Amazon Assessment Report 2021

Chapter 14

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

SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK
A GLOBAL INITIATIVE FOR THE UNITED NATIONS

About the Science Panel for the Amazon (SPA)

The Science Panel for the Amazon is an unprecedented initiative convened under the auspices of the United Nations Sustainable Development Solutions Network (SDSN). The SPA is composed of over 200 preeminent scientists and researchers from the eight Amazonian countries, French Guiana, and global partners. These experts came together to debate, analyze, and assemble the accumulated knowledge of the scientific community, Indigenous peoples, and other stakeholders that live and work in the Amazon.

The Panel is inspired by the Leticia Pact for the Amazon. This is a first-of-its-kind Report which provides a comprehensive, objective, open, transparent, systematic, and rigorous scientific assessment of the state of the Amazon's ecosystems, current trends, and their implications for the long-term well-being of the region, as well as opportunities and policy relevant options for conservation and sustainable development.

 ISBN: 9781734808001

Suggested Citation

Hecht S, Schmink M, Abers R, Assad ED, Bebbington DH, Brondizio ES, Costa FA, Calisto AMD, Fearnside PM, Garrett R, Heilpern S, McGrath D, Oliveira G, Pereira HS, Pinedo-Vazquez M. 2021. Chapter 14: The Amazon in Motion: Changing Politics, Development Strategies, Peoples, Landscapes, and Livelihoods. In: Nobre C, Encalada A, Anderson E, Roca Alcazar FH, Bustamante M, Mena C, Peña-Claros M, Poveda G, Rodriguez JP, Saleska S, Trumbore S, Val AL, Villa Nova L, Abramovay R, Alencar A, Rodríguez Alzza C, Armenteras D, Artaxo P, Athayde S, Barretto Filho HT, Barlow J, Berenguer E, Bortolotto F, Costa FA, Costa MH, Cuvi N, Fearnside PM, Ferreira J, Flores BM, Frieri S, Gatti LV, Guayasamin JM, Hecht S, Hirota M, Hoorn C, Josse C, Lapola DM, Larrea C, Larrea-Alcazar DM, Lehm Ardaya Z, Malhi Y, Marengo JA, Melack J, Moraes R M, Moutinho P, Murmis MR, Neves EG, Paez B, Painter L, Ramos A, Rosero-Peña MC, Schmink M, Sist P, ter Steege H, Val P, van der Voort H, Varese M, Zapata-Ríos G (Eds). Amazon Assessment Report 2021. United Nations Sustainable Development Solutions Network, New York, USA. Available from https://www.theamazonwewant.org/spa-reports/. DOI: 10.55161/NHRC6427

INDEX

GRAPHICAL ABSTRACT **2**

KEY MESSAGES **4**

ABSTRACT 5

14.1 BIG PROCESSES AND INVISIBLE AMAZONIAN PEOPLES AND LANDSCAPES **5**

14.2 MODERNIZATION AND ITS DISCONTENTS **7**

14.2.1 DEVELOPMENT AND MODERNIZATION PARADIGM 7
14.2.2 THE MODERNIZATION IMPERATIVE AND ITS TOOLBOX: DEVELOPMENT PLANNING, PROGRAMS, AND PROCESSES 10
14.2.2.1 Resource assessment, remote sensing, and modernization: the rise of land use suitability zoning, and conservation set-asides *11*
14.2.2.2 ISI and military modernizations in the Amazon (1960-1990): Geopolitics, agro-industry and agrarian reform alternatives *11*
14.2.3 TRANSITION, CONSTITUTIONALISM AND EARLY NEOLIBERALISM 13

14.3 RECENT DEVELOPMENT AND POLITICS **16**

14.3.1 THE INFLUENCE OF POLITICAL OPENING, MOBILIZATIONS, AND ENVIRONMENTAL POLITICS, AND THE FALL AND RISE OF DEFORESTATION 16
14.3.2 OLD PATHWAYS, NEW DRIVERS 19
14.3.2.1 New circuits of globalization *19*
14.3.2.2 New Amazonian financialization *20*
14.3.2.3 Clandestine economies *22*
14.3.2.4 Infrastructure *26*
14.3.3 EXPORT DEPENDENCY & PRECARIOUS STATES 31

14.4 AMAZONIAN PEOPLE ON THE GROUND **35**

14.4.1 AMAZONIAN URBANIZATION IN ANTIQUITY 35
14.4.2 THE RURAL-URBAN CONTINUUM 37
14.4.3 LIVING AND LIVELIHOODS IN THE URBAN-RURAL MATRIX 38
14.4.4 URBAN ENVIRONMENTAL ISSUES 41
14.4.5 MIGRATION: FORMAL, PRIVATE, AND SPONTANEOUS 42
14.4.6 SOCIAL MOVEMENTS, DEVELOPMENT PARADIGMS, AND GOVERNANCE 43

14.5 CONCLUSIONS **47**

14.6 RECOMMENDATIONS **50**

14.7 REFERENCES **52**

Graphical Abstract

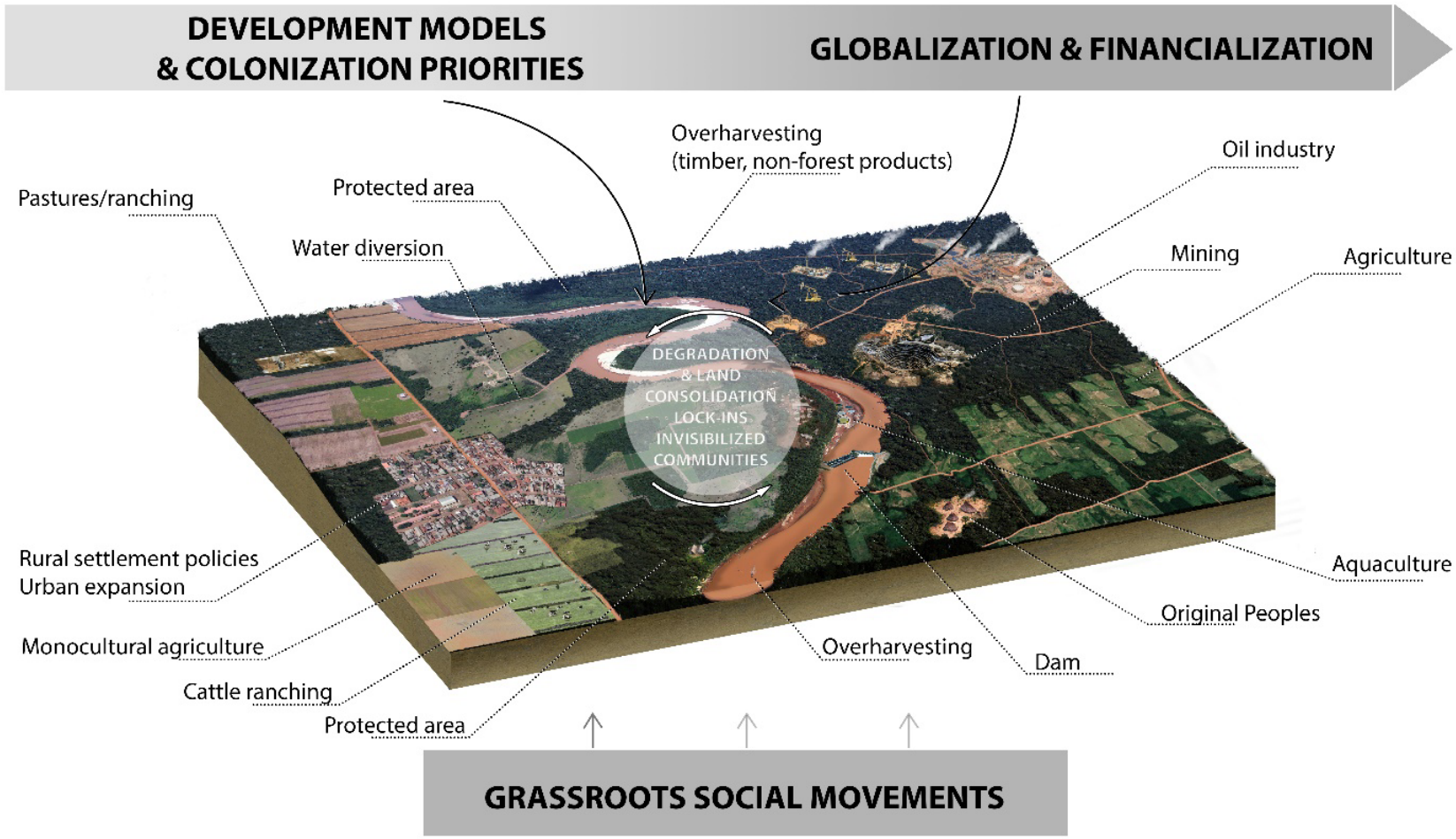

Figure 14.A Amazonian landscapes are shaped by development policies, globalization, financialization, and grassroots social movements

The Amazon in Motion: Changing Politics, Development Strategies, Peoples, Landscapes, and Livelihoods

Susanna Hecht[1], Marianne Schmink[2]*, Rebecca Abers[3], Eduardo Assad[4], Denise Humphreys Bebbington[5], Eduardo Brondizio[6], Francisco Costa[7], Ana María Durán Calisto[8], Philip Fearnside[9], Rachael Garrett[10], Sebastian Heilpern[11], David McGrath[12], Gustavo Oliveira[13], Henrique Pereira[14], Miguel Pinedo-Vazquez[15]*

Key Messages

- 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, social and cultural diversity, 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, rising inequality, expanding environmental concerns, and planetary change.
- Modernization policies and large-scale regional planning initially unfolded under mostly authoritarian Pan-Amazonian regimes, emphasizing national integration and Cold War politics. This stimulated early infrastructure investment (1960s) and state, informal, 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.
- The idea of "modernization" emphasized deep structural change supported by an understanding of nature, and especially forests, as inert platforms, obstacles to development, evidence of backwardness, and largely lacking in value. This was the basis for development policies and planning in the Amazon, approaches that were largely indifferent to its ecologies, and perceived the Amazon as a demographic void.
- 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

[1] University of California Los Angeles, USA, Luskin School of Public Policy, and Graduate Institute for International Development Studies, Geneva, Switzerland, sbhecht@ucla.edu
[2] University of Florida, Center for Latin American Studies, USA, schmink@latam.ufl.edu
[3] University of Brasília, Political Science Department, Brazil
[4] Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), São Paulo, Brazil
[5] Clark University, Department of International Development, Community and Environment Massachusetts, USA
[6] Indiana University Bloomington, Department of Anthropology, USA
[7] Federal University of Pará, Centre for High Amazonian Studies and Postgraduate Program in Economics, Brazil
[8] Yale School of Architecture, New Haven, CT and Estudio A0, Quito, Ecuador
[9] National Institute for Research in Amazonia (INPA), Department of Environmental Dynamics, Manaus, Amazonas, Brazil
[10] ETH Zurich University, Switzerland
[11] Cornell University, Cornell NY, USA
[12] Earth Innovation Institute, San Francisco, CA, and Graduate Program on Society, Nature and Development of the Federal University of Western Pará, Brazil
[13] University of California, Global and International Studies, Irvine, USA
[14] Federal University of Amazonas (UFAM), Agricultural Ecology, Brazil
[15] Columbia University, Earth Institute, New York, USA; Earth Innovation Instituto (EII), San Francisco, USA; and Universidad Intercultural de la Amazonia (UNIA), Pucallpa, Peru

increasingly dominated by simplified monocultural systems, and mineral, hydrocarbon, and timber extraction, largely export-oriented.

- 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 including state transfers and intra-family remittances underlie strong rural-urban interactions and widespread dependence on forests and rivers in the Amazon.
- Erratic public policy, limited technical support, uncertain tenure, and violence, combined with the volatility of small farm prices, have contributed to the emergence of multiple forms of clandestine economies. Rural instabilities and contested land rights have also been instrumental in fueling migration throughout the region.
- The insights and interests of local people, both urban and rural, native and migrant, are often overlooked. But these groups are generating alternative approaches to manage and restore landscapes, giving rise to new marketing systems and forms of governance. These systems can serve as models for a necessary shift in the approach to and practices of sustainable development in the Amazon.

Abstract

This chapter reviews the often-invisible, powerful processes that drive social and ecological change in the Amazon, and the diverse peoples who inhabit its landscapes. It explores the large-scale development ideologies of modernization, and the policy tools that were deployed to carry them out. Outlining general periods of macro policy shifts, it shows the evolution of the framework for today's complex interactions between large-scale agroindustry, mining, and hydrocarbons; diverse small-scale livelihoods; the clandestine and illicit economies of land grabbing, gold, coca and timber; and their operation in globalized and regional economies. While Pan-Amazonian governments have oscillated between authoritarian and more or less democratic forms of governance since the mid-20th century, more democratic transformations and trade have led to interactions among a wide array of new civil society actors; including non-governmental organizations (NGOs), social movements, rural syndicates, and urban social movements; and powerful actors such as national and international technical, financial, and corporate groups and international conservation organizations. New international sources of funding expanded well beyond multilateral or traditional bilateral aid; this includes financing from China and hedge funds, and new forms of both informal and corporate production lending. Integration into numerous globalized markets and finance have had enormous effects on Amazonian politics and economies at all scales. These dynamics have generated new kinds of policies, political framings, institutions, and economies, and restructured old ones; reshaped forms of urbanization, settlements, and land regimes; and stimulated extensive and controversial infrastructure development. On the ground, diverse Amazonian peoples have largely suffered the impacts of these processes, and have continued to adapt to changing circumstances while fighting to advance their own proposals for alternative forms of Amazon conservation and development.

Keywords: Development policy, globalization, urbanization, settlement, clandestine economy, deforestation, roads, dams, social movements

14.1 Big Processes and Invisible Amazonian Peoples and Landscapes

Far from being a homogenous forested river basin, the Amazon is home to diverse peoples and landscapes, often hidden from the outside perspective that tends to see the region as a vast forest devoid of human inhabitants. People on the ground make livings from the forests, rivers, lakes, wildlife, trees, crops and livestock they pro-

duce after clearing the forest, and minerals and oil they dig from under the ground. They also have urban livelihoods and depend on a variety of kin and state support networks. They live in ranches, farms, logging and mining camps, large project labor depots, Indigenous territories, and villages – but mostly in the region's cities and towns, invisible in the public's imagination of the Amazon as an untouched forest. Meanwhile, politicians, businesses, environmentalists, researchers, and financiers exert their influence over the region and extract its wealth, remaining hidden from sight in cities and countries far removed from the forest itself. Unnoticed, Amazonian people's ways of living, the places they live, and their quality of life have been transformed, swept up in nation-building projects and global development and processes of planetary change in recent decades.

Powerful outside forces and their results interact in complicated ways with the complex circumstances in each different corner of the Amazon, where particular histories and landscapes have evolved over millennia. This chapter sheds light on the major ideas, actors, and practices that have shaped its current dynamics to bring into better focus Amazonian people, how and where they live, and how that is changing under the impact of globalization, large-scale deforestation, land degradation, agro-toxics and mercury pollution, massive fires and rapid urbanization, accelerating and often erratic change regional politics, and planetary change. The chapter clarifies what forces and actors turned the Amazon into a place in crisis in terms of climate, species extinctions, and development inequalities and contradictions.

We begin the chapter by discussing the ideas of development and the politics that from the 1940s to the end of the 1980s actively shaped theoretical and political approaches to Amazonian transformation (Section 14.2). Subsection 14.2.1 introduces theories of development and modernization that have shaped recent Amazonian history in the context of the Cold War, the Amazon's emergent properties and large processes, and problems which remain "off the radar" (i.e., poorly studied and somewhat invisible) but which are major features of the Amazon's socio-economic and socio-environmental dynamics. Section 14.2.2 focuses on large-scale development policy approaches that have changed Amazonian regional economies since the 1960s and large-scale infrastructure programs that structure the current development trajectory. They establish the preconditions for the economic, ecological, and social dynamics that have shaped new and continuing processes of settlement, urbanization, infrastructure, state expansion, globalization, new forms of investment and finance, and rising social movements.

Section 14.3 deals with more recent dynamics evolving since the 1990s. The structure of regional economies in different parts of the Amazon varies a great deal, as will be discussed later in this chapter, and in Chapters 15, 17, and 18. What most country data suggest, however, is that there have been significant structural changes in agricultural and regional economies since the accelerated integration of the Amazon into regional, national, and global economies. These reflect the privatization of public lands and expropriation of commons; deforestation of protected areas and the lands of Indigenous peoples and local communities, and displacements by large scale infrastructure development, as will be discussed in Section 14.3.1. While human development indices have improved in many areas (e.g., schooling, access to water and health care) through the extension of national programs and basic income programs, such as Bolsa Familia, inequality has also increased (Richards and VanWey 2015; Guedes *et al.* 2012; Torras 2019), a situation brought to the fore during the COVID-19 pandemic.

Differing national contexts and politics reflect a wider role of the Amazon and its commodities in planetary politics and national economies. To understand this, Sections 14.3.2 and 14.3.3 focus on emergent drivers, such as new forms of globalization, new types of financing for projects and commodities, new kinds of export dependency, and clandestine economies, highlighting the hidden

properties that are inherent in the current transformations (Box 14.1). We also discuss urbanization, settlement patterns, and infrastructure development as emergent processes, both as new drivers and outcomes of change. We end in Section 14.3.4 with a discussion of changing patterns of urbanization and settlement, the complex livelihood systems Amazonian people have developed in response to the massive transformations underway in the region, and the social movements these people have organized to push back against current conservation and development policies to propose promising alternative paradigms for Amazonian governance and sustainability.

14.2 Modernization and its Discontents

14.2.1 Development and modernization paradigm

The Amazon, like much of the tropical world in the 1950s, was the object of "meta" thinking about development. The post-World War II (WWII) world seemed malleable to transformation from its existing systems of wealth and poverty into the modern world. The idea of "development" or, as a more colonial idiom had it, "improvement," as applied to the tropical world, implied a transformation via "modernization," meaning a pathway from underdeveloped or traditional societies towards a uniform kind of modernity, characterized as essentially urban, industrial, largely secular, and organized by laws, institutions, and markets based largely on those of the North Atlantic World. This paradigm required modern bureaucratic states framed by nationalist identity rather than colonial administrations or societies structured by bonds of kinship, identity, patronage, or tradition, and many policies were put into place to disrupt them. Modernization was also seen as a mechanism to counter the unevenness of regional economies within nations, since the sleek modernism of Latin America's urban capitals was regularly contrasted with imagery of depressing poverty in its rural societies (Albuquerque 1999; Buckley 2017).

The modernization paradigm involved a shift from relatively non-capitalist, mercantile or traditional forms of society and institutions into modern economic, social, and political structures: non-waged labor to waged and monetized forms; emphasis on private property regimes and institutions over collective property; shifts in structures and economic "engines" from rural to urban; cultural change in terms of individualization, secularization, and new values and forms of consumption; monetization and privatization of what had been collective resources; and finally, industrialization. This modernization process depended on strong state intervention in the economy and many other social structures.

At least until the early 1990s this modernization paradigm was seen as the dominant way that the issues of so-called Third World poverty, understood to be expressions of underdevelopment, could be resolved through the powers of technocratic science and planning (Rostow 1971). Regional inequalities and poverty could be overcome by constructive means through accelerating economic growth and structural change. These would be part of *national projects* rather than colonial programs, with revenues accruing to national coffers rather than foreign metropoles, thus developing state capacity, institutions, and the economy, and moving beyond natural resource dependency as central economic drivers. This narrative, put simply, was countered by "Dependency" theorists in the 1960s, who argued that peripheral areas were sites of systematic extraction of resources, goods, and wealth to major economic centers (metropoles) (Frank 1966; Bresser-Pereira 2011; Cardoso and Faletto 2021). This framing has reemerged, and now forms part of the discussions about development in the idioms of extractivism, which we discuss further on.

Box 14.1 The hidden (and not so hidden) processes of Amazonian transformation

Invisibilities

One central problem in understanding the Amazon is that of invisibilities. These include invisibilities associated with socio-economic systems: illicit economies (timber, gold, and coca; and land grabbing) whose economic values, social, and environmental costs are enormous; and invisibilities associated with informal economies (in-kind exchanges in informal markets); the use and subsistence value of forests and rivers to local populations; the large scale flows of populations as they travel in daily, periodic, and seasonal movements in the shaping of their livelihoods, especially given the high degree of insecurity that prevails in Amazonian livelihoods; and the invisibilities of the costs of many population displacements associated with enclosures, land seizures, infrastructure development, and violence (Fearnside 2006, 2014; Jaichand and Sampaio 2013; Bratman 2014; Atkins 2017; Ioris 2017; Randell 2017; Calvi *et al*. 2020). Also invisible are the ecological and social costs of corruption, resource theft, and speculation, and the costs of the losses of cultural diversity, knowledge systems, and value systems that have been central to maintaining ecosystems integrity and livelihoods.

Informal institutions, "tradition," and access and tenurial regimes also operate in ways that are often invisible to outsiders but obvious and trenchant in the operation of daily lives. "New" social mapping is now being used to reveal forms of urban dependencies on ecological resources and territories (UEA 2010; de Almeida *et al*. 2019). Among the most dramatic of these has been the emergence of the importance and extent of *Quilombola* settlements (see Chapter 13), both urban and rural (refuge territories whose existence was largely unnoticed by most development agencies until the turn of the 21st century). Other ubiquitous, but largely invisible populations are the "*caboclo*" river dwellers, lake-side dwellers and fisherman, forest collectors, and swidden cultivators (Harris and Nugent 2004; Brondizio 2009; Silva 2009). About 25% of Indigenous populations are at least part-time urban residents (Alexiades 2009; Eloy and Lasmar 2011; Alexiades and Peluso 2015; Campbell 2015a,b; Nasuti *et al*. 2015; Sobreiro 2014) relying on urban access for markets, communication, education, healthcare, and political organization, in sharp contrast to the uniquely forest-based images of Indigenous people.

Other invisibilities are related to environmental impacts, including the environmental consequences of Amazonian land use transformations such as hydro-bio-climatic changes (discussed in Chapters 19-24), and regional, national, and global impacts such as changing rainfall patterns and increased local temperatures. The shift in some areas of the Amazon turning into CO_2 emitters versus carbon sinks (Gatti *et al*. 2021), and the methane release associated with hydrocarbon extraction are serious cumulative unseen impacts, while increased ecological fragmentation and enhanced vulnerabilities to fires also change landscapes for many species whose declining numbers go unnoticed. New forms of pollution associated with agro-toxics linked to large scale monocultures, and mercury and arsenic pollution associated with gold mining, contaminate Amazonian waters and bioaccumulate through the food chain.

Subsidy from nature

Another less visible factor is the importance of the "subsidy from nature." Like fish, forest products are freely collected in support of both rural and urban livelihoods. In many cases, this "no cost" subsidy

for smallholders involves extensive resource management, knowledge, and labor inputs into the reproduction of the resource. The subsidy provided by free goods amounts to about a third of people's income, a result that for small-scale forest collectors is remarkably widespread. This means that typical ways of looking at rural and urban livelihoods often overlook the importance of collected goods in the economic portfolio.

The "subsidy from nature" also applies to externalities, through the simple extraction of value from nature with no attention to replacement costs, mediation, or remediation of environmental and social effects, or of impacts on ecosystem trajectories at local, regional, and planetary scales. For example, a natural product that was destructively harvested, such as commercial logging with no remediation or replanting, involves capturing and monetizing a resource embedded in ecological processes, incarnated in wood, without incurring any costs relating to the reproduction of the resource. In complex systems like the Amazon, while there were costs of logging (roads, trucks, labor), the timber resource itself - the main source of value - is often collected at little to no cost to loggers, or through corrupt capture of concessions, in contrast to other kinds of forestry and land-use systems where there are management costs that accrue to the profiter. Another key example is monocrop replacement of complex forests, collapsing their conditions and systems of recuperation, destroying their capacity to provide environmental services, and changing hydraulic, climatic, and ecological regimes (Coe *et al*. 2013; Laurance *et al*. 2018; Lovejoy and Nobre 2018). In this case, both the costs of "producing" an ecosystem product - say a mahogany tree - and the impacts of the externalities associated with its extraction increase system vulnerabilities, cause loss of resilience, and drive the loss of ecosystem services that are priced at zero. Social dislocations and conflicts also are not part of the calculus.

