mundo*. (2021).
124. Global Witness. *Defending tomorrow: The climate crisis and threats against land and environmental defenders*. *URL: https://www. globalwitness. org/en/campaigns/environmental-activists/defending-tomorrow* (2020).
125. Bebbington, D. H., Verdum, R., Gamboa, C. & Bebbington, A. J. The Infrastructure-Extractives-Resource Governance Complex in the Pan-Amazon: Roll Backs and Contestations. *Eur. Rev. Lat. Am. Caribb. Stud.* 183 (2018) doi:10.32992/erlacs.10414.
126. Bebbington, D. H., Verdun, R., Gamboa, C. & Bebbington, A. J. *Impacts of extractive industry and infrastructure on forests*. *Assessment and Scoping of Extractive Industries and Infrastructure in Relation to Deforestation: Amazonia* (2018).
127. Yanai, A. M., Nogueira, E. M., de Alencastro Graça, P. M. L. & Fearnside, P. M. Deforestation and Carbon Stock Loss in Brazil's Amazonian Settlements. *Environ. Manage.* **59**, 393–409 (2017).