Path Dependency

Path dependency is the *dependence* of economic outcomes on the *path* of previous actions rather than decisions focused uniquely on current conditions. With path dependency, "history matters" and has an enduring influence on economies, livelihoods, institutions, and politics, reflecting choices made at one time that affect the conditions and possibilities available at a future time. Path dependence involves embedded institutional, political, and economic commitments to a particular technological regime, or in the case of the Pan-Amazon, particular technological landscapes, with considerable barriers to "switching regimes." For ecological and environmental reasons, such landscapes may involve not just political or technical regimes, but may produce what might be called "quasi-irreversibility" because ecological change can undermine ecosystem functionality and resilience once the forests are gone. These changes can be revealed in deflection of successional pathways of vegetation, soil toxins that limit re-establishment of local species, soil compaction, and the impacts of ecosystem fragmentation, local extinctions, and microclimate barriers to recuperation, to mention just a few. These can produce degraded lands that are usually very expensive to recover, and provide the background of scrubby brush visible next to every roadway in the Amazon (Laurance *et al*. 2002, 2018). These ecological changes can align with political blockages or institutional barriers that limit the capacity to support more resilient and/or complex social or ecological states. Land-use decisions and practices can preclude other options and development paths because they are so transformative of the natural base of production and/or the institutionalities that support them, or the people involved with them.

14.2.2 The modernization imperative and its toolbox: Development planning, programs, and processes

Putting this modernization vision into practice involved an array of instruments that had worked in rebuilding Europe via the Marshall Plan, and for poverty alleviation in the United States via The Tennessee Valley Authority (TVA) and New Deal, which very specifically focused on natural resource zoning and hydropower development (Miller and Reidinger 1998; Ekbladh 2002; Ekbladh 2011; McMahon *et al*. 2017). This fit well with both authoritarian and civil governments in the region because of the luster of technocratic approaches compared to the more personalist trajectories that had characterized the first half of the 20th century (Burns *et al*. 1979; Skidmore 1986). Large-scale plans promulgated throughout the Andean and Brazilian Amazon mimicked the more general five-year planning models of Europe and the Communist bloc. Bureaucratic states would expand their territorial powers, with the Amazon a development planning "laboratory" along capitalist lines, and a bulwark against communism, a key concern in the Cold War period (Klein and Luna 2016).

The forms of intervention involved the coordination of banking, investment, and infrastructure through regional planning agencies that would override coteries in favor of national project and national political control. These regional frameworks would provide a kind of geographical coherence to the development enterprise and remove control from local actors and their patronage circles (León *et al*. 2015; Sudério 2020). A second important strategy was "growth poles," inspired by the ideas of French economist Henri Perroux; these were sites for specialized investment and supporting infrastructure in the Amazon, accompanied by development corridors between specific poles and regions (Perroux 1955; Mønsted 1974; Hite 2004). Scientific assessment of natural resources and land suitability served as guiding mechanisms in the development of resource and land capability zoning inspired by the large-scale resource planning of the TVA. Targeted social investment (agro-industrial and mining development, and later agrarian reform or its kindred programs) would be used to ameliorate uneven development, and state-legitimating social programs such as agrarian reform efforts.

Facing the Amazon, regional and military planners focused on the idea of national integration as the first step of what would become a larger concern with river basin planning. Brazilian military and US planners dreamed of transforming the Amazon through a kind of tropical TVA (Hecht and Rajão 2020; Garfield 2013; Buckley 2017). The integration of the TVA approach with its basin-wide scale and organizing, and centralized management agencies for regional growth poles, became the model for much of the river-basin planning in Latin America. This is best exemplified by Cuidad Guyana and the huge Macagua Dam in Venezuela, and broadly inspirational for tropical planning and agricultural development more generally, as in Bolivia with the planning agency Cordecruz, in Colombia with the Corporación Araraquara, and in Ecuador and Peru. In Brazil, the powerful agency SUDAM (Superintendência do Desenvolvimento da Amazônia), in many ways the model for the rest of the Pan-Amazon, was the coordinating agency.

In these modernization approaches, the ecosystem was simply classified as natural resources; a platform on which the development visions of modernity were gridded out. Ecological simplicity was created through land transformation, as diverse ecological and livelihood systems, mostly illegible to the state and outsiders, were mapped into large scale grids and planning spaces to be occupied by ranching and colonist monocultures. This kind of modification depended on what anthropologist James Scott has called the "drive for legibility" by authoritarian modernist states (Scott 1998).

The technocratic strategy also involved resource assessment for new development planning. While there had been some cartographic endeavors dur

ing WWII by US and Brazilian aircraft, the scale and frequent cloud cover required a different technology, one which, in the end, would become the main means through which the Amazon was apprehended by the states that claimed its territories. This new technology of remote sensing, which began with *Projeto RADAM* in Brazil and culminated in reports in the early 1970s, represented a fundamental shift in Amazonian studies and resource assessment via remote sensing, a central technological change whose impact is apparent throughout this report. In many ways, *Projeto RADAM* was foundational for understanding the scale of the Amazon.

14.2.2.1 Resource assessment, remote sensing, and modernization: the rise of land use suitability zoning, and conservation set-asides

Environmental degradation was of limited relevance in modernization discourse, and was more or less perceived as a technology problem, related to issues of efficiency, regional planning, and a few remote National Parks. Resource assessments, such as *Projeto RADAM* (1972), were carried out to provide a comprehensive survey, largely focused on minerals, soils, and forest types, and to examine the physical geography in order to upgrade the regional cartography of resources and boundaries (Herrera Celemin 1975) and to orient development enterprises. Remote sensing was employed by the Brazilian military government as a strategic input to national integration, and also followed TVA practices. The rich information provided set the stage for massive remote sensing initiatives upon which all Amazonian countries embarked (and have come to depend), especially when satellite remote sensing and computational capacities expanded. These produced the development of national remote sensing and land-use change monitoring laboratories such as Brazil's world-class INPE (National Institute for Space Research) and the Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA) that was instrumental in deciphering the dynamics of the Amazonian climate (Nobre *et al*. 2009). Remote sensing, and the models developed from satellite data, have become key in understanding the spatial dynamics of land-use change and its implications (e.g., fragmentation, carbon dynamics). Powerful remote sensing and computational technologies meant that significant analyses could take place remotely, with some ground truthing, displacing what had previously been the *sine qua non* of Amazonian research: fieldwork. While many scholars continued to explore the Amazon from the ground up, and continued to contribute to understanding of the historical importance of people's co-evolution with Amazonian natural systems, much of the environmental research continued to focus on "pristine" Amazonian nature, without humans.

Remote sensing projects like *Projeto RADAM* were unable to capture many aspects of human occupation, especially those of Indigenous peoples and local communities (IPLCs), whose livelihood was based on trees, tubers, bushmeat, and fish, until much later in the development of remote sensing technologies. The images of a vast agglomeration of resources and an unlimited forest underscored the idea of a demographic void and, fundamentally, of an experimental space that could be transformed into something more scientific, uniform, and ordered, according to a centralized vision (Silva 1957, 1967, 2003; da Costa Freitas 2004). This dynamic set into play a continuing contest for control of regional resources between existing populations, the state, and immigrants; and new regional aspirations by local inhabitants through claims for land, rights, and citizenship; along with the ambitions of more distant coteries.

14.2.2.2 ISI and military modernizations in the Amazon (1960-1990): Geopolitics, agro-industry and agrarian reform alternatives

Import Substitution Industrialization (ISI) was the main meta-policy framing for much of the

mid- century period in the Pan-Amazon.[1] The initial phase, exemplified by Brazilian president Kubitschek's promise to modernize "50 years in five," included the first major Amazon infrastructure project, the Belém-Brasilia highway, built between 1958-60. This became the prototype for the Trans-Amazon highway which was also part of the system of "highways of integration" that formed part of strategic plans elaborated by the military. These infrastructure ambitions continued after the period of military rule in Brazil (1964-1985), when the focus shifted from national integration to the integration of the Amazon into large-scale export corridors, as we discuss further on.

Military developmentalism unfolded in a series of five-year plans across the Brazilian Amazon, stressed integration through road building, supported large-scale rural enterprises (especially minerals and ranching, with significant subsidies), ramped up the technical and scientific institutions for agriculture and tropical research (Dalmarco *et al*. 2015; Klein and Luna 2018), developed growth poles and instruments for regional development coordination, and provided significant but also erratic credit lines for regional occupation, a highly subsidized export assembly, and a duty-free hub in Manaus (Kanai 2014; Wilson *et al*. 2015). For reasons of legitimation, regional food supply, and geopolitical occupation, and also to deflect the demands for agrarian reform, significant colonization projects were implemented in Brazil, Peru, Colombia, Ecuador, and Bolivia, engaging state-run, private, and spontaneous colonization, which we expand on later (Brazil 1976; Barbira-Scazzocchio 1980; Becker 1982; Kohlhepp 2001; Jepson 2006a,b; Intrator 2011). Supported by bilateral international funding from Europe and the US, and multinational funding, the early interventions development process also produced extensive deforestation, environmental degradation, human rights abuses, and invasion of Indigenous peoples and local communities' lands, as the Brazilian Amazon exploded into land conflicts (Almeida 1992; Hecht and Cockburn 1989; Schmink 1982; Schmink and Wood 1992; Jepson 2006a; Osorio 1992; Fearnside 1986). This period, from the mid-1960s until the 1990s (a generation), evolved with minimal environmental regulation and enforcement of the few laws there were.

Migrant colonist agricultural systems, in general initially based on rice production, were also problematic, plagued by production and marketing problems, labor issues, and agronomic failure, with real problems of soil nutrient decline and low yields, using varieties and practices not adapted to local conditions, largely as a function of faulty extension and unadapted practices. These issues were exacerbated by titling insecurities, rural violence, very high colonist attrition rates, and high turnover (Hall 2000; Murphy 2001; Etter *et al*. 2008; Fearnside 2009; Pacheco 2009; Acker 2014; Carrero *et al*. 2020; Yanai *et al*. 2017).

Large-scale deforestation was increasingly becoming an international issue throughout Amazonian terrains from the 1970s forward, as scientific literatures explored in greater detail the dynamics of standing forests, and the local, regional, and, increasingly, planetary level consequences of forest clearing. This linking of social issues with environmental concerns became increasingly acute

[1] Evolving from a critique of natural resource exports which we discussed earlier, it was argued that such economies condemned countries to a skewed role in the international division of labor and underdevelopment. ISI promoted policies that were meant to expand the national industrial base through four main stages: (1) domestic production of previously imported, simple, nondurable consumer goods; (2) the extension of domestic production to a wider range of consumer durables and more complex manufactured products; (3) the export of manufactured goods and continued industrial diversification as part of a modernization strategy; and 4) modernization of agriculture to free up labor for emerging industrial sectors. A range of policies around fiscal incentives, floating currency rates, and new infrastructure that favored industries and sectors guided by growth poles would drive the economy and its linkages forward, shifting development from its heavy emphasis on natural resources and international markets, to industrialized goods for local consumption, and manufactures in its export mix.

and internationalized in the controversies associated with the development of Brazil's *Polonoroeste* program, the paving of the Cuiaba-Porto Velho highway (BR-365), continuing problems with the Transamazon highway, and in Ecuador, Peru, and Bolivia's active colonization zones (Well 1980; Eastwood and Pollard 1985; Santos-Granero and Barclay 1998, 2000; Barbieri *et al*. 2009; Pinto-Ledezma and Mamani 2014; Orta 2015). These controversies allied international environmental and human rights groups with national groups and movements. Coinciding with urban industrial unrest, corruption within the military, distress over torture and political killings, and the clamor for democracy, these movements eventually led to the fall of authoritarian regimes and spread of democratic governments (Luciak 2001; Hagopian and Mainwaring 2005; Hecht *et al*. 2006; Zimmerer 2006; Hochstetler and Keck 2007). Military developmentalism in the Pan-Amazon had many different variations, but similarities included ideas of territorial integration and/or occupation via early infrastructure development, large-scale transfers of public land to private owners (discussed in Chapter 15), promotion of colonization programs, support to leading sector(s) (oil, mines, sugar, livestock), Cold War politics, and supporting massive land-use changes and highly conflictual regional processes of territorial expropriation and local repression (Alvarez-Berrios *et al*. 2013; Bebbington 1993; Brondizio *et al*. 2009; Andersson and Gibson 2007; Arrueta Rodríguez 1994; Assies 2002; Blanes Jiménez and Flores Céspedes 1983; Bottos 2008). In most cases the environmental problems, human rights abuses, and other forms of repression and serious corruption problems stimulated national mobilization and alliances with other parts of civil society, including labor unions, urban social movements, and national and international environmental organizations, and were instrumental in the region's rise to democracy and the writing of new constitutions (Hecht and Cockburn 1989; Schmink and Wood 1992; Kingstone and Power 2000; Hagopian and Mainwaring 2005; Hochstetler and Keck 2007).

There was also military environmentalism, as far as it went. Generally indifferent to deforestation *per se*, the Brazilian military regime was sensitive to international pressure, and to the issues raised by rising conditionality in international loans starting in the mid-1980s, that raised concerns about human rights, Indigenous territorial rights, traditional people's resource rights, species extinction, and climate change. In part this was reflected in the creation of National Parks during the 1970s, so that until the early 2000s and the new presidential administration, the military period had been considered the golden age of Amazonian National Park creation (Foresta 1991; Padua and Quintao 1982). Indigenous lands also had to be demarcated, although at a leisurely pace, in order to diminish concerns about human rights abuses during the period of military developmentalism.

Our review of the political economies of the 20th century and political ecologies of different Amazon interventions helps us understand what we might call "Amazon Ascendency" (Box 14.2), or how a region that had been seen as a backwater became a crucial economic presence in national accounts, and increasingly a driver of national social, economic, and environmental policy issues beyond gross domestic product (GDP). New concerns with legitimacy, social inequalities, and uneven patterns of development could be attenuated by intervening with Amazonian programs of multiple types, paving the way for both large and small-scale producers.

14.2.3 Transition, constitutionalism and early neoliberalism

The late 1980s are often used as a marker of the shift from authoritarian to nominally democratic politics and regimes in Latin America, although modernization ideas did not actually recede. Instead, approaches were augmented by new scientific framings of environment, history, ethnography, and social movements that challenged the technocratic orientation and planning models

Box 14.2 Amazon ascendency: Complex shifts in Amazonian resource conservation

The late 20th century Amazon was seen as a solution or resolution to several kinds of national problems with international implications. These included 1) national integration; 2) geopolitical concerns over boundaries; 3) problems of political insurgencies, whether real or imagined; 4) issues relating to Indigenous populations in ways that nominally satisfied international observers; 5) political potential for economic gains and exploratory resources; 6) agrarian issues without engaging structural reform in other, more politically delicate, regions, and where reform was vigorously resisted by national elites; 7) a means of "modernizing traditional agriculture" in new spatial contexts that would not antagonize landed oligarchs, a critical element of national political alliances and important to development agencies; 8) the elaboration of technologies that would fuel the agro-industrial sectors of economies via innovations in soy/corn rotations, new pasture grasses ,and the introduction of oil palm; and 9) rhetorical and actual environmental policies and institutional development that was of special interest to trading partners, multilateral organizations, and bilateral funders.

We can perhaps summarize aspects of these shifts in the following points that evolved in the post-authoritarian period, in terms of conservation, development approaches, and regulations. There were, as part of this process of economic change and increasing national engagement in civil societies, a series of other shifts which, although contested, suggested a new form of politics. These can be summarized as "Epistemic Shifts" in institutional development at the level of the states, and new market dynamics. These also produced emergent properties and new drivers that now shape the Amazon.

Epistemic shifts

1. In a profound change from the set-aside conservation model, inhabited landscapes were recognized as having conservation value as well as economic value, and their stewards deserved rights and recognition, substantively changing land rights for Indigenous peoples and local communities (Simmons *et al.* 2010; Fontana and Grugel 2016; BenYishay *et al.* 2017; Bebbington *et al.* 2018a). These rights are currently under attack almost everywhere in the Amazon.
2. Agroecological and socioecological critiques of monoculture agriculture and livestock development models have been accompanied by the rise of agroecological experiments and sustainable alternatives as a response to externalities, and to enhance the subsidy from nature and support of environmental services. There is a substantial literature on this, as evidenced in the bibliography.
3. Nature has standing and legal rights, at least at the level of rhetoric. The *Pachamama* Earth mother has legal standing in the constitutions of Ecuador and Bolivia. A river has rights in Colombia. This incorporation of respect and rights for nature represents at least an ideological counterweight to the view of nature as a mere commodity.
4. Traditional tenurial regimes and territories become legally and constitutionally-recognized through historical rights and ancestral use (i.e., Afro-descendant *quilombos*, *Palenque* or Maroon lands; traditional and extractive reserves). These also ratified Indigenous rights and autonomy. Again, these rights are under informal attack via land grabbing and formal legislative threat.
5. The Amazon was increasingly recognized as a "socio-environment" constructed through people's historical geo-biotic transformations of forests and soils, and engineering works, based on archeological, ethnographic, and historical research (Balée 1998; Fausto and Heckenberger 2007; Heckenberger *et al.* 2007; Parssinen *et al.* 2009; Clement *et al.* 2015; Athayde *et al.* 2017; Watling *et*

al. 2017; de Souza *et al.* 2018; Levis *et al.* 2018; Maezumi *et al.* 2018). These were analyzed with current enthographies and provide an alternative source of technologies for longer term ecosystem and social resilience in the current moment, and a kind of epistemological bridge to the future.

Legislative, regulatory, and analytic/technology regimes emerged as States evolved systems for environmental management

1. New ministries were created in all Pan-Amazonian countries, allied to ideas of sustainability and resilience and with new regulatory powers. Existing ministries (such as those in agriculture) took on expanded environmental portfolios.
2. Environmental legislation expanded, and Pan-Amazonian countries were integrated into international environmental agreements at national and local jurisdictional levels (Paris Climate Agreement 2015, Aichi 2017).
3. National "socio-environmental" politics, in Brazil and elsewhere, created insights into pathways and strategies for controlling deforestation. This included enhanced international support for alternative development models (Amazon Pilot project) and other sustainable research and practices which also ramified through regional research institutions. It included active demarcation of protected areas of all kinds, including inhabited forests. Moratoria on products from newly deforested areas were enacted, community organizations of many kinds were supported, credit black outs were applied in illegally deforested areas, state regulatory agencies were given support and funded, and real time monitoring and assessment, including fines and sanctions for illegal deforestation, occurred. This alignment of actions at all levels provided an unusual constraint on illegal clearing. Other processes were also at play, including low commodity prices, and producers' regulatory flight (leakage) to the Cerrado, Bolivia, and the Chaco.
4. Enhanced deforestation and land use monitoring, as well as land use modeling scenarios, emerged and provided powerful new scientific, policy, and regulatory tools.
5. New technologies for land demarcation, such as CAR (Brazilian Cadaster of Rural Areas), social mapping, and validation of historical claims were used to mediate and regularize land claims (Oliveira and Hecht 2016; Arima *et al*. 2014; Azevedo *et al*. 2017; Oliveira 2013). However, this geolocated land system required access to GIS systems that might not be available to many rural people, and increasingly these systems have been used to regularize illegal holdings (Ferrante *et al*. 2021).

Emergent Market Dynamics

1. Increased integration into global markets, especially China and the EU, for non-traditional Amazonian commodities (e.g., soy, Palm oil) and timber, gold, and beef. This accompanied a decline in US trade (formerly the Pan-Amazon's main trading partner). Strong international demand has increased, making the Amazonian agroindustry one of the largest sources of foreign exchange.
2. Expansion of clandestine markets, one of the main regional economic activities. Clandestine markets are an important source of both seasonal and continuous employment.
3. Expansion of green and fair-trade markets (e.g. *Açai, cacau/cacao*, rubber, Brazil nuts) has been important for valorizing native Amazonian crops and the populations that know how to produce them best. Increasingly, these products are branded (e.g., the "superfoods" maca and guarana) and move into global niche markets which show continuing growth potential, as do markets for basic food stuffs for Amazonian towns and cities.

4. Certification schemes have been important as marketing devices for food products, but problems of corruption remain, especially with timber (Clark and Kozar 2011; VanWey and Richards 2014; Brancalion *et al*. 2018).
5. Expanded demand for fast-growing timber from small farms (Sears *et al*. 2018).
6. Leakage of large-scale producers into less-regulated forested systems triggered significant deforestation in non-Amazonian forests (Meyfroidt *et al*. 2020).

that had dominated Amazonian interventions for a generation. This meant the end of the Import Substitution Industrialization model of development, which had been highly centralized; focused on internal markets, urbanization, and industrial expansion; with tariff and currency controls. Problems of cronyism, human-rights violations, and the marginalization of an emerging new entrepreneurial class undermined the legitimacy of these kinds of rules and rulers (Guidry *et al*. 2000; Hochstetler and Keck 2007). This shift produced Constitutional Conventions and an emphasis on the more market-oriented, decentralized, privatized economic exigencies of the Washington Consensus, a necessity for international finance, and early neoliberalism throughout the Amazon countries. Through the recognition of historical rights to territories, these constitutions laid the foundation for a rights-based approach to natural landscapes that was to be known as "Socio-environmentalism," ideas that took inhabited forests (and their complex tenurial regimes) as part of a conservation and land management strategy.

During the 1988 Brazilian Constitutional Convention, the articulation of inhabited landscapes as conservation spaces and the idea of forest peoples as forest guardians and defenders gained salience, and were incorporated into land laws and the creation of legislative frameworks and institutional development for agro-extractivist reserves, sustainable development settlements, historical communities and their territorial claims, and better recognition of Indigenous land rights. Indigenous people and local communities 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 (Balée and Erickson 2006; Nepstad *et al*. 2006; Vogt *et al*. 2015; Levis *et al*. 2018; Maezumi *et al*. 2018; Brondizio *et al*. 2021). 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 (Conklin and Graham 1995; Nogueira *et al*. 2018). In addition to new constitutions, this period saw the creation of new national environmental agencies, the emergence and institutionalization of the idea of socio-environmentalism, and radically reconfigured Amazonian conservation strategies (see Chapter 16). Socio-environmental politics have been part of every constitution of every Amazonian country since the early 1990s, articulated through concepts like the rights of nature, and the substantive recognition of the conservation value of inhabited landscapes.

14.3 Recent Development and Politics

14.3.1 The influence of political opening, mobilizations, and environmental politics, and the fall and rise of deforestation

The politics of the 2000-2020 period reflected the integration of many emergent factors that stimulated new social, institutional, and political structuring. The response to these complex pressures and changes was not uniform in the Pan-Amazon, but it produced new ideologies and strategies that moved beyond both traditional conservation modes and standard development frameworks. As mentioned in Box 14.5, the importance of new forms of land rights for Indigenous peoples and local communities, especially Afro-descendants, forest product extractors, river and lake commu-

nities, and others legitimized by long historical occupation, created both cultural and political spaces, a kind of forest citizenship. In Bolivia and Ecuador, ideas such as the Rights of Nature (the *Pachamama*) and ways of living focused on well-being over accumulation (*Buen vivir)* were incorporated into constitutional and political language (see also Chapter 25). While certainly mostly rhetorical, it articulated an Indigenous moral language into a nation-defining document.

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. The neoliberal period in the Amazon coincided roughly with the rise of Chinese and European engagement and investment in the economy, including as well a "China /Asia shock," as inexpensive, high-quality Chinese and other Asian-manufactured imports undermined and effectively dismantled many national industries. This caused economies to again focus on natural resource exports. China and the EU became more involved in the economies of Amazonian countries. This was also reflected in accelerated demand for raw materials, especially soy and beef (de Waroux *et al*. 2019). The 1990s and post-authoritarian transition period reflected the institutional weakness of a rising civil society that had been sharply repressed during authoritarian times, and the undermining of the state as part of macro policies, which more or less left markets as the central organizing institution.

Instability in the manufacturing sectors triggered a more erratic policy context, and shifted the ideas of the economy away from what had been import-substitution thinking with industrial efforts for internal markets, to export-led development based on raw or minimally processes materials - what was later called the "commodity consensus" (Svampa 2019), "extractivism," or "neo-dependency." This expansion coincided with a commodity boom largely led by demand from Asia, and increased national and global environmental concern, as environmental justice issues animated local politics and IPLCs, including Afro-descendent communities, whose lands and livelihoods were increasingly threatened. These contradictory dynamics were reflected in greater activism in both rural and urban domains, and pressure for social investments and new institutions for socio-environmental support. This produced a shift into a development regime now called "Neo-Extractivism," which involved continuing to expand exports while implementing fiscal transfer schemes as a means of poverty alleviation, and a movement away from structural change. These anti-poverty initiatives included conditional cash transfers throughout Latin America; such as *Bolsa Familia* in Brazil, a social transfer that provides a guaranteed income to mothers conditioned on children's schooling and child vaccination; and funded retirements, higher minimum wages, access to credit, and expanded social services.

In this context, "socio-environmentalism" represented a rethinking of the nature of conservation, which could include inhabited environments of many kinds oriented to sustainable and resilient forms of development. Because of its environmental and social justice components, and increased international concerns over climate change and deforestation, international conservation and environmental activists began large scale investments oriented towards maintaining standing forests as social and biotic places. This represented novel forms of rural investment that went well beyond the production credits previously provided for small farmers. These macro-changes in development models had significant policy impacts throughout the Amazon, but perhaps the most closely studied has been the Brazilian case (see Chapter 17). Figure 14.1 illustrates these dynamics.

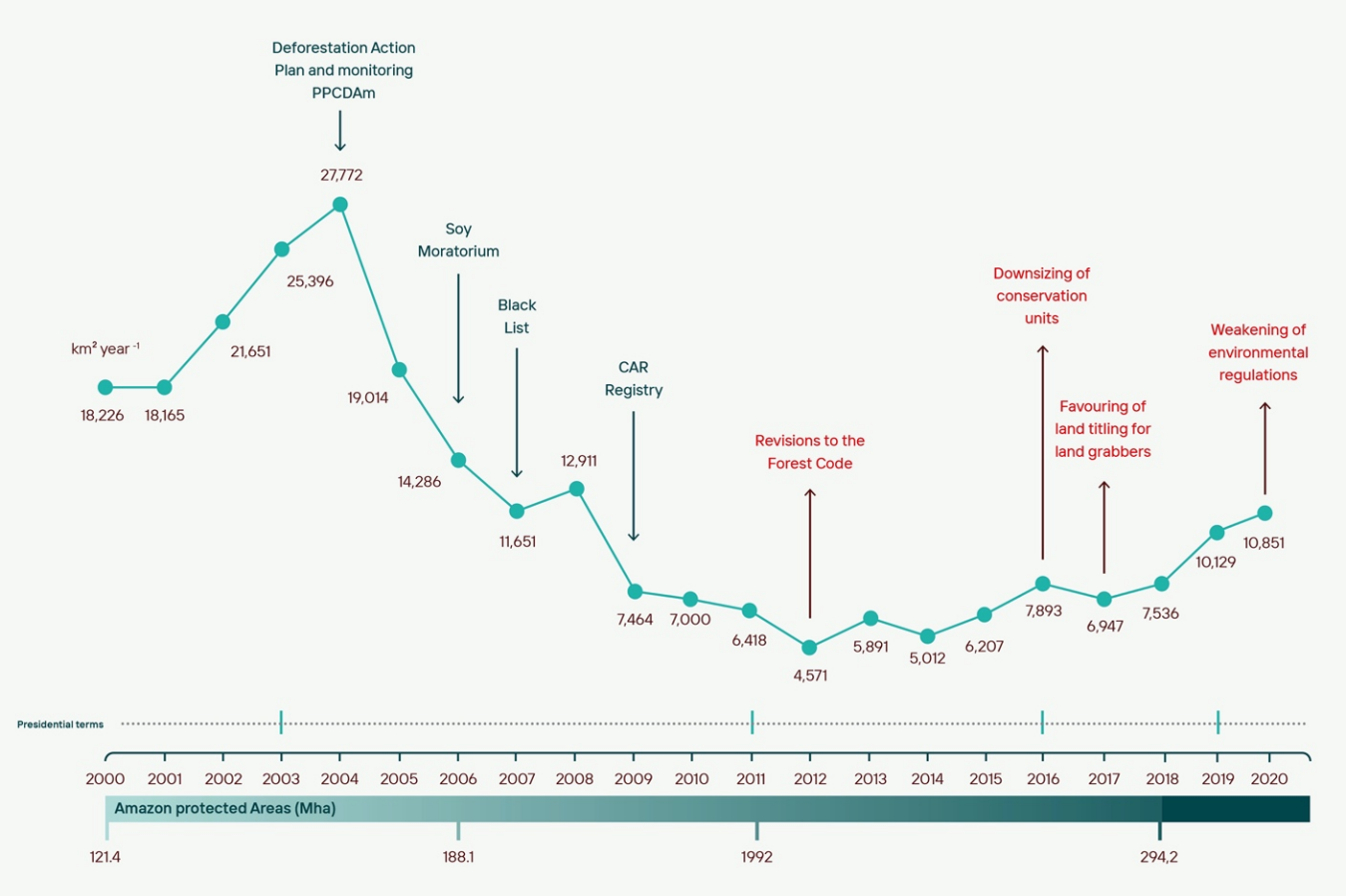

Figure 14.1 Deforestation in the Brazilian Amazon in response to policy changes, 2000-2018. Adapted from: PRODES 2020, Soares-Filho and Rajão 2018.

Figure 14.1 shows how important political and policy changes in Brazil led to dramatic declines in deforestation after a peak in 2004, and how subsequent policy reversals since 2016 have been accompanied by rising deforestation. Annual deforestation rates in the Amazon dropped by approximately 80% from 2005 to 2012, due to commodity price decreases, unfavorable currency exchange rates, policy interventions, significant institution development at local and national levels, wide participation of civil society in sustainable development initiatives, voluntary market agreements, expansion of protected areas, international support for forest-based initiatives such as the Pilot Project for the Amazon, much better monitoring of deforestation, and significant "leakage" (displacement of major deforestation processes to the Brazilian Cerrado, Bolivia, and the Chaco of Argentina), which all aligned to reduce Amazonian clearing in Brazil (Fearnside 2007; Hecht 2012, 2014a; de Waroux *et al.* 2016; Davenport *et al.* 2017; Duchelle *et al.* 2017; Lambin *et al.* 2018; Nogueira *et al.* 2018; de Waroux *et al.* 2019; Silva *et al.* 2020). Nevertheless, by 2016, with the impeachment of the President, and the emergence of a powerful agribusiness coterie who gained control over institutional and rural policy (the *Bancada Ruralista*) in Brazil, deforestation began to climb. By 2019 the annual deforestation rate in the Brazilian Amazon had increased by 122% since the

2012 low (Carrero *et al*. 2020), and continued to increase throughout 2020. By the first half of 2021, deforestation alerts rose to the highest in six years (Dantas 2021). A new law legalizing illegal seizures of public land was making its way through the legislature, threatening to regularize previously illegal land grabs and stimulate new waves of land grabbing (Fasolo 2021).

The current development model, Neo-extractivism, with its minimal diversification and processing within the main export sectors, has been usefully summarized by McKay (2017); (1) large volumes of materials extracted, destined for export with little or no processing; (2) value-chain concentration and sectoral disarticulation; (3) high-intensity environmental degradation; and (4) deterioration of labor opportunities and/or conditions. McKay and others argue that "agrarian extractivism" is a politically and analytically useful concept for understanding new landed dynamics and trajectories of agrarian change. "Rather than a form of industrial agricultural development; which implies value-added processing, sectoral linkages, and employment generation; agrarian extractivism challenges this dominant discourse, revealing … its negative implications for rural development" (McKay and Colque 2016; McKay 2017).

Pan-Amazonian deforestation is volatile for a number of reasons, both intrinsic to the region, and reflecting interactions with broader national ambitions and international processes. It clearly responds to policy and to national and international economic and political pressures, but it also reflects how these unfold on the natural resource base and through socio-environmental systems at different scales. While deforestation is the central concern now, it cannot be addressed without understanding the larger frameworks that justify and drive forest clearing and that contribute to larger instabilities. We emphasize the variation in Amazonian regional economies, structures, logics and production systems; the political coteries that have benefited; and the forms of resistance and economic alternatives that have emerged, both legal and illegal, in the construction of the current Amazon, as old pathways give way to multiple new drivers of change.

14.3.2 Old pathways, new drivers

14.3.2.1 New circuits of globalization

Globalization refers to the integration and movement of multiple commodities, capital, people, technologies, ideas, ideologies, discourses, and forms of representation that can structure and transform localities and economies, but also hybridize with local, regional, and national spaces. At the current moment, the expansion of soy, oil palm, beef, exotic pasture grasses, eucalyptus, new mining concessions, and oil and gas blocks that have proliferated in the Andean Amazon are forms of modern "ecological imperialism" in the Amazon, transforming national and global ecologies, commodities, and economic transfers.[2] The Amazon, however, has been integrated into large-scale circuits in the movement of goods for thousands of years, with the transfer of Amazonian germplasm, feathers, medicinal plants, stones, gold artifacts, metals, and technologies throughout Latin America (Whitehead 1990, 1994; Whitten *et al*. 1997).

Since the 2000s, global markets, rather than internal development strategies, have increasingly driven land-use processes in the Amazon. In particular, global markets for timber, pulp and paper, meat, drugs, oil, gold, and oilseeds have driven larger and faster transformations of the Amazonian Basin than in any other period. More industrialized countries have "off-shored" their environmental footprints toward the Amazon, as with the expansion of oil palm for Dutch biofuels, soy for China, and beef for Asia, choosing to exploit the Amazon in place of further degrading their own

[2] Ecological imperialism is a concept developed by Alfred Crosby (2004), who argued that settlers were successful in colonizing other regions because of their accidental or deliberate introduction of plants, animals and diseases that deeply shifted local ecologies.

resources (see for example Rajão *et al*. 2020; Austin 2010; Rudel 2007; Klinger 2018).

While certain forms of agro-industrial production can generate development where they involve value-added processes (Garrett and Rausch 2016; Richards *et al*. 2015; Richards and VanWey 2015), they generally perform poorly in terms of generating increased employment and improved access to services, and tend to exacerbate inequality (Weinhold *et al*. 2013). In this same vein, 'model municipalities' emerged as nodes in the evolution of a governance frontier in the Amazon, advancing a neoliberal paradigm that replaced more direct democratic measures (such as participatory budgeting) with municipal governance that regulated and stabilized 'green' agro-industrial development (Schmink *et al*. 2017; Thaler *et al*. 2019). The re-democratizing "wave" of governments of Amazonian countries, and the ascension of socio-environmental policies protecting IPLCs and the region's natural resources, appear to have been largely played out by 2020, with clear signs of political setbacks as the region as a whole has become more integrated into global economies, and national politics drifted toward coterie dynamics.

While new forms of financialization and globalization were unfolding in the context of powerful economic forces shaping export markets in agricultural commodities, failures in other development arenas, especially as regards employment, as occurred so broadly elsewhere in Latin America, caused clandestine economies to surge forward in part because of their relatively high labor demand.

14.3.2.2 New Amazonian financialization

An important new aspect of Pan-Amazonian dynamics has been the transformation of the financial sector. The role of South American development banks and state-owned commercial banks has decreased in providing loans and investment capital for agriculture, agroforestry, timber, other forest product extraction, mineral extraction, and even infrastructure construction. New, private financial actors have started to play an increasingly large role in production, consumption, and conservation practices. This includes not only greater participation of private commercial bank lending in the region, but also, and even more importantly, the role of new financial actors, such as hedge funds, sovereign wealth funds, pension funds, and new financial instruments in shaping the development trajectories and historical geography of the Amazon. By 2021, illegal Amazonian lands (including Indigenous lands) were being sold on Facebook (Fellet and Pamment 2021), and digital technologies had come to play an important role in facilitating illegal market transactions.

In agricultural production and ranching, state-owned commercial banks (such as *Banco do Brasil*) were the most important financiers of agriculture and ranching in the Amazon until the 1980s (Torres 1996). As soy monocultures expanded in the southern Brazilian Amazon during the 1990s (see Chapter 15), particularly over degraded pastures cleared from the Amazon forest in the states of Mato Grosso, Rondônia, and Pará, farmers started to rely increasingly upon seed and agrochemical trading companies such as Monsanto, Bunge, and others for credit – often pre-negotiating a third or more of their future harvests at the moment of purchasing their inputs for the year (Wesz Jr. 2016). In turn, this financialization of agribusiness trading companies provided them with more dynamism in generating profits, even making speculative gains from commodity trading and farmland investment (Salerno 2017). This process unfolded alongside deregulation of the banking sector in South America since the 1990s (Studart 2000), and the rise of private equity funds, hedge funds, local investment circles, and investment banking worldwide (Wójcik *et al*. 2018), which began to see natural resources and agribusiness in developing countries (particularly those with potential for growth, such as Brazil) as ideal targets for investment (Visser *et al*. 2015). Consequently, when soy displaced ranching in the southern fringes of the Amazon (especially in Mato Grosso), private equity funds, pension funds, and other new financial actors became the leading providers of capital (both from South America and beyond

the region) to large-scale "land development" and farm management companies (Oliveira and Hecht 2016).

Similar transformations have taken place with regard to finance for infrastructure construction, including not only roads and ports, but also, very significantly, hydroelectric dams in the western (Ecuador, Peru, and Bolivia) and southern (Brazil's Tapajós and Xingu basins) Amazon (Bebbington *et al*. 2018a). Many of these infrastructure projects involve Brazilian construction companies, especially the transnational giant Odebrecht, and were recently swept up in corruption scandals that reached into other Amazonian countries, toppling governments in Peru, Bolivia, Ecuador, and Brazil (Branford 2016). Historically, large-scale infrastructure projects have been financed by state-owned or multilateral development banks, among which Brazil's National Economic and Social Development Bank (BNDES) has played an outsized role in the region, including in neighboring Pan-Amazonian countries such as Peru, Ecuador, Colombia, and Venezuela (Rivasplata Cabrera *et al*. 2015; Hochstetler 2014).

There has been a notable shift in international development finance away from the Inter-American Development Bank (IDB) and the World Bank (WB) towards the China Development Bank and the China Export-Import Bank (Ray *et al*. 2019), in part because of the limited environmental or social conditionality on their loans. The latter are newcomers not only to the Amazon, but also to the realm of international development finance, and there has been concern that the entrance of Chinese development banks may destabilize perceived gains in the best practices for environmental protection and social responsibility adopted by the BNDES, IDB, and WB (BankTrack and Friends of the Earth 2012; Dussel Peters *et al*. 2018).[3]

Chinese finance is more responsive to government-to-government articulations and national-level policies than to bottom-up social movements and NGO interventions (Ray *et al*. 2019). Consequently, this shift transformed the balance of power among Amazonian actors, empowering national elites and others outside the Amazon who might benefit from infrastructure construction projects, while avoiding the direct negative effect of these projects, and weakening the relative strength of Amazonian Indigenous peoples, social movements, and NGOs in the face of such mega-projects. In this way, China is becoming a major force in Amazonian deforestation and environmental degradation (Fearnside *et al*. 2013; Fearnside and Figueiredo 2015), and is now the main trading and lending partner in Amazonian Latin America (see also Chapter 18).

Perhaps the most notable change regards the creation of new instruments for generating financial dividends from conservation itself. At the 2006 United Nations Framework Convention on Climate Change Conference of Parties, the Brazilian government was able to launch a partnership with European donors to establish (in 2008) the Amazon Fund (*Fundo Amazonia*), a USD 1.1 billion financial vehicle for sustainable development and conservation. The Norwegian government was the main contributor, while the German development agency KfW and Brazilian state-owned oil company Petrobras made smaller contributions. The crux of the project was that financial transfers from the Amazon Fund were conditional upon reducing deforestation and GHG emissions, while exploring and supporting alternative land uses.

[3] This is somewhat ironic given the troubled history of BNDES in the Amazon (Bergamini Junior 2003, Gallagher and Yuan 2017), even as recently as the 2000s, with high-profile disputes about the Belo Monte dam on the Xingu River (Fearnside 2006, 2017a; Diamond and Poirier 2010; Jaichand and Sampaio 2013; Bratman 2014). The rise of Chinese development finance has been accused of provoking a "race to the bottom" in international standards and perceived best practices (Gerlak *et al*. 2020). The lack of concern for impacts is illustrated by the 2014 Chinese purchase of a 33% interest in the notorious São Manoel Dam in Mato Grosso, located only 700 m from the Kayabí Indigenous Land, where the Indigenous people were not consulted (in violation of Brazilian law and International Labour Organization [ILO] Convention 169). The São Manoel reservoir was filled in 2017, despite multiple licensing irregularities, and it is the scene of continuing tensions with the Indigenous people it impacts (Fearnside 2017b, 2020).

The Amazon Fund became the world's largest financial instrument for deforestation control, and a lynchpin of the strategy of mobilizing finance and trade mechanisms for reducing emissions from deforestation and forest degradation (i.e., REDD or REDD+). Nonetheless, the implementation of REDD+, the activities of the Amazon Fund more broadly (including mechanisms for monitoring and calculating deforestation and emissions), and the economic quantification of these processes are the subject of intense scrutiny and heated debate (van der Hoff *et al*. 2018; Correa *et al*. 2019; Pinsky *et al*. 2019; West *et al*. 2020). Beyond technical questions about how to monitor and measure deforestation, degradation, and carbon emissions/sequestration, and how to calculate these phenomena in economic terms (Fearnside 2012a), the most important debates pertain to the political struggle over *who* sets the terms for and benefits from development in the Amazon (McAfee 2012; Corbera 2012; Mahanty *et al*. 2013; Klinger 2018). These political tensions became especially clear in 2020 as European donors withheld funds destined for the Amazon Fund due to rising deforestation in Brazil, while the federal government of Brazil publicly rejected the idea of other nations imposing conditions on Brazilian policy, and tensions increased over Mercosur agreements as a function of rising deforestation.

14.3.2.3 Clandestine economies

Clandestine economies emerge alongside, and converge with, regulated, lawful, and formalized economies. Working in the economies of gold, timber, and coca is often part of a livelihood strategy for many people in the Amazon. These economies form part of a portfolio strategy that works in tandem with larger household livelihood approaches in agriculture, urban or rural waged labor, petty commerce, non-timber forest products, and family cash income from formal sources like conditional cash transfers, pensions, agricultural or product sales, and remittances. As we will discuss below, both rural and urban incomes exhibit a high degree of precarity, and this is also reflected in the relatively high number of workers in illegal activities, at least periodically. However, all these types of income generation "subsidize" relatively low wages paid in all livelihood sectors for relatively unskilled labor. The expansion of clandestine economies reflects new technologies, expanded transport infrastructure, new geolocation technologies, new or expanding markets, and failed national development policies that produce few income opportunities and very high levels of employment and income precarity.

Legal and illegal systems often operate side by side, melding into each other in both space and products, as in the timber industry. Illegal land acquisition can be laundered through livestock, fake title, and land clearing amnesties or, as mentioned above, even sold on the internet. Traditional land tenure and access regimes were held by communities that often had limited legal standing if not demarcated under new laws, and hence community lands frequently are legally appropriated in spite of their new constitutionally legal status. The long history of fraudulent land grabbing in the Amazon often depended on simple forged documents, or failing that, setting fire to land registry offices, or simply using violence to intimidate or kill occupants (Schmink and Wood 1992).

The revenue generated from clandestine economies is substantial; for example, the United Nations estimates the value of the coca economy at half a billion USD globally (UNODC 2015), but returns often carry severe environmental and social costs, and may or may not produce much by way of local development linkages over time. A recent study by the Escolhas Institute compared gold-mining municipalities to those without; they showed that the economic impacts and well-being were highly ephemeral, since for many goods processing, adding value, and lucrative markets occurred elsewhere. The commodity value increases with the distance from the site of production, as is so typical of Amazonian commodities.

14.3.2.3.1 Gold

Peru is the largest gold producer in Latin America

and the seventh largest in the world. Yet, over half of Peruvian gold is extracted by unregulated artisanal and small-scale gold mining (ASGM) operations (Caballero Espejo *et al*. 2018; Rodrigues 2019). Significant proportions of the gold extracted in Amazonian countries is extracted illegally (Table 14.1). Virtually all the gold mining in the Madre de Dios region of the Peruvian Amazon is "informal," in violation of state environmental and labor regulations, a situation that essentially criminalizes all small-scale mining, despite its importance for livelihoods in the region (Bird and Krauer 2017). Efforts to formalize small-scale miners and induce them to shift to alternative agricultural activities have largely failed, because alternatives cannot match the higher incomes available through gold mining, due to high global prices for gold (currently almost USD 2,000/ounce; Monex 2021).

Mining is responsible for about 10% of deforestation in the Brazilian Amazon (Soares-Filho and Rajão 2018). Mineral soils that underlie tropical forests of the Amazon basin contain diffusely distributed gold deposits. Extracting this gold, which requires a combination of forest removal, soil pit mining, and the use of liquid mercury, poses a major threat to Amazonian biodiversity, water quality, forest carbon stocks, and human health (Diringer *et al*. 2019). The Pan-Amazon's major rivers are subject to sediment mining on tributaries, which affects aquatic systems. Further, regional roads for one product (like timber) permit broader access to formerly isolated environments, although a great deal of gold moves by small planes and on rivers (Bebbington and Bury 2013; Caballero Espejo *et al*. 2018).

Relatively limited and controlled exits points, such as gold through Lima, have been reconfigured to move almost entirely though the Amazon. This regionalization of the Peruvian ASGM trade reveals the flexibility of the gold production system, and particularly ASGM, in reacting to pressures emanating from the Peruvian state to eradicate illegal mining. This leakage mimics in many ways the shift of soy to less regulated venues. The Global Initiative Against Transnational Organized Crime (2016) notes that illegal gold mining is rapidly spreading across the Pan-Amazon.

Table 14.1. Percentage of gold considered 'extracted illegally'

Country	%
Brazil	36
Peru	28
Bolivia	30
Ecuador	77
Colombia	80
Venezuela	80-90

Source: Escolhas Institute 2020

These mining systems are organized in multiple ways, ranging from cooperatives or semi-cooperatives in the "Garimpeiro Reserve" in Pará and Mato Grosso, Brazil, to mines managed by Maroons in Surinam or elsewhere by Indigenous groups, and through debt peonage and other forms of forced labor and waged or product payment (Asner *et al*. 2013; Caballero Espejo *et al*. 2018; Cortés-McPherson 2019). Gold mining often provides an important complement to people's livelihood systems, and has also provided a form of economic upward mobility for some (Cleary 1990; Escolhas Institute 2020). Miners often become politically active in defense of the practices, and have in some cases made arguments in favor of informality and its redistributive and access features, as compared with large scale, formal mining which often involves large international companies and state subsidies (Bebbington and Bebbington 2018; Bebbington and Bury 2013; Schmink and Wood 1992).

In the realm of precarious states and illegal extraction, Venezuela deserves special mention. The Orinoco Mining Arc (*Arco Minero*) is the product of a national policy established in 2012; operations began in 2016 (Rendon *et al*. 2020). El Callao, an historical gold mine (begun in 1853) was exploited by the formal mining company Minerven since the 1970s. With the economic crisis, the mine stopped working, and was taken over by informal armed groups and the Venezuelan military. Armed forces controlled the *Arco Minero*; they extorted illegal miners and controlled commercial routes. Planes

took minerals to international markets (for exam ple, Curaçao, taking advantage of the free trade zone). Indigenous communities were forced into labor (mining or prostitution), but the mine itself also attracted a desperate diaspora from other parts of Venezuela. While the Yanomami were periodically given respite and Brazilian miners expelled from their lands, the Venezuelan situation remained complicated, especially in light of the precarity of the state itself and the ambiguous nature of its regional actors. Illegal mining can affect Indigenous groups through direct land invasion, but also through the contamination of fish and aquatic birds, a main source of protein in many Amazonian communities, and trafficking of goods and people.

14. 3.2.3.2 Land grabbing

In Brazil, "land grabbing" is known as "*grilagem*," involving land claiming through showing effective use (see also Box 15.3, Chapter 15).[4] For centuries it has been a major part of Brazil's land-tenure practice by large actors, and invasion and later legalization by small homesteaders (*posseiros*) through various system of traditional land recognition (Benatti *et al*. 2006; Moreno 1999; Schmink and Wood 1992). The 54 to 65 million hectares of "undesignated lands" (*terras devolutas*) of Brazil are the major targets, but substantial unclassified lands also exist in Loreto in Peru, and in the former Revolutionary Armed Forces of Colombia (FARC) territories (Azevedo-Ramos and Moutinho 2018; Reydon *et al*. 2020). Indigenous lands and other forms of land claiming, such as Afro-descendent communities and other traditionally recognized, but not yet demarcated, lands are also increasingly under threat, apparently encouraged by the current Brazilian administration's discourse (HRW 2019).

In Colombia, various dynamics associated with the interactions of paramilitaries, and shifts in FARC governance, have also stimulated land grabs in the absence of mediating authorities. Maroon lands in the Chaco have been targeted for expropriation as well (Armenteras *et al*. 2013; Ballve 2013; Gomez *et al*. 2015; Grajales 2011, 2015). It is exactly at these zones of shifting territoriality where deforestation is most likely to occur as a "hotspot," since land clearing works to help establish definitive land claims in places where they are contested. The situations in Colombia, Peru, Ecuador, and Bolivia are complicated by the hydrocarbon industry, which operates with subterranean concessions, even as above ground land or resource concessions accrue to others. The hydrocarbon sector, like the infrastructure sector more generally, provides access roads into extensive areas that can become sites of land appropriation.

While the legal dynamics across the Amazon vary, dynamics of land claiming can be quite similar.[5] Land grabbing involves deforestation, because

[4] The use of the term "land grabbing" in the Amazon is different from the way it is commonly used in other contexts. Particularly since 2008, this term usually refers to the purchase of large areas by outsiders, such that the local population is excluded, especially small farmers producing for local consumption (Borras Jr. *et al*. 2011). More recently, however, more complex notions of "land grabbing" have come to the foreground that do not necessarily amount to "foreignization," as the process was characterized in Brazil, such that it can encompass more clearly the historical and ongoing processes of *grilagem* in the Amazon (Oliveira 2013, 2021; Oliveira and Myers 2021).

[5] The Terra do Meio is an area in the Brazilian Amazonian state of Pará the size of Switzerland, that has long been essentially outside of the control of the Brazilian government, dominated by land grabbers, drug traffickers, and others (e.g., Fearnside 2008). The southern part of the state of Amazonas is now also an active land-grabbing frontier, including the claiming and clearing of Brazil nut groves used by traditional extractivists in the municipality of Boca do Acre, and other vulnerable regions (Maisonnave and de Almeida 2020). Beginning in 2009, Brazil enacted a series of laws that allowed "legalization" or "regularization" of illegal land claims larger than 100 ha, which had been the maximum that could be legalized in practice (despite a 2005 law allowing legalization of up to 500 ha that was not put into practice by the Brazilian National Institute for Agrarian Reform [INCRA]) (Barreto *et al*. 2008). Law No. 11,952, known as the first "land-grabbers' law" (*lei da grilagem*), increased the area that could be legalized to 1,500 ha (Brazil PR 2009). In 2017, the second "land-grabbers' law" (Law No. 3465) increased this to 2,500 ha. (Brazil PR 2017). In December 2019 Brazil's federal government issued MP-910, a temporary executive order (*medida provisória*) valid for 120 days, allowing 2,500 ha land claims to be legalized based on "self-declaration" without requiring any onsite inspection (Fearnside 2020). This measure was

clearing land for cattle pasture is the best way to demonstrate "productive use" and justifying a land title. Clearing also discourages other potential claimants from invading the area and eliminates forest resources for those who might depend on them (Fearnside 2008). This kind of "conjuring property" (Campbell 2015a) is critical for understanding the expansion of livestock as a mechanism of valorizing land claim, a means of asset creation rather than necessarily a production input (Hecht 1993), and a key element in the continuing private expansion of roads, which facilitate forest conversion (see Chapter 19).

14.3.2.3.3. Logging

In the highly biodiverse forests of the Amazon, logging is always selective, marketing only species that are commercially valuable, in contrast to temperate and boreal forests where logging often involves clearcutting. Illegal logging has been and still is rampant in the Brazilian Amazon, and supplies more timber to the market than legal logging (Brindis 2014; Butler 2013; Greenpeace 2003; IMAZON 2017). Much of the timber that appears in official statistics as coming from areas being deforested legally or from legal forest management projects is actually being "laundered" from illegal logging; Brancalion *et al.* (2018) show that the volume of high-value species declared in supposedly legal timber sales far exceeds the volumes of these species originally present in the forest areas from which the timber supposedly came. An estimated 47% of wood sold in Colombia is illegal (EIA 2019), while in the Peruvian Amazon, illegal wood is extracted in Loreto, Ucayali, Madre de Dios, the Marañon River, Yurimaguas, Ucayali River, and Ucayali/ Contamana, legalized in Colombia, and sold in Tabatinga, Brazil (Praeli 2019).

Licensed forest management systems can be unsustainable due to various loopholes that have been created, and frequent violation of regulations both by government licensers and by those who receive the licenses. Bribes can be paid. More fundamentally, economic contradictions make unsustainable behavior financially rational due to the widespread availability of wood from predatory and unsustainable sources (see also Chapter 27). Moreover, because forest trees grow at rates up to around 3% per year, while other investments can produce returns on the order of 10% per year (in real terms, independent of inflation), it makes financial sense to cut and sell the potentially sustainable forest resource as fast as possible, and invest the proceeds elsewhere. This fundamental contradiction has been shown to lead to unsustainable harvesting of potentially renewable biological resources throughout the world (Clark 1973), and it applies strongly to Amazonian forest management (de Jong *et al.* 2014; Fearnside 1989, 1995).

14.3.2.3.4. Coca

Coca leaf chewing can alleviate hunger, cold, and fatigue, and coca is also a psychotropic with a vast international market. It is a crop that can be flexibly produced; it is processed locally into a paste, and production can easily move from one area to another in coca producing zones, to avoid political pressure or state repression; this has occurred with frequency (Gootenberg 2017; Gootenberg and Dávalos 2018).[6]

Over four million Peruvians continue to practice

allowed to expire and was transformed into a proposed law (PL No. 2633/2020), which is currently passing through the committee process in the Chamber of Deputies (Brazil Câmara dos Deputados 2020). Note that all of these laws apply to each claimant or taxpayer identification number (CPF), making it possible to legalize substantial areas either by a family with various members or by a land grabber using "*laranjas*" (literally "oranges," or people whose identities are used by others, with or without consent). This means that land grabbers and squatters assume that they can illegally occupy other areas, and eventually a new law will grant yet another "amnesty," pardoning the violations and granting land titles.

[6] The source of all cultivated coca are two closely related South American shrub species, *Erythroxylum coca* and *Erythroxylum novogranatense* (Plowman 1984), adapted to environmentally distinct regions in Colombia, Bolivia, Peru (Ehleringer *et al.* 2000), and, more recently, Brazil (Duffy 2008). Each species has an additional variety, *E. coca var. ipadu* and *E. novogranatense var. truxillense*, with the former known for its traditional use by lowland Amazonian groups (Plowman 1981, 1984) and the latter a drought-resistant variety

traditional use of the coca leaf (Rospigliosi *et al.* 2004) as they have done for perhaps as long as 5,000 years (Piperno and Pearsall 1998). Coca has been an object of international harassment since Richard Nixon's War on Drugs, and William Clinton's Plan Colombia, which invested billions in coca eradication, with limited success (Bradley and Millington 2008). Justifications for coca eradication programs have also included political discourses on anti-insurgency, anti-communism, and the War on Terror.

A highly valuable traditional crop, coca is an ideal product for small farmers, since it generates considerable employment and revenue, is locally processed, and integrates well into agroforestry systems. United Nations data from coca cultivation on the Ucayali River indicate that one hectare could conservatively produce approximately 860 kg of sun-dried coca leaf at an average farm gate price of USD 2.8 per kg in 2004 (UNODC 2005) or USD 2,350 per hectare, without the farmer even having to leave his farm. This estimate dwarfs the income potential of alternative crops farmed close to the regional market city of Pucallpa (even as the USD 2,350 per hectare accounts for as little as 2% of the US street value for the same amount of leaf in cocaine form) (Salisbury and Fagan 2011).

The indirect impact of coca production on deforestation is considered to be much larger than the actual area used for cultivation, since abandoned plots tend to convert to sites used for small-scale agriculture, cattle ranching, and further land clearing in the surrounding area (Davalos *et al.* 2014). As a means of money laundering, investment, and land speculation, coca often works in tandem with livestock, land claiming, and speculation in coca zones (Gootenberg 2017; Negret *et al.* 2019). While for a considerable time coca was eradicated manually, the expansion of the use of herbicides (glyphosate) has resulted in it drifting onto legal household and subsistence croplands, where it is quite toxic to small stock, has marginalized producers, and often exacerbated political tensions, threatening Indigenous areas (Arenas-Mendoza 2019). However, repressive measures have not succeeded in eliminating coca plantations in the region; the area from the southern Andean-Amazonian foothills to the Ecuadorian border is still one of the major coca-producing regions in Colombia (UNODC 2015). Current hotspots of cultivation include the Ucayali, the Putumayo, Caquetá, the border areas between Bolivia and Peru, and more generally the fluid triborder region (Cuesta Zapata and Trujillo Montalvo 2009).

14.3.2.4 Infrastructure

Rising global demand for commodities, particularly grains and beef but also minerals and fossil fuels, and the seemingly unquenchable imperative of regional and global integration, are driving large scale land-use change and dramatically reshaping the physical and human environment of the Amazon region. Access and energy infrastructure projects dominate the investment portfolios of all Amazonian governments and are the projects whose spillovers generate the most environmental and social impacts. Lands are cleared to build transoceanic multi-modal transport networks to support agro-industrial expansion, to construct hydroelectric dams and transmission networks, and to develop mega-mining projects and assist in the extraction and transport of hydrocarbons. These investments interact and support each other, enabling each project's financial viability. However, the significant environmental and social impacts unleashed by multiple projects are rarely if ever assessed for their potential cumulative and synergistic effects (Bebbington *et al.* 2020; Van Dijck 2008).

grown largely for commercial purposes in arid to semi-arid inter-Andean valleys. Although *E. coca var. ipadu* has been cultivated in the lowland Amazon for many centuries, historically its low alkaloid content made it a poor choice for cocaine production; nevertheless, recent research on coca cultivated illegally in the Colombian Amazon indicates farmers are increasingly cultivating high producing hybrids of *E. coca var. ipadu* (Johnson *et al.* 2003), in part as a response to climate change. These hybrids would be well-adapted and easily diffused to other parts of the Amazon (Duffy 2008).

Governments across the Pan Amazon, and from across the political spectrum, now pursue export-oriented economic policies that prioritize large-scale infrastructure projects in support of natural resource and agroindustry expansion, and also because they are increasingly a necessary employment program in light of the contraction of small-scale agriculture and stable urban employment. Such investments both attract large amounts of foreign investment, and fuel bursts in employment and economic activity in more remote geographies. They form part of a longstanding development paradigm that promotes centralized urbanization, connectivity, and economic growth over more local, resilient, and participatory strategies. These investments are also important for the support of mineral and fossil fuel extraction that finance social policy and other expenditures that give viability to their "Neoextractivist" political projects (Bebbington *et al*. 2018a). Throughout the Pan-Amazon, roads became primary sites of land speculation (see Chapter 19). Construction companies saw lucrative infrastructure as key sites for contracts awarded though the dynamics of corruption. One Brazilian company, Odebrecht, became famous for corrupting almost every national government in the Pan-Amazon (Campos *et al*. 2019; Morales and Morales 2019; Lagunes and Svejnar 2020).

Large-scale infrastructure projects are justified on the grounds of job creation and economic benefits for priority sectors of the economy (soy, livestock, mining, oil and gas), but smallholders can be equally eager for better transportation access and the land valorization that it produces. We discuss some of three of these dynamics further on.

Beginning in 2000, and led by Brazil, an ambitious, coordinated infrastructure initiative, IIRSA (*Initiative for the Integration of the Regional Infrastructure of South America)*, now managed by COSIPLAN *(South American Council on Infrastructure and Planning*), prioritized and promoted select sectors and geographies to receive infrastructure investment (Box 14.3). IIRSA/COSIPLAN's proposed hubs traversing the Amazon Basin are especially contentious given their high costs in terms of human rights, threats to Indigenous peoples and local communities, land expropriation, forest clearance, and forest degradation (Bebbington *et al*. 2018b; Bebbington 2020; Ferrante and Fearnside 2020; Ferrante *et al*. 2020).

How infrastructure decisions are made, in practice, does not necessarily reflect the magnitude of these consequences, but in many cases reflects the political power of coteries, especially in the absence of more participatory forms of planning, even if these are legally mandated, and better "full cost accounting." Pressure groups can include the military, economic interests, corporate groups, grassroots social movements, and other actors, and the influence of corruption and the personal interests of political leaders. Decisions are not taken in the manner that one might imagine, but rather reflect a great deal of political expediency and largely follow the autocratic practices of the military period.[7] In Brazil, information on broader socio-environmental impacts is not even gathered before critical decisions are made; this comes later during the licensing process that serves to justify the decisions that have already been made for political reasons (Fearnside 2012b). Even when involving the Chinese government and state-owned companies, the latter often play to

[7] In Brazil, as in other Amazonian countries, infrastructure projects are normally part of "pluriannual plans" (PPAs), which are sets of projects (including many investments in addition to infrastructure) that are proposed for implementation over a four- or five-year period (Fearnside *et al*. 2012). The president collects suggestions from the different ministries and is responsible for submitting a proposal for the PPA to the congress, where there is plenty of room for lobbying by interested parties, and "horse trading" among political groups. The 2020-2023 PPA was approved by the Senate with 326 amendments (West and Fearnside 2021). High-level plans such as IIRSA (see Killeen 2007; Zibechi 2015) have little influence, although they can be used as arguments for justifying projects wanted for other reasons. In Ecuador for example, projects that had remained on the books were taken off the COSIPLAN system, mainly to assure more national autonomy. Once included in the PPA, further political struggles determine the priority a project receives for inclusion in the annual budget.

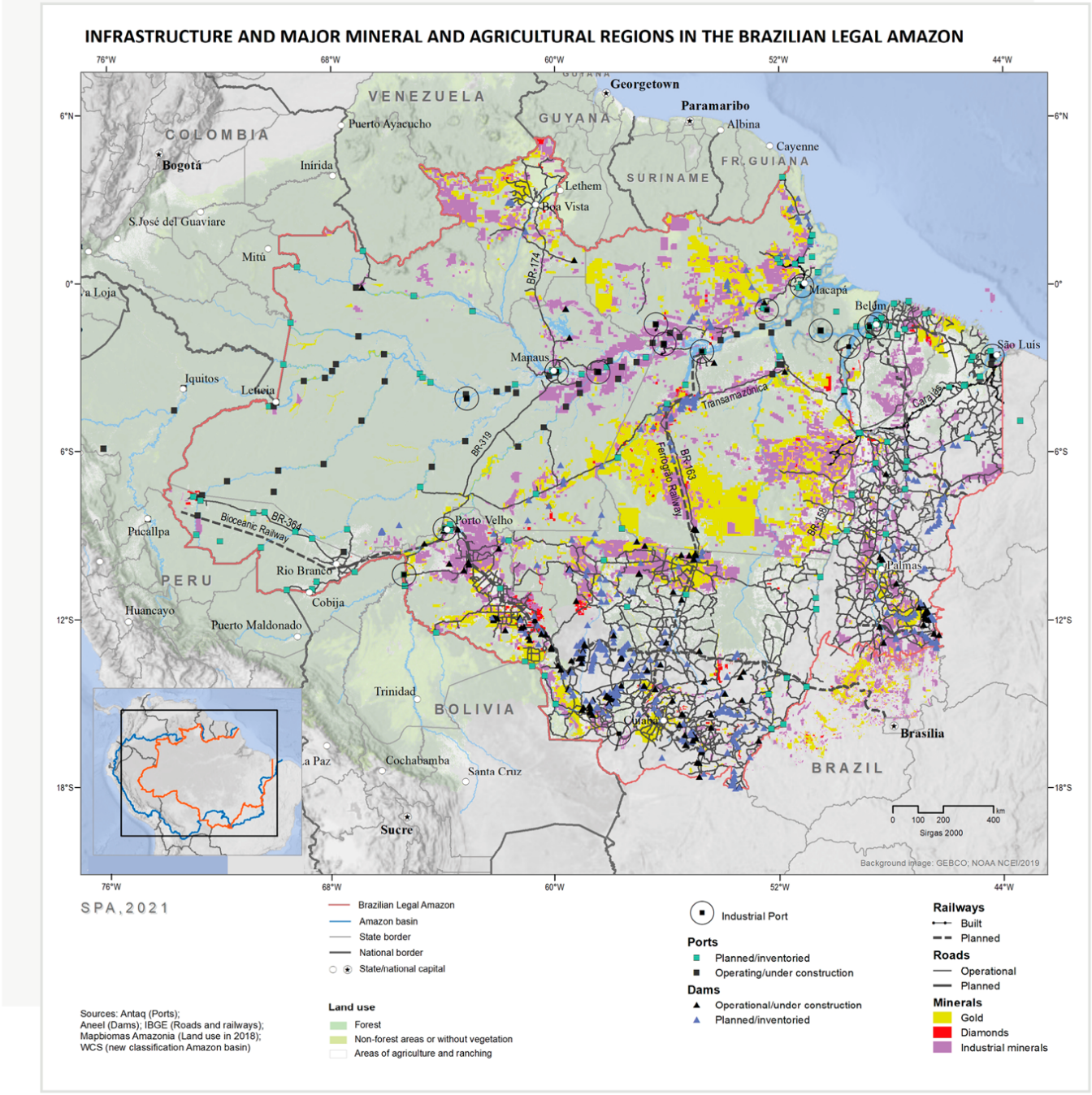

Figure 14.2 Map of infrastructure and major mineral and agricultural regions and projects.

Box 14.3: IIRSA/COSIPLAN

The Initiative for Regional Infrastructure Integration in South America, created in 2000 and managed by the South American Council of Infrastructure and Planning since 2009, established a framework to promote a series of coordinated, strategic mega-infrastructure investments at a continental scale. The initiative breathed new life into longstanding development narratives of connectivity, integration, and economic growth, but now combined with the urgency of increasing competitiveness in a globalizing world.

IIRSA/COSIPLAN proposed to support the transformation of the Amazon through a series of ten strategic, integrated development corridors or hubs connecting countries in the region with each other and to global markets (Simmons *et al.* 2018; Walker *et al.* 2019). The portfolio of projects included some 544 priority investments totaling over USD 130 billion (Little 2014). The larger vision included the creation of navigable waterways, a system of ports and logistical centers, a transcontinental railway with over 15,000 km of new track, and improvements to ~2 million kilometers of roads, in addition to modernizing the telecommunications systems and standardizing and harmonizing regulations in support of the efficient flow of goods and services. The initiative also encourages private sector participation and introduces innovative financing arrangements to overcome the types of bottlenecks experienced by publicly funded infrastructure projects. The creation of integrated development corridors offers governments and financiers of infrastructure big vision projects around which they can link purported benefits (jobs and economic growth, increased access) to secure the support of subnational authorities and local populations.

One of the greatest challenges to continental integration has been the construction of terrestrial transport corridors connecting Atlantic and Pacific ports. The Southern Interoceanic Highway, spanning over 2,600 kilometers and connecting Brazilian and Peruvian ports, was inaugurated in 2011 to great fanfare. More recently, the highway has drawn criticism for overstating the amount of commerce it would carry, the lack of social and environmental safeguards, and the significant deforestation and illegal gold mining that it has induced. In addition to the Southern Interoceanic Highway, Peru continues to develop a Northern Interoceanic route involving a combination of investments in road building, river navigation (the proposed Amazon waterway), and port development. Finally, a third route, the Central Interoceanic Highway, has improved the road network linking Lima to Pucallpa, leaving open the possibility of a terrestrial connection to Cruzeiro do Sul in Acre.

In Brazil, national infrastructure plans complement and reinforce larger regional integration objectives. Brazil's Agenda for Priority Integration Projects earmarked nearly 70 percent of its USD 20 trillion budget to support the construction of multi-modal systems of transport (roads, rail, and waterways) (Bebbington *et al.* 2018b). Investments in these systems of transport are attractive because they are high-value projects and create synergies with other potential investments.

The vast infrastructure network envisioned for the Amazon is intended to connect remote production and extraction sites, reduce transport costs, and increase the efficiency of transporting commodities destined for foreign markets, but especially China. Improving access infrastructure in the Pan-Amazon is clearly a priority for both subnational and national governments; however, a recent study found that many of the proposed roads – the researchers analyzed a portfolio of 75 - did not include sufficient impact assessments of social and environmental impacts, nor were the projects found to be economically viable (Vilela *et al.* 2020).

distinct interests and priorities, and compete for capital and political support for divergent infrastructure projects, such as the north-south *Ferrogrão* railroad connecting Mato Grosso state to the Amazon Basin ports on the Tapajós, the east-west Bi-Oceanic railroad crossing the Amazon and the Andes (Oliveira and Myers 2021), or the recent *Ferro-Pará*.

Availability of funds and expertise from outside sources can be important in determining which projects get priority. In the past this has included major projects financed from multinational development banks (Fearnside 1987), Korea, and especially China, now a critical player in various planned railways, dams, and waterways (Ascensão *et al*. 2018; Branford and Torres 2018; Fearnside and Figueiredo 2015; Serrano Moreno *et al*. 2020; Oliveira and Myers 2021; Oliveira 2021).

State-owned companies, and their managerial agencies, can significantly influence decisions on major infrastructure projects. Examples include the Carajás railway, which was completed in 1984 by Companhia Vale do Rio Doce, a Brazilian government mining company that was later privatized and is now called Vale. The railway carries iron ore 890 km from the Carajás mine to a port near São Luis, Maranhão. State-owned oil companies in Ecuador (PetroEcuador), Colombia, and Brazil (Petrobrás) have significant control and financing over forms of regional development and extraction. Another example is the Tucuruí Dam, which blocked the Tocantins River in 1984. The dam was built by ELETRONORTE (the government electricity company for northern Brazil) to supply aluminum factories in Barcarena (Pará), and São Luis (Maranhão) (Fearnside 1999, 2001a, 2016). Construction companies are famous for pressuring for access and energy infrastructure development. The soy transport corridor from the interior of Mato Grosso to the Cargill Terminal in Santarem was promoted by soy growers and infrastructure firms (Torres and Branford 2018). The effect of corruption on infrastructure decisions can also help explain why expensive projects can gain priority, as the Odebrecht case reveals so trenchantly.

14.3.2.4.1. Roads

In recent decades, significant investment has been directed to building new and upgrading existing highways that form part of a series of strategic transport corridors promoted under IIRSA/COSIPLAN. These plans echo the large-scale road building projects of previous eras, such as the construction of the Belem-Brasilia highway (1960) and the *Carretera Marginal de la Selva* (1963) which was intended to connect the Amazon regions of Bolivia, Peru, Ecuador, Colombia, and the Venezuelan *llanos*.

In subsequent decades the Trans-Amazon highway was started in the early 1970s, followed by the Cuiaba-Porto Velho road in the 1980s, and a burgeoning set of formal and informal road building since the opening of the major trunk roads (Fearnside 2015). Current formal and informal roads are discussed further in Chapter 19. One outcome of this dynamic has been continuing deforestation and forest degradation, except in periods of deep civil strife, as in Peru with Shining Path, and in Colombia with various occupying rebel groups (Negret *et al*. 2019; Clerici *et al*. 2020), only to increase deforestation afterwards.

One of the truisms of infrastructure could be the axiom “have road, have deforestation.” There are numerous scientific articles that have documented this dynamic everywhere in the Amazon for decades (Arima *et al*. 2008; Armenteras *et al*. 2006; Baraloto *et al*. 2015; see also Chapter 19), usually accompanied by images of deforestation flanking the road (see Figure 29.5, Chapter 19). A recent article reviewing road-associated clearing (Vilela *et al*. 2020) found the rapidly-expanding Amazon network to be permanently altering the world’s largest tropical forest through forest fragmentation, sub-canopy processes (selective logging, hunting, and increased fire vulnerability), and sub-canopy cutting in preparation for more extensive clearing and eventual land claiming.

This kind of forest degradation now rivals deforestation. Most proposed road projects lack rigorous impact assessments or even basic economic justification, reflecting the habits of bureaucratic practice. The Vilela *et al*. (2020) study cited above analyzed the expected environmental, social, and economic impacts of 75 road projects, totaling 12 thousand kilometers of planned roads. All projects, although in different magnitudes, would negatively impact the environment, and involved deforestation of some 2.4 million ha. Forty-five percent would also generate economic losses, even without accounting for social and environmental externalities. Canceling economically unjustified projects would avoid 1.1 million hectares of deforestation and USD 7.6 billion in wasted funding for development projects (Vilela *et al*. 2020). The fragmentation, ecological loss of connectivity, degradation of landscapes used mainly for speculation, and the constant threat to protected areas of many types, threatening the integrity of significant areas and ecologically important landscapes, remain part of the massive externalities associated with roads. Chapters 19 and 20 outline the environmental effects in more detail.

Most of the environmental impacts of infrastructure development are elaborated in more detail in Chapter 19. Both the construction of new roads and the paving of existing secondary roads also have dramatic effects on the human population of the area along the route. When a new road is built in an area of the Amazon that previously lacked road access, the residents of the area are likely to be traditional groups such as Indigenous peoples, riverside dwellers (*ribeirinhos),* or forest extractivists collecting non-timber forest products. The advantages of the road in allowing more rapid access to hospitals and other urban services can often be far outweighed by the negative effects, as new migrants, loggers, and land grabbers move into the area, often displacing earlier populations (Schmink and Wood 1992; Yanai *et al*. 2017).

New roads attract actors of various types. Individual families can migrate to the area to occupy land (*posseiros*) (e.g., Simmons *et al*. 2010). With the passage of time, these migrants may be expelled violently by more powerful actors who convert the area into large ranches, as occurred along the Belém-Brasília Highway (Foweraker 1981; Valverde and Dias 1967) and along BR364. Initial settlers may be "regularized" by the Brazilian National Institute for Colonization and Agrarian Reform (INCRA), or granted lots elsewhere in official settlement projects (Fearnside 2001b; Schmink and Wood 1992). Brazil's "*Terra Legal*" (Legal Land) program, which was intended to curtail advancement of the agricultural frontier into the Amazon, actually consolidated agribusiness and extractivism in the Amazon-Cerrado transition zones (Oliveira 2013) as small farmers sold lots with legalized title. This process has been widely repeated throughout Amazonian settlement projects (Ferrante *et al*. 2020).

A parallel process occurs in government settlement projects, where, even if not legally permitted, the original settlers sell their lots to others who concentrate them into medium and large ranches (e.g., Carrero and Fearnside 2011; Yanai *et al*. 2020). Initial occupation can also occur as large areas are appropriated by land-grabbers (*grileiros*), who then subdivide the claims and sell the land in smaller parcels, or alternatively, land consolidators who use multiple names to acquire larger holdings.

14.3.2.4.2. Ports

Nearly 100 major industrial river ports have been built on the Brazilian Amazon's major rivers over the past two decades (Andreoni 2020). Many have been internationally financed and built by commodities companies with little government oversight, such as the former Minister of Agriculture's port in Porto Velho (Brazil) or the Cargill port in Santarem (Bratman 2019). These ports have transformed the region, further opening it to agribusiness and reducing transport costs for export commodities, especially soy, to China and the rest of the world. However, this boom in port infra-

structure often came at the expense of the environment and traditional riverine communities. Today, more than 40 additional major river ports are planned in the Amazon biome; on the Tapajós, Tocantins, and Madeira rivers; proposed port development in Peru; and the Ichilo-Mamoré-Madeira-Amazonas waterway in Bolivia. These projects are again being pursued largely without taking into account cumulative socio-environmental impacts (Silva *et al*. 2008; Leal *et al*. 2012; Alves *et al*. 2015; Barbosa and Moreira 2017).

14.3.2.4.3 Dams

The construction of dams and hydro-electric plants remains a major development strategy across the region. Decisions on logistical infrastructure, such as roads, dams, railways, ports, and waterways, are critical, both because they represent major government investments and because their social and environmental consequences are enormous (see Chapters 19 and 20).

While the social impacts of dams vary from site to site, some of the major and well documented social effects include displacement of populations, loss of livelihoods from fisheries, downstream effects, impacts on Indigenous populations, and impacts on human health and migration, as detailed in Box 14.4 (Fearnside 2016; Andrade 2021).

14.3.3 Export dependency & precarious states

As the previous sections have shown, Pan Amazonian states have become increasingly dependent on global exports of enormously valuable natural resources from Amazonian forests, waters, lands, and sub-soils, part of a wave of Latin American "neoextractivism" combining commodity exports with the deployment of social welfare programs to address persistent poverty in the face of limited economic opportunity and virtually no structural change (Baletti 2014; McKay 2017; Svampa 2019). Some writers have labeled this current phase of development a new incarnation of dependent development (Svampa 2019).[8] At the same time, however, there are new innovative economies based on traditional Amazonian crops like *açai, guarana*, animal products, and medicines that circulate in national and globalized markets.

The extraction of industrial ores and hydrocarbons and agroindustry are not especially labor-absorbing activities, and most export products leave the Amazon as raw or minimally refined products. Other systems of capital accumulation include multiple forms of resource capture that take place through direct appropriation (land grabbing, wild animal commerce, resource theft), and a variety of institutional rents that depend on political positioning (credit lines, speculation, corruption), regulatory and institutional capture, and illegality and violence. That is, a great deal of economic activity and profit making is related to positioning, access, and to a degree, impunity.

Amazonian states suffer from continuing issues of political instability regardless of political format (authoritarian, illiberal, or democratic), which has given a "stop-start" quality to Amazonian development initiatives, with frequent policy reversals or shifts in emphasis that increase volatility in processes, prices, and policy implementation. Most Amazonian nations are young states with new constitutions only a few decades old that emerged after authoritarian regimes or illiberal democracies collapsed, and remain characterized by intense factionalisms if not insurgencies (such as in Colombia and Peru), succession movements (Bolivia, Ecuador), and the complex political scenar-

[8] Dependency theory argued that over-reliance on natural resources made economies vulnerable to volatilities in global markets for reasons of price and politics, global competition and technical change in the sectors, and declining terms of trade in raw materials versus industrialized products. This actually "underdeveloped" countries rather than developing them, by structuring institutions and infrastructure around sectors which were often, and still are, largely dominated by large international corporations who garnered most of the benefits, and national coteries allied to them. This idea was elaborated further by Bunker (1985), who placed environmental degradation as another element in the "development of underdevelopment".

Box 14.4 The social impacts of dams

Displacement of population

Displacement of population is the most dramatic human consequence of hydroelectric dams. The full weight of this impact falls on those who have the misfortune of living in a place chosen for flooding by a dam, while the benefits of the dam go to people and industries in distant cities, making environmental justice one of the primary concerns with Amazonian dams (Fearnside 2020). The 23,000 people displaced by Brazil's Tucuruí Dam in 1984 still suffer the consequences of their displacement (Fearnside 1999, 2020; Santos *et al*. 1996). Those displaced by the Madeira River dams are also suffering (Baraúna 2014; Simão and Athayde 2016). At Belo Monte, a large population of riverside dwellers was displaced and moved to "urban settlements" distant from the river, with dramatic consequences both from the loss of livelihood and from the loss of the physical and social environment (Magalhães and da Cunha 2017). Meanwhile, a massive influx of migrants moved into the region.

Loss of livelihoods from fisheries

Dams have severe impacts on natural ecosystems (see Chapter 20). These changes lead to a loss of the fisheries that sustain much of the human populations in areas flooded by reservoirs, and in the river stretches both below and above the reservoir where fisheries are also negatively impacted. In the case of Tucurui, the fisheries below the dam declined precipitously, both for fish and for freshwater shrimp, eliminating the fishing fleet at Cametá (the main city in the lower Tocantins) (Fearnside 1999, 2001a; Odinetz-Collart 1987). Fish-landing data along the length of the Tocantins River show that the fish production in the Tucuruí reservoir never compensated for the loss of fish production in the natural river (Cintra 2009). Fish production in Amazonian reservoirs is minimal. At Balbina, commercial fishing was banned beginning in 1997 due to the fish population's precipitous decline (Weisser 2001). The Santo Antônio and Jirau Dams on the Madeira River destroyed one of the world's most productive fluvial fisheries that had supported large populations of fishers in Brazil, Bolivia, and Peru. Impacts come from blocking fish migration, including the famous "giant catfish" of the Madeira River, from impeding the descent of fish larvae spawned in the river's headwaters, from the reservoirs' unfavorable environment for many species, and from reduction of nutrients associated with sediments (Fearnside 2014; Forsberg *et al*. 2017; Faleiros and Isensee e Sá 2019). Hydropower development can negatively affect perceptions of fishery sustainability and exacerbate existing weaknesses in fisheries governance (Doria *et al*. 2021).

Indigenous populations

Indigenous peoples suffer the same impacts as other dam-affected people, plus some that are unique to Indigenous groups. The loss of sacred sites is particularly serious, and this is not even considered as an impact in environmental impact assessments (EIAs), as in the case of the proposed São Luiz do Tapajós Dam, which would flood the site where the great ancestor of the Munduruku people created the Tapajós River (Fearnside 2015). Most traumatic for the Munduruku was the dynamiting in 2013 and flooding in 2014 of the Sete Quedas falls to make way for the Teles Pires Dam (Branford and Torres 2017). This is the place where the spirits of deceased tribal elders reside, or the equivalent of Heaven for Christians. Sacred sites were also destroyed in 2017 by the São Manoel Dam 40 km downstream, and tensions with the residents of the Kayabi Indigenous Land, located only 700 m from the dam, have resulted in Brazil's

National Force still being deployed to the site to protect the dam (Fearnside 2017a; *Neo Mondo* 2018). These cases illustrate the problem of sites located outside of Indigenous lands being vital to the Indigenous groups, in this case destroying both fisheries and sacred sites.

Dam impacts can result in severe losses of Indigenous cultures. In the case of the Balbina Dam, the two largest Waimiri-Atroari villages were flooded, and the displaced population moved to the roadside of the BR-174 (Manaus-Boa Vista) Highway, where they were on their way to physical and cultural elimination. After a disastrous delay, the hydropower company (ELETRONORTE) financed a program that convinced the group to leave the roadside and build a new village in the forest (Fearnside 1989). The group has survived and increased in population, but has paid a heavy price in cultural loss under the influence of the power company's program (Rodrigues and Fearnside 2014).

The Belo Monte Dam did not flood Indigenous land, but it diverted 80% of the water in the Xingu River to flow to a powerhouse 100 km downstream from the main dam, leaving the "Big Bend of the Xingu" (*Volta Grande do Xingu*) with very little water. Two Indigenous lands are located along this stretch, and a third group on a tributary that joins the Xingu in this stretch also lost the fishery on which they depend (de Oliveira and Cohn 2014; Villas-Bôas *et al.* 2015). As severe as these impacts were, they were dwarfed by the impacts of planned dams on the Xingu River upstream of Belo Monte (Fearnside 2006). Belo Monte is completely unviable economically without water stored in upstream dams, making it clear that official denials of the original plans for these dams represent disinformation (de Sousa Júnior *et al.* 2006; Fearnside 2017a). The first priority would be the Babaquara Dam (officially renamed as the "Altamira' Dam, but best known by its original name). This would flood 6,140 km^2, twice the size of Balbina or Tucuruí, almost all of which is Indigenous land (Fearnside 2006).

Health impacts

Dams have health impacts on the people who live around reservoirs or eat fish from them. Mercury is naturally present in the soils in the Amazon because the soils are millions of years old and have been receiving mercury via rain – the result of volcanic eruptions that inject mercury into the atmosphere, where it spreads around the globe. Additions of mercury from its use in alluvial gold mining can also occur, but they are not necessary to have substantial amounts of mercury present at the bottom of reservoirs. The water in reservoirs like Tucurui or Balbina stratifies into layers based on temperature, and the cold water at the bottom does not mix with the warm water near the surface. The result is that oxygen in the water at the bottom is soon depleted as leaves and other forms of organic matter are converted to CO_2. This provides an anoxic environment (without oxygen) in which mercury is converted into highly toxic methylmercury. The methylmercury in the water is absorbed by plankton, and passes up the food chain to fish, increasing approximately ten-fold in concentration with each link in the food chain. High concentrations of mercury have been found in reservoir fish and in the hair of people who eat these fish at Tucurui (Arrifano *et al.* 2018; Leino and Lodenius 1995) and Balbina (Forsberg *et al.* 2017; Weisser 2001).

Insects represent another health risk from reservoirs. The dramatic "mosquito plague" at Tucuruí was an enormous explosion of mosquitos of the genus *Mansonia* that were breeding in the floating macrophytes in the reservoir (Tadei *et al.* 1991). Mosquitos have a painful bite, but the main disease they can transmit (filariasis or "elephantiasis") is not yet present in Brazil, although it is present in Surinam and French Guiana. Other mosquitoes, such the *Anopheles* species that spread malaria, can also breed in reservoirs (Sánchez-Ribas *et al.* 2012).

Downstream impacts

The river downstream of a dam changes in ways that have negative impacts for the many human residents of these areas. These include fish die-offs, and retention of sediments in dams that deprive the downstream river of the nutrients associated with these particles, thus jeopardizing the base of the food chain for fish production. The Madeira-River dams reduced downstream sediments (Latrubesse *et al*. 2017), and downstream fish catches have declined markedly (Santos *et al*. 2020). Sediment retention by dams planned in Peru and Bolivia will impact fisheries along the entire length of the Amazon River in Brazil (Forsberg *et al*. 2017). Ironically, almost all planned dams are to be financed by BNDES and built by Brazilian construction firms. The loss of sediment affects nutrient distributions in flooded forests and floodplains which may be used for collection and floodplain agriculture. Another impact of dams on downstream communities occurs during construction, when the river flow is temporarily halted or reduced to near zero as the dam begins to fill. Ironically, when the spillways are first opened, the water level in the downstream river can rise far above its normal high-water mark, causing flooding damage to downstream residents.

Social effects of migration

Social effects of migration to the dam construction area are notable. While a few entrepreneurs can earn fortunes from the local economic boom during the construction phase, most of the population loses heavily. Altamira, the city nearest to the Belo Monte Dam, experienced an explosion in the prices of housing and basic household needs, making the city unaffordable for many of the original residents. There was also an explosion of violence, with Altamira being rated the most violent city in Brazil (Sales 2017). A long list of urban problems accompanied dam construction (Miranda Neto 2015; do Nascimento 2017; Gauthier and Moran 2018).

ios in the "Caribbean Amazon" of Guyana, Suriname, and French Guyana.

All Amazonian governments have had serious corruption scandals (Fogel 2019). Six of the last Peruvian presidents have been indicted for corruption associated with cronyism and personal payoffs, often associated with infrastructure development. Peru cycled through three presidents in a one-month period in 2021. Corruption concerns also emerge around concession systems for hydrocarbons, minerals, and timber. The lack of transparency and favoritism in many contracts and bidding processes have generated distrust of the national state and supported a dynamic of illegality around land acquisition, infrastructure concessions, production certifications, clearing moratoriums, invasions of protected areas, forms of bribery, and political patronage. All these add distorting elements to regional dynamics, and foster distrust of government and broader, lower-level societal corruptions (Bulte *et al*. 2007; Campos *et al*. 2019; Fogel 2019).

While GDP has increased across the Pan-Amazon, inequality and precarity remain central issues, and COVID-19 has driven poverty, inequality, and vulnerability to new heights. Peru, Colombia, Bolivia, Ecuador, and Brazil have some of the highest per capita infection and death rates. The COVID-19 crisis has diverted some attention away from forest destruction and protection, made illegal incursions easier by paralyzing state actions to control clearing (Silva Junior *et al*. 2021), and in some states led to implicit *carte blanche* to go forward with semi-legal and destructive practices.

In spite of the current "commodity consensus" framework and its agro-industrial emphasis and widespread environmental destruction, there are new innovative economies based on traditional Amazonian crops like *açai, guarana*, cacao, and other traditional Amazonian goods and medicines (see Chapter 30). These remain largely niche crops, whose value and value chains are quite different from large-scale commodity dynamics. Of the major export items, coca and gold go through significant processing in Amazonian localities, and might be considered more "industrialized exports" than many of the other export commodities (Gootenberg and Campos 2015; Gootenberg 2017; Hilson and Laing 2017; McKay 2017; Betancur-Corredor *et al*. 2018) even though the local value added is often ephemeral (Escolhas Institute 2021).

In the midst of these powerful and often hidden forces and processes shaping Amazonian development and conservation, the diverse people who live there continue to respond as best they can to increasingly precarious options for making a living in the forests, rivers, and lands of the Amazon. They draw on Indigenous cosmologies and practices dating back millennia (see Chapters 8 and 10), and the 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 (Athayde *et al*. 2017; Vadjunec and Schmink 2012). Far from passive and invisible, these Amazonian people in motion have continued to mobilize to protect their territories, livelihoods, and cultural identities by defending their own proposals for a future characterized by new forms of governance, social innovation, land uses, and goods. This is done through traditional national political channels, and seeking cross-basin partners and international allies.

14.4 Amazonian People on the Ground

The settlement patterns of Amazonian populations are highly complex and dynamic, including diverse patterns and forms of migration by peoples internal and external to the region, and between urban and rural areas. Contrary to the general understanding of the Amazon as a large, natural forest, the population is highly concentrated in urban areas, including large numbers of Indigenous peoples with complex links to the rural hinterland, a pattern that dates to antiquity. We first examine urbanization as a settlement form of significance in Amazonian antiquity, and the historically-rooted complex linkages between rural livelihoods and urban settlements (Sobreiro 2014; Campbell 2015b; Peluso 2012, 2017; Hecht *et al*. 2015). Finally, we examine broader settlement and migration patterns.

14.4.1 Amazonian urbanization in antiquity

Although the Amazon is perceived as a wild place with a biotic rather than human history, earlier sections of this Report (Chapter 8) have shown that humans have occupied the Amazon for at least 12,000 years, with very large populations (in many places much greater than they are today). Evidence of these populations includes extensive areas of ring ditch construction, numerous mounds, central plaza villages, extensive engineering works, widespread anthropogenic soils, humanized ecologies and biogeographies, celestial observatories, and extensive mastery of long-distance integrated water-based travel. Material culture included artistic masterpieces, gold metallurgy, ceremonial burial sites, a complex suite of domesticated and semi-domesticated plants, and a sophisticated pharmacopeia, all evidence of complex civilizations. The populations of the Amazon declined by more than 90% due to epidemic diseases after contact with Europeans (Denevan 1992, 2003; Clement *et al*. 2015), obliterating knowledge systems and tropical ways of being that also included complex polities and urban life (Whitehead 1994; Heckenberger 2009; Rostain 2009).

During the colonial period, Amazonian urban settlements included a mix of Indigenous, religious,

military, and commercial models, reflecting geopolitical and economic strategies. Mission towns stretched from the mouth of the La Plata River up through much of the Amazon territories, especially the Bolivian Amazonia, to the mouth of the Amazon and Orinoco Rivers (Block 1994). Missions; often built on the ruins of past villages, trading centers, and towns; brought together native populations, profiting from their use in forced labor regimes. Trading centers established at river conjunctures became commercial entrepots, multiethnic urban sites that often included substantial Indigenous populations (Roller 2014). Many Indigenous populations never left these enclaves, and native, traditional populations continued to move back and forth between towns and cities and hinterlands and home villages. The persistence of this pattern today may reflect much deeper cultural roots.

Later, at the end of the 18th and beginning of the 19th century, the Brazilian Amazonian trade in enslaved people through the ports of Belém and Sao Luis rivaled the slave trade in Bahia and Rio de Janeiro (Salles 1971; Hawthorne 2010). Fugitive slave communities of Afro-descendant people sprang up deep in forests, the *Quilombos* that stretched throughout the lower Amazon, and all the way up into the Guyanas (Agostini 2002; Cavalcante 2011; De la Torre 2012; Florentino and Amantino 2012a,b; Hecht 2013; dos Santos Gomes 2015). The mercantile system, the military outposts that attended it, and ethnically complex towns and villages made up webs of "informal" trading networks, especially in the lower Amazon (La Torre López and Huertas 1999; De la Torre 2012). This provided the framework for the rubber-boom period of economic expansion that, for some decades, built on and expanded these settlements, and internal transportation systems, further disrupting Indigenous settlements and economies (see also Chapter 11). The towns established during these historic periods continued to dominate mostly riparian settlement patterns until the post-WWII period and the shift to terrestrial transport.

The extractive cycles that sustained frontier development in the Amazon after the 19th century contributed to a characteristic "disarticulated urbanism" (Godfrey and Browder 1997), with multiple urban centers dispersed within a shifting frontier economy. This focus on the global system in its modern form may obscure pre-existing Amazonian systems of livelihoods and also supporting agricultural systems and non-timber products that flowed into households and markets (Hecht 2007; Schmink and García 2015). Many Amazonian cities have undergone periodic cycles of expansion and contraction, export versus local orientations reflecting population movements into and from the countryside, following fluxes in global demand for particular forest products and the emergence of new local types of demand for local construction woods, Amazonian foods, and new export systems for products like *açai* (Sears *et al*. 2007; Uriarte *et al*. 2012). The durability of household and individual engagement within commercial, waged, and subsistence frameworks of the older pattern of urban-rural livelihoods, with traditional circular migration or multi-sited households, is a model of urbanism that differs from much of the temperate zone patterns of urbanization, although this polyvalence is also widespread in tropical Africa and Asia (Hecht 2014b).

After WWII, dynamic relationships between urban and rural spaces became increasingly shaped by the influence of nation-building and state-driven formalist planning. This involved new "showcase cities" like Ciudad Guyana (in Venezuela) and, after 1989, towns such as Palmas and the redo Goiania (Correa *et al*. 2019) designed as agro-industrial service towns and planned rural cities in private colonization projects (Jepson 2006b). These corporate planned cities complemented planned agrarian reform village settlements in Bolivia, Colombia (Caquetá), and Peru (San Martin) (Eastwood and Pollard 1985; Redo *et al*. 2011). A largely bifurcated Amazonian model of new settlement unfolded in which large-scale capital was encouraged by extensive subsidies, largely following the growth pole spatial planning ideas for areas of mineral extraction and specific urban areas like

Manaus (Hite 2004), while spatially extensive agrarian reform using a different territorial settlement model was expanding, linking poles through settlement corridors with road infrastructure. A fantasy of planned urbanization as part of infrastructure arrangements and the idea of orderly settlement has been attended by massive spontaneous settlement, a striking fluidity in boom towns, and their abandonment after resources are depleted or the speculative cycle in land runs its course. Rural settlement has gone hand in hand with new urbanization, expansion of illegal side roads, and the increased importance and growth of medium-sized towns that can permit interaction with rural resources, while continuing access to banking, health, and education systems, and periodic employment that reflects changing rural economies. While road and infrastructure development has "triggered" some spontaneous "infrastructure" towns, these settlements are notorious for their lack of urban and social infrastructure.

Migration flows in the region are largely characterized by the rural-urban shift of population (Maia and Buainain 2015). With nearly two-thirds of the population living at least part time in urban areas, the Amazon presents one of the highest rates of internal migration in Peru and Brazil; roughly 10% of the population migrated between 2005 and 2010 (IBGE 2018). The Amazon's emergence as the next energy frontier also changed the social and spatial composition of the Andean Amazon, as northern Peru, Ecuador, and Bolivia have become sources of employment and road speculation based on hydrocarbons, timber, gold, and coca production, whose labor demand is often seasonal.

14.4.2 The rural-urban continuum

Of roughly three million Brazilian inhabitants in 1960, only about 36% resided in urban areas; by 2010, 74% of the Amazonian population resided in towns and cities. A similar pattern is found in Peru (Menton and Cronkleton 2019), Colombia, and Ecuador. Current urban transitions in the developing world have several features that differ from the Euro-American pattern:

1) They have occurred extremely quickly (in a decade or two as opposed to centuries.
2) They were underpinned by different kinds of urban, rural, or forest functionalities from most European systems.
3) They reflect strong exogenous pressures at least as much as endogenous dynamics; that is, land wars, economic displacement, globalization, political violence, road development, and in some cases climate change (Brondizio *et al*. 2011; Hecht 2014b; Hecht *et al*. 2014; Kanai 2014; Mansur *et al*. 2018).
4) Rural areas, in areas with a deep settlement history, often have high population densities, strong relations to historical and current forms of family or small-scale agriculture and forest livelihoods, and deep regional histories. Examples include the estuary areas and the environs of Iquitos (Sears *et al*. 2007; Brondizio 2008, 2009; Pinedo-Vasquez and Padoch 2009; Brondizio *et al*. 2011).
5) Current urbanization processes are generally more globalized in terms of commodities, financial flows, and often labor (or its lack), and shaped by new production ideologies.
6) Urban export corridors and mega project labor depot construction sites; such as those near Maraba, Carajás in Pará, Ciudad Guyana, and Jari; are examples of the spontaneous urban expansion (i.e. unplanned satellite cities or peri-urban expansion) that accompanies planned cities. These settlements are often labor depots and informal service centers (Roberts 1995; Randell 2017; Weißermel 2020; Ulmer 2021).

Urbanization that builds on older livelihood mobilities involves newer forms of transport and communication (although Amazonian towns often still rely on their aquatic systems), while increasing dependency on state services for cash transfers, pensions, health and education services, and

periodic work, local markets, and a complex platform for livelihood construction, in a context of an often "wageless world" with high degrees of precarity. About 40% of Amazonian residents now fall below World Bank poverty lines (Verner 2013). This in turn has contributed to a need for enhanced levels of mobility and migration, a regular re-engagement with cities and markets, and to intensified rural-urban links and exchanges, often through the use of complex, informal social networks of kinship, clientelism, and patronage (Peluso and Alexiades 2005; Pinedo-Vasquez *et al.* 2001; Brondizio *et al.* 2011; Eloy *et al.* 2014; Tritsch and Le Tourneau 2016). Rural conflict, violence, and in some cases, climate change also contribute to this complex reengagement with a new kind of urbanism and new rurality, where both city and country engage in forms of production that may mimic each other, with increasing similarities in production and consumption patterns. The urban growth of *açai* palms and other foods, and the complex of products generated in the dooryard garden, a kind of "open-air laboratory," often mimic rural household subsistence patterns (WinklerPrins 2002; WinklerPrins and de Souza 2005; Lewis 2008).

14.4.3 Living and livelihoods in the urban-rural matrix

Amazonian urban studies are in their infancy, especially compared to the mass of research on Latin American coastal cities and capitals. Urban processes clearly have profound implications for regional development, conservation, and livelihoods. The complex dynamics of circular migration, multi-sited households, and strong rural-urban interaction and dependence are widespread in the Amazon and throughout the tropics, as depicted in Figure 14.3 based on a study in Iquitos, Peru. Several insights help characterize current dynamics we see in "embedded urbanization" (towns and cities historically rooted in their regional livelihood systems) versus "service centers" (labor depots and export cities linked to mega development construction sites, oil camps, and export enterprises). First, the increase in multi-sited households has blurred distinctions

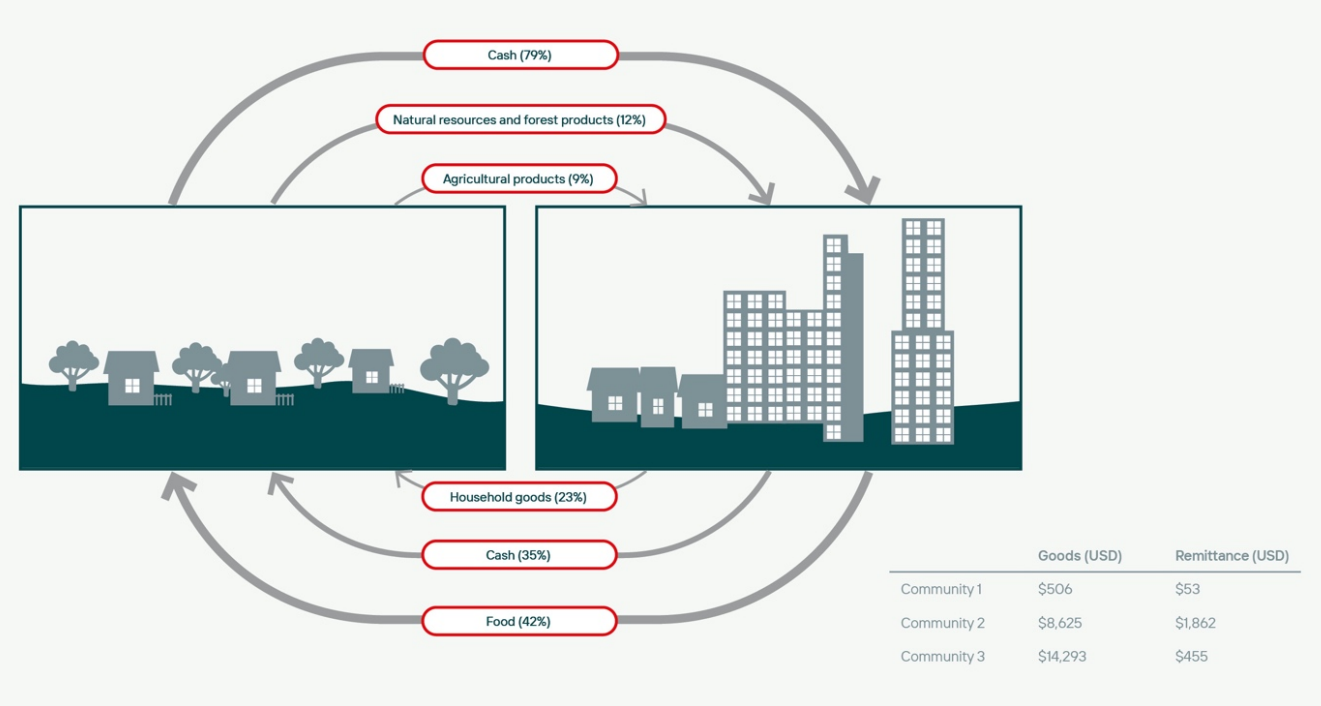

Figure 14.3 Remittances and Gift Flows Between Iquitos, Peru, and Rural Communities. Adapted from Gregory and Coomes 2019, 298.

between rural and urban areas, making peri-urban areas and peripheries the intersection of new forms of livelihood construction. This includes forest, agricultural, urban and rural waged livelihoods, and petty commerce and state transfers. When observed from the perspective of families, the Amazon region is indeed a 'rural-urban continuum.' Family networks shape the urban and rural landscapes of the region, supporting intense patterns of circulation and exchanges across short and long distances. However, interactions between people and families in rural and urban areas vary significantly in the region, as a function of geography and transportation, with the density and frequency of interactions proportional to proximity to cities and the type of transportation available (Padoch *et al*. 2008; Parry *et al*. 2010; Eloy *et al*. 2014; Nasuti *et al*. 2015). Independently, rural/resource economies are intrinsically connected to urban hubs, involving social networks between extended families, intermediaries, market brokers, and corporations (such as *açaí* or Brazil nut exporters); these interactions, depicted in Figure 14.3, are behind large segments of the regional economy and social life, generating high-value regional economic chains in fishing, fruit, and regional and international non-timber forest products.

Rural-based extractive activities such as logging, gold mining, and fisheries are now important sources of employment and income for urban residents. Life in most rural communities has become a reflection of life in low-income urban neighborhoods and vice-versa. Seasonal economies are especially important to families (e.g., *açai* and fish commercialization along the floodplains, mining, harvesting, construction work); seasonal mobile economies tend to be highly gendered, predominantly dominated by men. Almeida (2011) has documented the dependence of Brazilian urban populations on resource configurations for Belém and Manaus, showing the extent of travel, seasonality, and gender division in these systems.

Several factors affect rural-urban interactions and urbanization in different parts of the region, including the increasing availability of inter-municipal transportation and personal transportation (motorcycles, small boats, cars), kinship networks, access to market opportunities and market niches, access to cellphones and communication technology, availability of public services and education, and life-style. A continuing dynamic is the marginalization of small farm agriculture in the Amazon except in peri-urban areas, areas with traditional tenurial regimes, more traditional regional settlements, and those close to historic urbanizations. More recent colonist settlements have been characterized by very high levels of landownership turnover, close to 72% (Yanai *et al*. 2012, 2020), high deforestation, and continuing rural violence. Infrastructure development, such as dams, continues to displace people from rural areas (Chiavenato 1993; Sousa Júnior and Reid 2010; Carrero and Fearnside 2011; Fearnside 2016; Atkins 2017; Ferrante *et al*. 2020).

The peri-urban and peripheries have become new, central forms of livelihood construction in the Amazon's low-income urban neighborhoods, such as in Belem, Santarem, Tefe, Rio Branco, Manaus, Macapa, Coca, Leticia, Iquitos, Pucallpa, boom towns in the ambit of the oil axis of Ecuador (Lago Agrio), the smuggling town of Leticia, infrastructure development hubs like Marabá, and drug entrepots like San Jose de Guaviare (Cuesta Zapata and Trujillo Montalvo 1999; Armenteras *et al*. 2013), and ports on the Putumayo. These peri-urban and household agroforests are increasingly important for food security and petty commerce under conditions of precarity (Emperaire *et al*. 2012; Madaleno 2000), the low wages that accrue to both urban and rural waged work, and the volatile and generally low prices for agricultural or forest products.

Another key finding is that local ecological knowledge and complex production systems support rural and peri-urban livelihoods and agro-diversity in the Amazon**.** Multifunctional agroforestry, forest, and aquatic management systems

form both rural and peri-urban production systems. These multi-strata and multi-species systems of natural resource exploitation can incorporate small stock, stagger harvest times, have labor flexibility, engage local fisheries, and cycle materials (Pereira *et al*. 2015; Coomes and Barham 1994; Pinedo-Vasquez *et al*. 2002; Padoch *et al*. 2008; Perrault-Archambault and Coomes 2008; Manzi and Coomes 2009; Coomes *et al*. 2010, 2015; Vogt *et al*. 2015, 2016). The different, varied forms of rural, peri-urban, and urban agriculture are important providers of agro-diversity conservation, and other forms of ecosystem services (Padoch and Pinedo-Vasquez 2010; Beyerlein and Pereira 2018). Under-recognized, but increasingly important, are the roles these agroforestry-urban ecosystems play in the larger issue of environmental services support, such as in moderating heat island effects, which are certain to become more severe in the future, or wind and water infiltration (de Souza and Alvala 2014; Fernandez *et al*. 2015; Livesley *et al*. 2016), and, increasingly, food security. Urban-rural connections could be enhanced with better participation in local actions to support linkages for both urban and rural agroecological and production activities, as further discussed in Chapter 34.

Historically, Amazonians were defined by a one-dimensional occupation---such as farmer, fisher, rubber tapper, or wage worker, even as their identities and livelihoods were always more complex. Rural income has become more varied, reflecting changes in agricultural economies, and encompassing employment in urban areas, commerce, and various forms of cash transfer/benefit programs. Amazonian incomes come from agriculture and resource markets, but the role of remittances is increasingly important, including money sent to Amazonian kin from other cities or rural areas and, increasingly, internationally. About one fifth of Ecuador's population resides overseas, as does a similar proportion of Venezuelans, and their remittances often exceed regional direct foreign investment funds (Hecht 2014b; Hecht *et al*. 2015). Almost 4 million Colombians live outside the country, which has also had very high rates of internal displacement (Ibáñez and Velez 2008; Ibáñez and Moya 2010; Sánchez-Cuervo and Aide 2013). Incomes come from different combinations of agricultural/resource-based activities, access to urban employment and market-niche opportunities, education, health services, and other arrangements (Eloy *et al*. 2014; Padoch *et al*. 2008). Substantial numbers of Brazilian families depend on conditional cash transfer programs such as *Bolsa Familia* and *Bolsa Floresta*. As cash benefits have to be collected in urban centers, this has further strengthened connections between rural areas and cities. These conditional cash transfers have become a central poverty alleviation practice in the region.

Rural populations remain stable in some parts of the region while aging in others, with different patterns of gender balance in out-migration. Geography/distance make a difference in terms of the frequency of rural-urban interactions and mobility. There is increasing movement from more distant tributaries and roads towards the peri-urban areas of medium to large urban centers, with growing population density in peri-urban areas as sites of settlement for small scale production and positioned for access to urban financial, medical, and educational services (also related to accessing cash transfers programs). The extent to which these processes are leading to the aging (or elder/children predominance) of rural areas is still unclear. In many rural areas, the "feminization" of the rural is discussed, as women remain in rural areas (Zimmerer 2014), but gendered patterns of migration require deeper analysis. In areas of Ecuador and Colombia, female migration into domestic service and prostitution dominates (Barbieri and Carr 2005; Massey *et al*. 2006; Tacoli and Mabala 2010; Abbots 2012; Paerregaard 2015). Women sometimes dominate in rural-urban migration as domestic servants, teachers, and public functionaries; migrate with their children for schooling, leaving men behind in the rural areas; or migrate to facilitate government transfers (Schmink and García 2015; Padoch *et al*. 2008, 2014; Brondizio *et al*. 2011).The intersection of economic and infrastructural precarity, high rates of violence and crime, and the effects of climate

change particularly impact low-income populations in rural areas and urban peripheries. These vulnerabilities have been enhanced by COVID-19 impacts on local cities and circular migration.

14.4.4 Urban environmental issues

Urban sanitation infrastructure in the Amazon is precarious at best (Brondizio 2016; Mansur *et al*. 2018; De Lima *et al*. 2020). Vast majorities of municipalities have less than 20% sewage collection (Mansur *et al*. 2016), and these issues are becoming more complex, with increasing patterns of climate related "deluge rains" that cause extensive flooding, overwhelming the infrastructure that does exist, and hammering settled areas near storm and flood-vulnerable waterways. Strong droughts can undermine rural production of various kinds, and with their associated high heat island temperatures make urban areas lethally hot, more than 5°C degrees above adjacent nonurban areas (de Souza and Alvala 2014). As urban areas grow, issues of pollution become more extreme, and these are reflected in increased indices of waterborne disease, such as recent outbreaks of cholera, and mosquito-borne illness like dengue, Zika, and malaria. In addition, worrisome problems like mercury contamination, oil contamination, and industrial pollution are on the rise, as is concern over COVID-19 (Howard *et al*. 2011; Bourdineaud *et al*. 2015; Webb *et al*. 2016; Arrifano *et al*. 2018). Air quality questions are becoming more important as vast fires proliferate in the dry season. Limited visibility is only part of the problem; respiratory problems such as asthma worsen and hospitalizations increase (Irga *et al*. 2015; Butt *et al*. 2020). Long term impacts of prolonged forest fire smoke are now a large public health question, and again enhance vulnerability to COVID-19.

The shift into aquaculture in the form of tilapia ponds near Peruvian towns is also raising concerns about resurgences of malaria (Maheu-Giroux *et al*. 2010). Sea level rise is affecting the lower Amazon estuary settlements with "sunny day" flooding and worsening water quality (Mansur *et al*. 2016; De Lima *et al*. 2020). These problems are compounded by high levels of criminality. Amazonian urban areas experience a great deal of crime and violence, reflecting the dynamics of poverty and clandestine economies, including the presence of drug traffickers or organized crime. A recent report by a Mexican-based NGO (*El Consejo Ciudadano para la Seguridad Pública y la Justicia Penal*) places the Amazonian capitals of Manaus (23rd), Belém (26th), and Macapá (48th) among the 50 most violent cities in the world (41 of which are in Latin America) (Seguridad, Justicia y Paz 2021).

This section has summarized the "embedded urban-rural Amazon," its livelihood dynamics, and some of its vulnerabilities. The complex interactions between urban waged work and natural resources livelihoods in subsistence, exchange and commerce, city services, state transfers, and the dynamics of rural survival are linked to multivalent forms of income and identities. These dynamics suggest that there are many ways that Amazonian peoples' resources and environmental services can be simultaneously supported to improve welfare. Recent panel studies of welfare in the Brazilian Amazon in urbanizing and rapidly deforesting areas show that urbanization does not lead to positive changes in human welfare, and that state agricultural investments also undermine welfare as they marginalize small scale producers (Silva *et al*. 2017). This information, coupled with recent studies on the socioeconomic impacts of gold mining (Escolhas Institute 2021) and large-scale agro-industrial development, suggest a problematic set of paths of Amazonian transformation in terms of their development benefits, while their environmental and social costs are high; a huge development externality. The poor infrastructure conditions of many towns, and the precarity of incomes, may make integration with rural life both an economic necessity (a safety net in the formal absence of one, and indicative of a new kind of rurality [Rivera and Campos 2008; Hecht 2009; Pinedo-Vasquez and Padoch 2009]) and also important for overall health by reducing exposures to pathogens.

14.4.5 Migration: Formal, private, and spontaneous

To western eyes, the Amazon has stood as an El Dorado to adventurers and to the state, a refuge from *minifundia*, a place for new beginnings, of insurgencies and prisons, of opportunity and its negation (see Figure 25.1 on Amazon worldviews over time, Chapter 25). There are now literally thousands of planned and unplanned settlements, ranging from formalized private colonization, corporate planned cities, and state-led colonization, to informal settlement, boom town explosions, landless occupations, and do-it-yourself *de facto* agrarian reform (Perz *et al*. 2010; Simmons *et al*. 2010).

Early phases of Amazonian colonization involved the importation or dislocation of labor at the regional level through Indigenous peonage, indenture, and slavery; and African slavery for forest collection and plantation agriculture (MacLaughlin 1973; Acevedo and Castro 1997; Salles 2005; Roller 2010, 2014). This instigated another form of "hidden urbanism," begun initially around Afrodescendant communities located deep in forests, the *Quilombos* that stretched throughout the lower Amazon, and all the way up into the Guyanas (Agostini 2002; Cavalcante 2011; De la Torre 2012; Florentino and Amantino 2012a,b; Hecht 2013; dos Santos Gomes 2015). The rubber period stimulated formal state and private colonization in Bolivia (Lavalle 1999), and state-organized movements into Peru's Selva Central (Santos-Granero and Barclay 1998). Colombia's Putumayo became especially infamous for its Indigenous slavery and the international political fallout that this occasioned (Taussig 1984; Goodman 2010; Hecht 2013). Brazil, and especially the western state of Acre, which was a key supplier of rubber for the global market, relied on massive relocation from Brazil's northeast, Indigenous enslavement, and even involved workers from the US. More than a million people were resettled in the Amazon under various labor regimes, spatial configurations, forms of coercion, and labor migration of multiple types, including US workers to assist with railroad construction (Weinstein 1983; Coomes and Barham 1994; Ferreira 2005; Neeleman *et al*. 2013). Similar forms of settlement and labor recruitment, again from the northeast region of Brazil, were reanimated during WWII (Garfield 2010) for rubber supply for the US after Asian supplies were no longer available.

The Amazon has been open to foreign settlement since the 19th century when it embraced American slave holders (Guilhon 1987; Hecht 2013); settlers included Japanese, Mennonites, people from the former Ottoman empire, Syrians, Belgians, French, eastern bloc refugees, and in the Guyanas, South Asians (especially Indians) and Hmong, among many others. Although the Amazon shows a high degree of internal national migration, it also has a long history of cosmopolitan migration, both permanent and short term (Hecht 2013; Benchimol 1998). The Korean company towns that sprang up to support the construction of Korean-financed dams in Ecuador provide an example of a controlled, and probably impermanent diaspora, and the recent arrival of Haitian migrants and a Venezuelan diaspora into Brazil, Ecuador, and Colombia reflect the political and environmental drivers of migration.

Migration can be categorized as a combination of push and pull factors. The standard discussion of push factors emphasizes livelihood problems, the issues of *minifundia*, environmental issues faced by smallholders in Andean zones and the Brazilian northeast, political pressures from the "*Violencia*" in spontaneous migrations in the Colombian massive occupation of the Guaviare (Molano 2019), and more general displacements of up to 5 million people in Colombia. Rural instabilities and land rights were instrumental in fueling insurgencies in Latin America in the post-war period (Bolivia, Brazil, Colombia, Peru). Agrarian reform as frontier settlement would become a key social policy initiative, and a territorial strategy (De Janvry 1981; Pacheco 2009; Hecht and Cockburn 2011).

Modern colonization policies have emphasized pull factors for the most part, offering land, credit,

and production assistance accompanied by large scale public relations campaigns. These programs have fed a narrative that frames the Amazon as an "empty" and "uninhabited" space, echoing hundreds of years of geopolitical and settlement language. With the idea of "he who has, keeps" ("*Uti Possedetis*" in Roman law), as awareness of resources grew and infrastructure expanded, colonization took on a geopolitical cast ("*Integrar para não entregar*" or basically "use it or lose it", "Integrate to avoid handing over"), and a continuing alternative to agrarian reform in more developed areas in virtually all Amazonian countries, to avoid expropriation of the terrains of landed elites in more settled areas where such elites maintained significant power. Further, colonization appeared to address serious social inequalities and helped frame states as modern rather than oligarchic entities actively seeking to redress inequality in access to land, which was, at mid-century, a striking feature of Latin American societies. It was this "strategic" use of colonization within the different framings and needs of national economies, from geopolitics to counter-insurgency to eco-settlement, that gave Amazonian settlement its highly erratic quality and its terrains of shifting, and often contradictory, policy. Yet, this very appealing political narrative was important, even as many colonization areas became rife with conflict. Erratic public policy, combined with volatility for small farm prices, environmental and other production problems, and a general sense of abandonment have been central in the emergence of clandestine economies of multiple types (Betancur-Corredor *et al*. 2018; Caballero Espejo *et al*. 2018; Gootenberg and Dávalos 2018; Kolen *et al*. 2018). Clandestine economies can be seen as highly labor absorbing as compared to agro-industries and livestock production, and thus are often vigorously defended, regardless of environmental or health consequences. The empty land narrative, which was foundational for all the other settlement arguments, ignored the fundamental reality that these lands were inhabited by Indigenous populations, traditional peoples, previous settlers, and Afro-descendant communities who made claim to their historical territories, sometimes based on earlier treaties signed with defunct empires, overlapping sovereignties, and to appeals to current land rights laws by previous settlers and new recognitions of territorial claims. Settlement policy and practice, as we mentioned, has undergone significant program shifts, and this is perhaps best exemplified in Brazil, which has by far the largest number of formal settlements, extensive informal settlements, and settlements declared by local states (Box 14.5). The geographic distribution of the various forms of settlement is shown in Figure 14.4

One of the most consistent outcomes in settlements has been the high degree of colonist attrition, which is marked in both formal and informal colonist settlements, with levels of turnover as high as 77% (Carrero and Fearnside 2011). Thus, because most farm lots changed hands at least once, and often many times, deforestation and farm consolidation processes do not reflect the action of one single household (defying the classic Chayanovian models of household behavior), but rather of successive households or landowners over time. The models of settlement currently on offer suggest little by way of settler security, but fulfill important ideological and aspirational functions, even as they reproduce patterns of landholding inequality in most contexts, as we also see in Chapter 15.

14.4.6 Social movements, development paradigms, and governance

Since colonial times, Amazonian social movements have struggled for rights to land, livelihood, physical security, autonomy, and ultimately more inclusive and sustainable development approaches (Box 14.6). In the 20th and 21st centuries, authoritarian, illiberal governments and regional elites severely repressed social movements throughout the region, in many cases denying rights to traditional territories and assassinating their leaders, as in the iconic case of rubber-tapper leader Chico Mendes in 1988 (Vadjunec *et al*. 2011; Hecht and Cockburn 1989) and a decade later, activist nun Dorothy Stang who also died in

Figure 14.4 Distribution of settlements by type in Brazil's Legal Amazon region. Source: Yanai et al. 2017.

Box 14.5 Traditional and environmental settlement programs in the Brazilian Amazon

Brazil's National Institute for Colonization and Agrarian Reform classifies federal settlements into two groups; the "traditional" model consists basically of gridded areas divided into distinct parcels or "*lotes*," usually part of a plan involving an *agrovila*, a kind of service center. These involve settlement projects (PAs), integrated colonization projects (PICs) and directed settlement projects (PADs). The last includes resettlement projects. These settlements permit colonists to receive formal title after a few years. The justification for these settlements usually involves social justice arguments, agrarian reform concerns, modernization arguments, and pressures for regional food production. These settlements are based on private property regimes for the most part, and are dominated by annual crops and pasture (see Chapter 15). Land rights associated with spontaneous occupation usually involve clearing land for claiming and recognition of the holding by INCRA.

Environmentally distinctive settlements arose more recently in Brazil due to the pressure from traditional populations to recognize historical land rights for forest-based populations and their livelihoods. These kinds of settlement are meant for traditional populations, to support activities with low deforestation impacts, such as agro-extractive activities and sustainable forest management (Agro-Extractivist Settlement Projects [PAEs, *Projetos de Assentamento Agroextrativista*], Sustainable Development Projects [PDSs, *Projetos de Desenvolvimento Sustentável*] and Forest Settlement Projects [PAFs, *Projetos de Assentamento Florestal*]). These can either be new kinds of settlements or involve regularization of existing holdings, which are often characterized by collective rights or long-term access rights. Environmentally distinctive settlements can be installed in areas of primary forest, whether or not the areas have previously been inhabited by traditional populations, and may be organized around *agrovilas* (planned agricultural villages) where the families live. Lots destined for the settlers' production are located elsewhere in the settlement, in some cases far from the *agrovilas* (Silveira and Wiggers 2013). Settlements with collective land rights can be divided into individual lots if settlers request an individual area, or if division into lots is needed to avoid territorial conflicts between settlers (Guerra 2002).

Environmentally distinctive settlements are infused with the language of sustainability, and they do deforest less than the tradition settlements, but the dynamics of deforestation follow the classic pattern: taking out valuable timber, clearing for annual cropping and/or pasture, fragmentation of forests, and over the long-term, shifting into pasture. These proximate drivers can also reflect indirect non-legal processes such as illegal logging, land grabbing through clearing to claim and other forms of land fraud, and single owners acquiring multiple lots. Recurrent problems include limited credit for activities other than livestock, poor levels of technical assistance, limited monitoring of ownership patterns and clearing sizes, and cutting into protected areas. The literally devastating result is that settlements contributed to 17% of the total forest clear-cutting and 20% of the total carbon lost in the Legal Amazon (Yanai *et al*. 2017). Despite only 8% (397,254 km^2) of the Legal Amazon being occupied by settlements, and despite most of the cumulative deforestation (83% or approximately 870,000 km^2) being outside of the settlements analyzed, the contribution of these settlements to deforestation rates and to carbon loss were both substantial and increased over time. Most of the carbon stock loss (2.2 Pg C or 86% of the total carbon loss in settlements) occurred in settlements situated in the Arc of Deforestation, where deforestation pressure is intense and the number of settlements is large (2,190 settlements or 80% of the total) (Yanai *et al*. 2017).

A continuing pattern of assassination of forest defenders (Staff 2007; May 2015). Far less noted, in the absence of international profiles, have been the hundreds of assassinations of peasant leaders. Brazil, and the Pan-Amazon more generally, leads the world in the frequency of murders of human rights activities, Indigenous rights leaders, and forest guardians according to Amnesty International (2020) (see also Chapter 16).

Democratization in the 1980s and 1990s allowed Amazonian civil societies greater opportunity to participate in policy debates in both rural and urban areas. A high point took place in Belém, where, between 1997 and 2001, a vibrant participatory budgeting initiative was implemented to discuss small urban infrastructure for community-determined projects (Silva *et al.* 2015). This kind of initiative lost space, however, with the expansion of national government support for large-scale infrastructure in the 2000s. Movements throughout the Pan-Amazon have increasingly mobilized to address the destabilizing impact of these projects, and to push for improved environmental governance and alternative regional development models.

In rural areas, new kinds of land claims gained traction following Brazil's 1988 Constitution, which recognized the territories of many kinds of traditional peoples, including Indigenous and Afro-descendent peoples, rubber tappers, non-timber forest product extractivists of many kinds, traditional fishers, and communities in sustainable development units as we have discussed earlier. Accompanied by better protected area legislation, this produced new conceptualizations of "socio-environmental" forms of conservation in inhabited landscapes (Box 14.6). More than 70 million hectares in Brazil alone were conserved with this model, which provided the legal basis for contesting the expansion of land grabbing associated with soy and cattle ranching, and the expanding road system. Similar language and concepts spread through the Pan-Amazon, building on previous experiences of resistance by Andean Indigenous groups, as countries shifted away from their earlier authoritarian regimes. These gains are now under threat everywhere in the Amazon, and especially Brazil.

Indigenous groups, in particular, have increasingly turned to international organizations and trans-basin organizing to pressure governments to respect human rights, citizenship, and territories in a context of increasing violence and threats to their territorial and human rights. As these words were written in 2021, thousands of Indigenous peoples and their supporters were protesting in the Brazilian capitol against the controversial law PL 490 under consideration by the Brazilian legislature, which would undermine the exclusive rights of Indigenous peoples to their lands, and impose an arbitrary time frame of occupation and demarcation at 1988 (the year Brazil's constitution was approved) to determine Indigenous land rights (Castro 2021). PL490 would permit mining and timber concessions on Indigenous lands.

14.5 Conclusions

The great Brazilian writer Euclides da Cunha noted that Amazonian countries would never really come into their own histories and identities until they began to understand the implications of their Amazonias (Cunha 1907). The Amazonian transformations presented in this chapter are framed by the complexity of the Amazon's environment, the antiquity of human co-existence with the region's natural resources as outlined in earlier chapters, and now the powerful forces that have imposed dramatic, and in many ways novel, configurations on Amazonian peoples and nature, especially over the past half a century. While forms of government have shifted among authoritarian, illiberal and liberal regimes from the left and the right, the Amazonian question remains essentially the same: What to do with a vast illegible national territory, infused with the myths and realities of riches, inhabited by largely obscure populations? What to do with an ecologically exuberant, largely incomprehensible terrain to planners, capitalists, farmers and the political classes

Box 14.6 Insurgent citizenship: Social movements and social change

While the fiscal crisis of the 1980s and 90s implied diminishing availability of funds for big infrastructure (except roads), this situation started to change in the mid-2000s, especially in Brazil. With the creation of the *Programa de Aceleração do Crescimento* stimulus program in 2007, major funds became available for both urban and regional large-scale infrastructure. These initiatives have met with massive and highly-publicized popular resistance from the lowlands to the Andes (Canessa 2014; Jerez *et al.* 2015). In the mid-1980s, social and environmental movements joined together to protest the Cuiabá-Porto Velho road (BR-364), attracting international and national attention (Hecht and Cockburn 1989; Hochstetler and Keck 2007; Schmink and Wood 1992). In Ecuador, the Waorani people have been struggling for reparations from Texaco/Chevron and PetroEcuador for the devastating impacts of drilling operations, including a lawsuit under litigation in US court since 1993 (Pellegrini *et al.* 2020). More recently, grassroots groups have protested the construction of a road in Bolivia's Isobore Sécure National Park and Indigenous Territory (TIPNIS) (McNeish 2013), the Camisea pipeline in Peru (Urteaga-Crovetto 2012), and the mega-hydroelectric power plan of Belo Monte in Brazil (Fearnside 2017a), to name just a few contentious projects.

National and subnational governments in the Pan-Amazon have generally resisted attempts to create more robust participatory institutions through which affected communities can engage in informed consent around big infrastructure projects (Bebbington *et al.* 2018a,b). In Brazil, community participation in decision-making about such projects is almost entirely reduced to environmental permitting hearings late in the process, with little practical impact on decision-making (Abers 2016; Zhouri 2011). Land-use zoning efforts, popular in the 1990s, were an opportunity to engage community participation, but these plans were frequently overturned or approved without effective participation (Bratman 2019).

In the 2000s, left-leaning national governments throughout the region promised a more participatory and sustainable approach to mega-projects. One example was the BR-163 road paving project in Pará and Mato Grosso (Brazil). The federal government approved a Sustainable Development Plan for the region designed by civil society groups through extensive consultations. Unfortunately, it was never implemented (Abers *et al.* 2017). This area was critical due to the threat of soy expansion into smallholder, Indigenous, Extractive Reserve, and *ribeirinho* lands. Similar promises were made about the Belo Monte dam, and a Regional Development Plan for the Xingu (PDRSX) was modeled after the defunct BR-163 plan. Civil society groups, however, have reported difficulties getting their proposals approved through the participatory mechanisms created to implement the plan (Pereira and Gomide 2019: 202-22), and the definitions of 'sustainability' are themselves contested (Bratman 2019). Later, with the new federal administration, the BR163 became famous for its "Fire Day" (*Dia de Fogo*) where fires were actively set in defiance of regulations against clearing and burning along the road.

In the absence of effective participatory structures, local and especially Indigenous movements have sometimes made headway through protest. The Indigenous March of 1990 (*Marcha por el Territorio y la Dignidad*) influenced Bolivia's forestry law (1996) and struggles for territorial recognition and control (Barroso 2013). In Ecuador, *La Gran Marcha* of 1992 won the recognition of Indigenous land rights. In late September 2021, lowland groups in Bolivia again marched, not only for land and autonomy, but to protest environmental destruction. Recent protest "caravans" by Indigenous populations in Europe have focused on the impacts of European consumption patterns, the encroachment on lands and violence

against Amazonian Indigenous peoples, and the lack of prior consent in the implementation of mega projects. These contributed to questions raised in the EU about MERCOSUR trade agreements, in light of Amazonian destruction and human rights problems.

Another way that Amazonian movements have influenced political institutions is through the dissemination of the concept of *Buen Vivir,* which has been included in the constitutions of Ecuador, Bolivia, Colombia, and Peru. Throughout the Andes and Amazon, Indigenous cultures have concepts of a healthy life based on traditional knowledge and lifeways, and of care for the environment; this includes Quechua (Ecuador), *Sumak Kawsay;* Aymara (Bolivia), *Suma Qamaña;* in Guarani, *Teke Porã;* and in Baniwa (Brazil), *Manakai* (Cruz and Pereira 2017; IHU 2012). These ideas have been translated into Spanish as *Buen Vivir,* a paradigm that deprioritizes economic growth and puts people's lives, nature, and basic rights to education, health, and social equity at the center of development (Alcantara and Sampaio 2017: 232). These ideas reside at the heart of many Amazonian cultures and represent different kinds of "episteme," a normative and foundational principle that informs behavior. *Buen Vivir* is an important example of how social movements can contribute to debates about alternative models of development.

located in the capitals, along the coasts, interiors, and in the mountains, who were to decide its fate? And thus was the Amazonian thrust into the current world through the ideologies and practices of modernization, and the massive ecological, sociocultural, and economic simplifications that have attended it over the last 50 years or so. The simple answer about the Amazon lay in the recipes of modernization writ everywhere in its various incarnations. In the Amazon, what this meant was to shed the fabric of Amazonian lives, and turn complexity into monocultures, mines, degraded pastures, struggling small farms, and precarious cities. The largest tropical forest on the planet became among the most urbanized places in the developing world and full of hyper-simplified landscapes.

For modernization to advance, the complexity of forests had to be reduced from multiplicities, to landscapes of a few species at most, and much of this devoted to animal feed of soy, corn, and grass. Over huge areas, lands would be freed from their diversity by a kind of hellfire that would swirl their millennia of DNA and carbon bodies into choking ash, enough to darken cities hundreds of kilometers away. This was done in the name of many things and contested meanings: bringing civilization to the tribal, religion to the heathen, taming the wild, national sovereignty, nation building, geopolitics, poverty alleviation, national integration, agrarian reform, territorial governance, market triumphalism, and transformation of the means and the modes of production into a mostly capitalist idiom. It also meant that the Amazon would become one of the largest planning terrains on the planet, second only to China, and in many ways, the graveyard of failed, and largely forgotten regional plans, that had the problem of constantly remerging for bad reasons and bad results. Modernization has moved the Amazon from its traditional forms into a caricature of modernity; urban, secular, waged, and monetized, but largely lacking the distributional structural change and the larger welfare improvements that politically and economically justified ravaging Amazonian lands and waters, a failure exemplified by the current astronomical COVID-19 mortality. 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, key elements of their foreign exchange. This has been achieved through the expansion of mining, fossil fuel extraction, monoculture agriculture, speculative frontiers and infrastructure to support the export and flight of national wealth, and the creation and re-creation of inequalities. Large, clandestine economies of plu-

ndered timber, stolen lands, illegal gold and its mercurial waters, furtive coca production, and continuing streams of migration, seasonal labor, and a bricolage of urban and rural livelihood tactics frame the contours of the precarity for much of the region's population. The modernization development model as it is currently deployed incarnates externalities (unaccounted for environmental costs) not as a "bug," but rather as an essential feature of the process, with the true costs borne at multiple scales, from local ecological destruction and extinctions, social dislocations, and immiseration, to regional and global climate change. The prevailing definitive forms of destruction lock out alternative ideas and practices that regional populations advance as "multiple" and "hybrid forms" (what is often called a "pluriverse") of modernities based in systems of local knowledge, social innovations, and equitable outcomes, that support environmental services rather than the systems of almost colonial plunder and wealth extraction which currently dominate.

In spite of their importance, cities, towns, and villages remain more or less out of the discussion, even as they are now home, at least part of the time, to the large majority of Amazonian inhabitants. How these urban areas will adapt, how they shape their hinterlands, and how people's complex livelihoods will unfold under increasing social instability is still largely off the radar. Moving forward, the insights and interests of local people, both urban and rural, native and migrant, and especially the region's diverse and highly-organized Indigenous peoples, Afro-descendants, riparian, and urban dwellers among many others, must serve as the touchstone for a dramatic shift in the approach for sustainable, resilient development and conservation in the Amazon.

14.6 Recommendations

- Most of the wealth generated in the Amazon is transferred away from it. The modernization model that has largely prevailed since the 1960s, where tropical environments and the people of the region were largely viewed as obstacles, has generated severe geo-ecological damage, social inequalities, and economic dysfunction in the form of corruption, extensive clandestine economies, and failing institutions. This model of monocultural uniformity and extractivism has entwined Amazonian development with climate change, economic vulnerabilities, and deep employment instabilities. A more just, inclusive, and resilient future for the region calls for confronting these legacies and rethinking development, not only in a regionally-integrated way but also in terms of multiple local realities (or forms of modernities or "pluriverses"). Such an approach calls for aligning regional-level policies with support for place-based initiatives addressing social and environmental problems on the ground. At the regional level, the alignment of supportive state policies, regional institutions, and national/international approaches, such as supply chain certifications and agreements, green markets, and conservation finance, can contribute to promoting clarity in environmental governance, economic incentives for sustainable production systems and value aggregation, and addressing infrastructural deficiencies. At the local level, support for place-based initiatives and organizations can contribute to sustainable resource management and value aggregation that generates employment and inclusion where resources are produced. As with previously successful efforts to control deforestation, institutional alignment from the municipal to federal level is crucial.
- Amazonian development projects need to engage in full cost accounting of the social and environmental impacts prior to licensing, should follow informed consent practices for affected communities, and should plan for realistic compensation for harms produced by projects. Implementing and requiring participatory input, through both existing and new institutional mechanisms, might also help such programs avoid pitfalls and deploy lessons learned.

- Amazonian towns and cities are neglected terrains in Amazon research and land use planning to guide their expansion. Information on the dynamics of Amazonian urbanization and its relationship to varying hinterland processes, such as land-use change, pollution, migration flows, resource demands, and impacts on biodiversity and watersheds is extremely sparse. The influence of urban areas on surrounding and distant landscapes varies significantly across historical-geographic contexts and does not follow the same conventions of urban dynamics in temperate zones. More concerted attention to understanding these processes is needed and should be shared throughout Amazonian countries.
- Most people in the Amazon live in cities with highly precarious and often ephemeral livelihoods, receiving income from multiple sources, including wages, petty commerce, state transfers, and remittances. These can include strong relations with rural and Indigenous areas, local fisheries, and subsistence or rural waged labor in agriculture, construction, illicit logging, gold mining and the coca economy. This economic bricolage is poorly understood, and policies can undermine parts of these income sources, radically enhancing already entrenched inequality. More participatory forms of urban development, and regional development more generally, and support for the inclusion of producers and resource users in value aggregation opportunities could help support complex livelihoods.
- Amazonian cities and their peri-urban areas are sites of agricultural production for subsistence as well as sale. Amazonian towns often have significant areas of agricultural and agroforestry production within them. In spite of their importance in food production and employment, both are largely "policy orphans". Greater promotion and creation of open space and forms of urban agroforestry could enhance food security under increasingly precarious conditions. Peri-urban and close in hinterland production should be supported with credit and infrastructure for transportation, commercialization, and value aggregation. These could build on local knowledge and practices, such as support for the thousands of local associations and cooperatives engaged in such efforts.
- Given the intensity of tropical urban heat island effects, multipurpose urban arborization (which can also help with diversifying food sources, promote thermal comfort, minimize the effect of extreme weather, and enhance wildlife habitat) should be a priority. Use of local knowledge systems in tree selection and management can build on multiple strategies for urban comfort under increasing temperatures. Arborization can provide elements of an urban conservation strategy.
- Amazonian cities lack basic water and sanitation infrastructure. In light of the billions of dollars spent on Amazonian infrastructure to support export corridors, a much larger percentage should be allocated to urban systems. In addition to improving quality of life and lowering sewage loads to rivers, such investments should increase resilience to extreme heat and flooding events.
- While deforestation clearly remains a problem, the Amazon is also the site of significant toxic pollution, including mercury and arsenic from gold mining; and pesticides, herbicides, and other biotoxins from agro-industrial systems which contaminate both land and water. In ore mining areas, extensive water pollution, processing chemicals, and holding pools remain largely unregulated, and hydrocarbon extraction areas are famous for their impacts on air, water, and land. Urban port areas are also increasingly polluted. While in principle there are regulations that address these issues, for the most part they continue unabated. Better enforcement is necessary.
- One of the drivers of deforestation in the Andean Amazon is the displacement of coca producers, who move to escape enforcement of 'war on drugs' policies. This moves coca systems further into forests and across borders.

This fuels deforestation both through production and money laundering. The legalization of marijuana in many US states helped reduce criminality and illegal invasion of public lands, while providing taxable revenue.

- The insights and interests of local people, both urban and rural, native and migrant, are often overlooked. But these groups are generating alternative approaches to manage and restore landscapes, and 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.

14.7 References

Abbots EJ. 2012. In the Absence of Men? Gender, Migration and Domestic Labour in the Southern Ecuadorean Andes. *Journal of Latin American Studies* **44**: 71-96.

Abers RN. 2016. Conflitos, Mobilizações e Participação Institucionalizada: A Relação Entre a Sociedade Civil e a Construção de Grandes Obras de Infraestrutura. Textos Para Discussão IPEA 2231. Available at: http://www.ipea.gov.br/portal/index.php?option=com_content&view=article&id=28679.

Abers RN, de Oliveira MS and Pereira AK. 2017. Inclusive Development and the Asymmetric State: Big Projects and Local Communities in the Brazilian Amazon. *The Journal of Development Studies* **53**(6): 857–72.

Acevedo R and Castro E. 1997. Negros do Trombetas. Belem, UFPA.

Acker A. 2014. The greatest fire on Earth: How VW and the Brazilian military regime accidentally helped to turn the Amazon into a global political arena. *Revista Brasileira De Historia* **34**(68): 13-33.

Agostini C. 2002. Entre senzalas e quilombos: "comunidades do mato" em Vassouras do oitocentos. Arqueologia da Sociedade Moderna na América do Sul: cultura material, discursos e práticas. Buenos Aires: Ed. Del Tridente.

Albuquerque DM. 1999. A invenção do Nordeste. Recife/São Paulo: Fundação Joaquim Nabuco e Editora Cortez.

Alcantara LCS and Sampaio CAC. 2017. Good Living as a Paradigm of Development: Utopia or Alternative Possible? *Desenvolvimento E Meio Ambiente* **40**: 231-251.

Alexiades M. 2009. Mobility and Migration in Indigenous Amazonia. New York, Berghahn.

Alexiades MN and Peluso DM. 2015. Introduction: Indigenous Urbanization in Lowland South America. The Journal of Latin American and Caribbean Anthropology.

Almeida ALO. 1992. The colonization of the Amazon. Austin: University of Texas Press.

Almeida AW. 2011. Terras Tradicialmente Occupadas. Sao Paulo, TESEO.

Alvarez-Berrios NL, Pares-Ramos IK and Aide TM. 2013 Contrasting Patterns of Urban Expansion in Colombia, Ecuador, Peru, and Bolivia Between 1992 and 2009. *Ambio* **42**: 29-40.

Alves RJ, Rocha LC, Pontes A, *et al*. 2015. Estudo socioeconômico de comunidades da área do polo industrial de Barcarena, Pará, Brasil. *Enciclopédia Biosf*. **11**.

Amnesty International. 2022. Amnesty International Report 2020/21: The state of the world's human rights. Available at: https://www.amnesty.org/en/documents/pol10/3202/2021/en/

Andersson K and Gibson CC. 2007. Decentralized governance and environmental change: Local institutional moderation of deforestation in Bolivia. *Journal of Policy Analysis and Management* **26**: 99-123.

Andrade R. 2021. One river and 40+ dams: The China factor in the Amazonian Tapajós waterway. In: The Political Economy of Hydropower in Southwest China and Beyond. Springer, 275–293.

Andreoni M. 2020. Multiplying Amazon river ports open new Brazil-to-China commodities routes. In: Mongabay Series: Amazon Infrastructure, Amazon Soy Investigations, Global Commodities, Land rights and extractives. Published on November 19, 2020. Available at: https://news.mongabay.com/2020/11/multiplying-amazon-river-ports-open-new-brazil-to-china-commodities-routes/

Arenas-Mendoza HA. 2019. The Fumigations with Glyphosate in Indigenous Territories in Colombia. *Veredas do Direito* **16**: 11.

Arima EY, Barreto P, Araujo E and Soares B. 2014. Public policies can reduce tropical deforestation: Lessons and challenges from Brazil. *Land Use Policy* **41**: 465-473.

Arima EY, Walker RT, Sales M, *et al*. 2008. The fragmentation of space in the Amazon basin: Emergent road networks. *Photogrammetric Engineering and Remote Sensing* **74**(6): 699-709.

Armenteras D, Rodriguez N and Retana J. 2013. Landscape Dynamics in Northwestern Amazonia: An Assessment of Pastures, Fire and Illicit Crops as Drivers of Tropical Deforestation. *Plos One* **8**(1).

Armenteras D, Rudas G, Rodriguez N, *et al*. 2006. Patterns and causes of deforestation in the Colombian Amazon. *Ecological Indicators* **6**(2): 353-368.

Arrifano GPF, Martin-Doimeadios RCR, Jimenez-Moreno M, *et al*. 2018. Large-scale projects in the amazon and human exposure to mercury: The case-study of the Tucurui Dam. *Ecotoxicology and Environmental Safety* **147**: 299-305.

Arrueta Rodríguez JA. 1994. Campesinado, coca y estado: sindicalismo y movilización de productores de coca en torno al plan trienal de lucha contra el narcotráfico: Cochabamba, 1987-1989. Cusco: Centro de Estudios Regionales Andinos "Bartolomé de Las Casas".

Ascensão F, Fahrig L, Clevenger AP, *et al*. 2018. Environmental challenges for the Belt and Road Initiative. *Nature Sustainability* **1**: 206–209

Asner GP, Llactayo W, Tupayachi R and Luna ER. 2013. Elevated rates of gold mining in the Amazon revealed through high-resolution monitoring. *Proceedings of the National Academy of Sciences* **110**(46): 18454–18459

Assies W. 2002. From rubber estate to simple commodity production: Agrarian struggles in the northern Bolivian Amazon. *Journal of Peasant Studies* **29**: 83-+.

Athayde S, Silva-Lugo J, Schmink M, *et al*. 2017. Reconnecting art and science for sustainability: learning from Indigenous knowledge through participatory action-research in the Amazon. *Ecology and Society* **22**(2).

Atkins E. 2017. Dammed and diversionary: The multi-dimensional framing of Brazil's Belo Monte dam. *Singapore Journal of Tropical Geography* **38**(3): 276-292.

Austin K. 2010. The "Hamburger Connection" as Ecologically Unequal Exchange: A Cross-National Investigation of Beef Exports and Deforestation in Less-Developed Countries. *Rural Sociology* **75**: 270-299.

Azevedo AA, Rajão R, Costa MA, *et al*. 2017. Limits of Brazil's Forest Code as a means to end illegal deforestation. *Proceedings of the National Academy of Sciences* **114**(29): 7653-7658

Azevedo-Ramos C and Moutinho P. 2018. No man's land in the Brazilian Amazon: Could undesignated public forests slow Amazon deforestation? *Land Use Policy* **73**: 125-127.

Balée WL. 1998. Advances in historical ecology. New York, Columbia University Press.

Balée W and Erickson C. 2006. Time and complexity in historical ecology: studies in the neotropical lowlands. Columbia University Press.

Baletti B. 2014. Saving the Amazon? Sustainable soy and the new extractivism. *Environment and Planning A* **46**: 5–25.

Ballve T. 2013. Grassroots masquerades: Development, paramilitaries, and land laundering in Colombia. *Geoforum* **50**: 62-75.

BankTrack and Friends of the Earth. 2012. China Development Bank's overseas investments: An assessment of environmental and social policies and practices.

Baraloto C, Alverga P, Quispe SB, *et al*. 2015. Effects of road infrastructure on forest value across a tri-national Amazonian frontier. *Biological Conservation* **191**: 674-681.

Baraúna GMQ. 2014. Atingidos por barragens: Conflitos Socioambientais no Rio Madeira. Doctoral thesis in social anthropology. Universidade Federal do Amazonas, Manaus, Amazonas, Brazil. 338 pp. http://tede.ufam.edu.br/handle/tede/4050

Barbieri AF and Carr DL. 2005. Gender-specific out-migration, deforestation and urbanization in the Ecuadorian Amazon. *Global and Planetary Change* **47**(2-4): 99-110.

Barbieri AF, Carr DL and Bilsborrow RE. 2009. Migration Within the Frontier: The Second Generation Colonization in the Ecuadorian Amazon. *Population Research and Policy Review* **28**(3): 291-320.

Barbira-Scazzocchio F. 1980. Land, people and planning in contemporary Amazonia. Cambridge, Cambridgeshire, Centre of Latin American Studies Cambridge University.

Barbosa JA and Moreira ECP. 2017. 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.

Barreto P, Pinto A, Brito B and Hayashi S. 2008. Quem é dono da Amazônia: Uma análise do recadastramento de imóveis rurais. IMAZON, Belém, Pará, Brazil. 72 pp. Available at: https://imazon.org.br/publicacoes/quem-e-dono-da-amazonia-uma-analise-do-recadastramento-de-imoveis-rurais-2/

Barroso V. 2013. El territorio como escenario de construcción y de- construcción de la identidad de las productoras y productores de hoja de coca quechuas-aymaras en el polígono 7 del Parque Nacional Isiboro Sécure (TIPNIS). Bolivia. Masters thesis, FLACSO – Ecuador.

Bebbington A. 1993. Modernization from Below - an Alternative Indigenous Development. *Economic Geography* **69**: 274-292.

Bebbington A and Bebbington DH. 2018. Mining, movements and sustainable development: Concepts for a framework. *Sustainable Development* **26**: 441-449.

Bebbington A and Bury J. 2013. Subterranean Struggles. Austin Texas: University of Texas Press.

Bebbington AJ, Bebbington DH, Sauls LA, *et al*. 2018a. Resource extraction and infrastructure threaten forest cover and community rights. *Proceedings of the National Academy of Sciences of the United States of America* **115**: 13164-13173.

Bebbington A, Chicchon A, Cuba N, *et al*. 2020. Opinion: Priorities for governing large-scale infrastructure in the tropics. *Proceedings of the National Academy of Sciences* **117**(36): 21829-21833.

Bebbington DH, Verdun R, Gamboa C and Bebbington AJ. 2018b. Impacts of extractive industry and infrastructure on forests. Assessment and Scoping of Extractive Industries and Infrastructure in Relation to Deforestation: Amazonia. Climate and Land Use Alliance.

Becker BK. 1982. Geopolítica da Amazônia: a nova fronteira de recursos. Rio de Janeiro, Zahar Editores.

Benatti JH, Santos RA and Pena da Gama AS. 2006. A Grilagem de Terras Públicas na Amazônia Brasileira. Ipam - Instituto de Pesquisa Ambiental da Amazônia. Série Estudos 8. Ministério do Meio Ambiente (MMA), Brasília, DF, Brazil. 108 pp. Available at: https://www.mma.gov.br/estruturas/225/_arquivos/9___a_grilagem_de_terras_pblicas_na_amaznia_brasileira_225.pdf

Benchimol S. 1998. Eretz Amazônia: Os judeus na Amazônia. Manaus, Editora Valer.

BenYishay A, Heuser S, Runfola D and Trichler R. 2017. Indigenous land rights and deforestation: Evidence from the Brazilian Amazon. *Journal of Environmental Economics and Management* **86**: 29-47.

Bergamini Junior S. 2003. Classificação de risco ambiental: O modelo construído no BNDES. *Revista do BNDES* **10**(20): 197-228.

Betancur-Corredor B, Loaiza-Usuga JC, Denich M and Borgemeister C. 2018. Gold mining as a potential driver of development in Colombia: Challenges and opportunities. *Journal of cleaner production* **199**: 538-553.

Beyerlein P AND Pereira HDS. 2018. Morphological diversity and identification key for landraces of the Amerindian yam in central Amazon. *Pesquisa Agropecuária Brasileira* **53**(4): 405-418.

Bird L and Krauer N. 2017. Case Study: Illicit Gold Mining in Peru. Geneva: Global Initiative against Transnational Organized Crime. Available at: https://globalinitiative.net/wp-

content/uploads/2017/11/tgiatoc-case-study-peru-1878-web-lo-res.pdf.

Blanes Jiménez J and Flores Céspedes G. 1983. Campesino, migrante y colonizador : reproducción de la economía familiar en el Chapare tropical. La Paz, Bolivia: Ediciones CERES.

Block D. 1994. Mission culture on the upper Amazon: native tradition, Jesuit enterprise & secular policy in Moxos, 1660-1880. Lincoln, University of Nebraska Press.

Borras Jr. SM, Hall R, Scoones I, *et al*. 2011. Towards a better understanding of global land grabbing: an editorial introduction. *The Journal of Peasant Studies* **38**(2): 209-216

Bottos LC. 2008. Old Colony Mennonites in Argentina and Bolivia Nation Making, Religious Conflict and Imagination of the Future. Introduction. In: Old Colony Mennonites in Argentina and Bolivia: Nation Making, Religious Conflict and Imagination of the Future: 1-16.

Bourdineaud JP, Durrieu G, Sarrazin SLF, *et al*. 2015. Mercurial exposure of residents of Santarem and Oriximina cities (Para, Brazil) through fish consumption. *Environmental Science and Pollution Research* **22**(16): 12150-12161.

Bradley AV and Millington AC. 2008. Coca and Colonists: Quantifying and Explaining Forest Clearance under Coca and Anti-Narcotics Policy Regimes. *Ecology and Society* **13**.

Brancalion PH, de Almeida DR, Vidal E, *et al*. 2018. Fake legal logging in the Brazilian Amazon. *Science Advances* **4**(8): eaat1192.

Branford S. 2016. Corruption guided award of huge Amazon dam contracts in Brazil. Mongabay Series: Amazon Infrastructure: 13 January 2016. Available at: https://news.mongabay.com/2016/01/bndes-corruption-guided-award-of-huge-amazon-dam-contracts-in-brazil/

Branford S and Torres M. 2017. The end of a people: Amazon dam destroys sacred Munduruku 'Heaven'. Mongabay, 5 January 2017. Available at: https://news.mongabay.com/2017/01/the-end-of-a-people-amazon-dam-destroys-sacred-munduruku-heaven/

Branford S and Torres M. 2018. China increasingly involved in Brazil's ambitious Amazon rail network. Mongabay, 8 November 2018. Available at: https://news.mongabay.com/2018/11/china-increasingly-involved-in-brazils-ambitious-amazon-rail-network/

Bratman EZ. 2014. Contradictions of green development: Human rights and environmental norms in light of Belo Monte dam activism. *Journal of Latin American Studies* **46**(2): 261-289.

Bratman EZ. 2019. Governing the Rainforest: Sustainable Development Politics in the Brazilian Amazon, Oxford University Press.

Brazil PR (Presidência da República). 2009. Lei Nº 11.952, de 25 de junho de 2009. http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2009/Lei/L11952.htm

Brazil PR (Presidência da República). 2017. Lei Nº 13.465, de 11 de julho de 2017. http://www.planalto.gov.br/ccivil_03/_Ato2015-2018/2017/Lei/L13465.htm

Brazil. Câmara dos Deputados. 2020. PL. 2633/2020. https://www.camara.leg.br/proposicoesWeb/fichadetramitacao?idProposicao=2252589

Brazil. 1976. II Plano de Desenvolvimento da Amazônia: detalhamento do II plano nacional de desenvolvimento (1975-79). Superintendência do Desenvolvimento da Amazônia. Belém, Coordenação de Informática Divisão de Documentação.

Bresser-Pereira LC. 2011. From the National-Bourgeoisie to the Dependency Interpretation of Latin America. *Latin American Perspectives* **38**(3): 40-58.

Brindis D. 2014. Illegal timber from Brazilian Amazon sold all over the world. Greenpeace, Amsterdam, The Netherlands. Available at: https://www.greenpeace.org/usa/new-greenpeace-investigation-illegal-timber-brazilian-amazon-sold-world-legal-paperwork/

Brondizio E. 2008. The Amazonian Caboclo and the Açaí Palm: Forest Farmers in the Global Market. *Adv. Econ. Bot*. **16**: 1–19.

Brondizio E. 2009. Agriculture Intensification, Economic Identity, and Shared Invisibility in Amazonian Peasantry: Caboclos and Colonists in Comparative Perspective. *Amazon Peasant Societies in a Changing Environment*: 181-214.

Brondizio ES. 2016. The elephant in the room: Amazonian cities deserve more attention in climate change and sustainability discussions. The Nature of Cities. Available at: http://www.thenatureofcities.com/2016/02/02/the-elephant-in-the-room-amazonian-cities-deserve-more-attention-in-climate-change-and-sustainability-discussions/

Brondizio ES, Andersson K, de Castro F, *et al*. 2021. Making place-based sustainability initiatives visible in the Brazilian Amazon. *Curr. Opin. Environ. Sustain*. **49**: 66–78.

Brondizio ES, Cak A, Caldas MM, *et al*. 2009. Small Farmers and Deforestation in Amazonia. In: Amazonia and Global Change, eds. Keller M, Bustamante M, Gash J and Dias PS: 117-143.

Brondizio ES, Siqueira AD and Vogt N. (Eds). 2011. Forest Resources, City Services: Globalization, Household Networks, and Urbanization in the Amazon estuary. The Social Lives of Forest. Chicago, University of Chicago.

Buckley E. 2017. Technocrats and the Politics of Drought and Development in 20th century Brazil. North Carolina, University of North Carolina.

Bulte EH, Damania R and Lopez R. 2007. On the gains of committing to inefficiency: Corruption, deforestation and low land productivity in Latin America. *Journal of Environmental Economics and Management* **54**(3): 277-295.

Bunker S. 1985. Underdeveloping the Amazon. Chicago, Univeristy of Chicago Press.

Burns EB, Skidmore TE and Bernhard V. 1979. Elites, masses, and modernization in Latin America, 1850-1930. Austin, University of Texas Press.

Butler RA. 2013. Illegal logging remains rampant in Brazil. Mongabay, 23 October 2013. Available at: http://news.mongabay.com/2013/10/illegal-logging-remains-rampant-in-brazil/[18/12/2015 13:55:51]

Butt EW, Conibear L, Reddington CL, *et al*. (2020). Large air quality and human health impacts due to Amazon forest and vegetation fires. *Environmental Research Communications* **2**(9): 095001.

Caballero Espejo J, Messinger M, Román-Dañobeytia F, *et al*. 2018. Deforestation and forest degradation due to gold mining in the Peruvian Amazon: A 34-year perspective. *Remote Sensing* **10**: 1903.

Calvi MF, Moran EF, da Silva RFB and Batistella M. 2020. The construction of the Belo Monte dam in the Brazilian Amazon and its consequences on regional rural labor. *Land Use Policy* **90**: 104327.

Campbell J. 2015a. Conjuring Property: speculation and environmental futures in the Brazilian Amazon. Seattle, Washington: University of Washington Press.

Campbell JM. 2015b. Indigenous Urbanization in Amazonia: Interpretive Challenges and Opportunities. *The Journal of Latin American and Caribbean Anthropology* **20**(1).

Campos N, Engel E, Fischer RD and Galetovic A. 2019. Renegotiations and corruption in infrastructure: The Odebrecht case. Available at SSRN 3447631.

Canessa A. 2014. Conflict, claim and contradiction in the new "indigenous" state of Bolivia. *Critique of Anthropology* **34**(2): 153-173.

Cardoso FH and Faletto E. 2021. Dependency and development in Latin America, University of California Press.

Carrero GC and Fearnside PM. 2011. Forest clearing dynamics and the expansion of land holdings in Apuí, a deforestation hotspot on Brazil's Transamazon Highway. *Ecology and Society* **16**(2). Available at: http://www.ecologyandsociety.org/vol16/iss2/art26/

Carrero GC, Fearnside PM, do Valle DR and de Souza Alves C. 2020. Deforestation Trajectories on a Development Frontier in the Brazilian Amazon: 35 Years of Settlement Colonization, Policy and Economic Shifts, and Land Accumulation. *Environmental Management* **66**(6): 966-984.

Castro C. 2021. O que é o PL 490 e como ele afeta a vida dos povos indígenas? O Eco. Available at: https://www.uol.com.br/ecoa/ultimas-noticias/2021/07/07/o-que-e-o-pl-490-e-como-ele-afeta-a-vida-dos-povos-indigenas.htm?cmpid=copiaecola

Cavalcante IMS. 2011. Acesso e acessibilidade aos serviços de saúde em três quilombos na Amazônia paraense: um olhar antropológico. Dissertação, Universidade Federal do Amazonas.

Chiavenato JJ. 1993. As meninas do Belo Monte. São Paulo, SP, Scritta Editorial.

Cintra IHA. 2009. A pesca no reservatório da usina hidrelétrica de Tucuruí, Estado do Pará, Brasil. PhD thesis in fisheries engineering, Universidade Federal do Ceará, Fortaleza, Ceará, Brazil. 190 pp. http://www.pgengpesca.ufc.brlindex.php?option=com_content&view::article&id~l9&ltemid=32

Clark CB. 1973. The economics of overexploitation. *Science* **181**: 630-634.

Clark MR and Kozar JS. 2011. Comparing Sustainable Forest Management Certifications Standards: A Meta-analysis. *Ecology and Society* **16**(1).

Cleary D. 1990. Anatomy of the Amazon Gold Rush. University of Iowa Press.

Clement CR, Denevan WM, Heckenberger MJ, *et al*. 2015. The domestication of Amazonia before European conquest. *Proceedings of the Royal Society B-Biological Sciences* **282**(1812): 32-40.

Clerici N, Armenteras D, Kareiva P, *et al*. 2020. Deforestation in Colombian protected areas increased during post-conflict periods. *Scientific Reports* **10**(1).

Coe MT, Marthews TR, Costa MH, *et al*. 2013. Deforestation and climate feedbacks threaten the ecological integrity of south–southeastern Amazonia. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* **368** (1619).

Conklin BA and Graham LR. 1995. The shifting middle ground: Amazonian Indians and eco-politics. *Am. Anthropol*. **9**: 695–710.

Coomes OT and Barham BL. 1994. The Amazon Rubber Boom - Labor Control, Resistance and Failed Plantation Development Revisited. *Hispanic American Historical Review* **74**(2): 231-257.

Coomes OT, McGuire SJ, Garine E, *et al*. 2015. Farmer seed networks make a limited contribution to agriculture? Four common misconceptions. *Food Policy* **56**: 41-50.

Coomes OT, Takasaki Y, Abizaid C and Barham BL. 2010. Floodplain fisheries as natural insurance for the rural poor in tropical forest environments: evidence from Amazonia. *Fisheries Management and Ecology* **17**(6): 513-521.

Corbera E. 2012. Problematizing REDD+ as an experiment in payments for ecosystem services. *Current Opinion in Environmental Sustainability* **4**(6): 612-619.

Correa J, van der Hoff R and Rajão R. 2019. Amazon Fund 10 years later: lessons from the world's largest REDD+ program. *Forests* **10**(3), 272.

Cortés-McPherson D. 2019 Expansion of small-scale gold mining in Madre de Dios: 'capital interests' and the emergence of a new elite of entrepreneurs in the Peruvian Amazon. *The Extractive Industries and Society* **6**: 382-389.

Crosby AW. 2004. Ecological imperialism: the biological expansion of Europe, 900-1900. Cambridge University Press.

Cruz J and Pereira H. 2017. Redes de Sustentabilidade: Gestão Territorial e Diálogos Interculturais no Rio Negro-AM. *Revista Areté, Revista Amazônica de Ensino de Ciências* **10**: 21.

Cuesta Zapata S and Trujillo Montalvo P. 1999. La frontera de fronteras : Putumayo : violencia, narcotráfico y guerrilla. Quito, Ecuador, Fundación de Investigaciones Andino Amazónicas: Abya Yala.

Cuesta Zapata S and Trujillo Montalvo P. 2009. Monitoreo de territorios afectados por cultivos ilícitos. Available at: https://www.unodc.org/documents/colombia/2019/Agosto/Informe_de_Monitore o_de_Territorios_Afectador_por_Cultivos_Ilicitos_en_Colombia_2018_)

Cunha E. 1907. Peru versus Bolívia. Rio de Janeiro: J. Olympio.

da Costa Freitas JM. 2004. A escola geopolítica brasileira: Golbery do Couto e Silva, Carlos de Meira Mattos e Therezinha de Castro. Biblioteca do Exército Editora.

Dalmarco G, Zawislak PA, Hulsink W and Brambilla F. 2015. How knowledge flows in university-industry relations An overview from two economic sectors in Brazil. *European Business Review* **27**(2): 148-160.

Dantas C. 2021. Amazônia tem 1º semestre de 2021 com maior área sob alerta de desmate em 6 anos. O Globo Amazônia. Available at: https://g1.globo.com/natureza/amazonia/noticia/2021/07/02/primeiro-semestre-de-2021-tem-o-maior-numero-de-alertas-de-desmatamento-na-amazonia-em-6-anos.ghtml

Davalos LM, Holmes JS, Rodriguez N and Armenteras D. 2014. Demand for beef is unrelated to pasture expansion in northwestern Amazonia. *Biological Conservation* **170**: 64-73.

Davenport RB, Vivan JL, May PH, *et al*. 2017. Adaptive Forest Governance in Northwestern Mato Grosso, Brazil: Pilot project outcomes across agrarian reform landscapes. *Environmental Policy and Governance* **27**(5): 453-471.

de Almeida AWB, Dourado SB, Bertolini C. 2019. A New Social Cartography. In: This Is Not an Atlas: 46-53.

de Janvry A. 1981. The agrarian question and reformism in Latin America. Johns Hopkins University Press Baltimore.

de Jong W, Cano W, Zenteno M and Soriano M. 2014. The legally allowable versus the informally practicable in Bolivia's domestic timber market. *Forest Policy and Economics* **48**: 46-54.

de la Torre O. 2012. The Land is Ours and We Are Free to Do All that We Want: Quilombos And Black Rural Protest in Amazonia, Brazil, 1917–1929. *The Latin Americanist* **56**(4): 33-56.

de Lima ACB, Almeida O, Pinedo-Vasquez M, *et al*. 2020. Climate hazards in small and medium cities in the Amazon Delta and Estuary: challenges for resilience. *Environment and Urbanization* **32**(1): 195-212.

de Oliveira JPC and Cohn C. (Eds.). 2014. Belo Monte e a Questão Indígena. Associação Brasileira de Antropologia (ABA), Brasília, DF, Brazil. 337 pp.

de Sousa Júnior WC, Reid J and Leitão NCS. 2006. Custos e benefícios do Complexo Hidrelétrico Belo Monte: Uma abordagem econômico-ambiental. Conservation Strategy Fund (CSF), Lagoa Santa, Minas Gerais, Brazil. 90 pp. Available at: https://www.conservation-strategy.org/publication/custos-e-beneficios-do-complexo-hidreletrico-belo-monte-uma-abordagem-economico

de Souza DO and Alvala RCD. 2014. Observational evidence of the urban heat island of Manaus City, Brazil. *Meteorological Applications* **21**(2): 186-193.

de Souza JG, Schaan DP, Robinson M, *et al*. 2018. Pre-Columbian earth-builders settled along the entire southern rim of the Amazon. *Nature communications* **9**(1): 1-10.

de Waroux YL, Garrett RD, Graesser J, *et al*. 2019. The Restructuring of South American Soy and Beef Production and Trade Under Changing Environmental Regulations. *World Development* **121**: 188-202.

de Waroux YL, Garrett RD, Heilmayr R and Lambin EF. 2016. Land-use policies and corporate investments in agriculture in the Gran Chaco and Chiquitano. *Proceedings of the National Academy of Sciences of the United States of America* **113**(15): 4021-4026.

Denevan WM. 1992. The Pristine Myth - the Landscape of the America in 1492. *Annals of the Association of American Geographers* **82**(3): 369-385.

Denevan WM. 2003. The native population of Amazonia in 1492 reconsidered. *Revista De Indias* **62**(227): 175-188.

Diamond S and Poirier C. 2010. Brazil's native peoples and the Belo Monte Dam: A case study. NACLA Report on the Americas 43(5): 25-29.

Diringer SE, Berky AJ, Marani M, *et al*. 2019. Deforestation Due to Artisanal and Small-Scale Gold Mining Exacerbates Soil and Mercury Mobilization in Madre de Dios, Peru. *Environmental Science & Technology* **54**(1): 286-296.

do Nascimento SM. 2017. Violência e Estado de Exceção na Amazônia Brasileira um Estudo sobre a Implantação da Hidrelétrica de Belo Monte no Rio Xingu (PA). Doctoral thesis in sustainable development of the humid tropics, Universidade Federal do Pará, Belém, Pará, Brazil. 291 pp.

dos Santos Gomes F. 2015. Mocambos e quilombos: uma história do campesinato negro no Brasil, Editora Companhia das Letras.

Doria CRC, de Souza MP, Lorenzen K and Athayde.S. 2021. Stakeholder Perceptions on the Governance of Fisheries Systems Transformed by Hydroelectric Dam Development in the Madeira River, Brazil. *Front. Environ. Sci.*

Duchelle AE, de Sassi C, Jagger P, *et al*. 2017. Balancing carrots and sticks in REDD plus: implications for social safeguards. *Ecology and Society* **22**(3).

Duffy G. 2008. First Coca Find in Brazil Amazon. BBC News. Retrieved May 25, 2014 Available at: http://news.bbc.co.uk/2/hi/7299964.stm

Dussel Peters E, Armony AC and Cui S (coords.). 2018. Building Development for a New Era. China´s Infrastructure Projects in Latin America and the Caribbean. Red ALC-China and University of Pittsburgh/Center for International Studies, Pittsburgh and Mexico.

Eastwood DA and Pollard H. 1985. The development of colonization in lowland Bolivia: objectives and evaluation. *Boletín de Estudios Latinoamericanos y del Caribe* **38**: 61-82.

EIA. 2019. Condenando el bosque: ilegalidad y falta de gobernanza en la Amazonía colombiana. Available at: https://content.eia-global.org/posts/documents/000/000/894/original/Condenando_el_Bosque.pdf?156 1565558

Ekbladh D. 2002. "Mr. TVA": grass-roots development, David Lilienthal, and the rise and fall of the Tennessee Valley Authority as a symbol for US Overseas Development, 1933–1973. *Diplomatic History* **26**(3): 335-374.

Ekbladh D. 2011. The great American mission: Modernization and the construction of an American world order, Princeton University Press.

Eloy L, Brondizio ES and Pateo R. 2014. New perspectives on mobility, urbanisation, and resource management in Amazônia. *Bolletim of Latin American Research (BLAR):* 1-16

Eloy L and Lasmar C. 2011. Urbanization and transformation of Indigenous resource management: the case of upper Rio Negro (Brazil). *Acta Amazonica* **41**(1): 91-101

Emperaire L, Eloy L, da Cunha MC, *et al*. 2012. Localized production using Geographical Indications in the Amazon: The ecological stakes related to producing the cassava flour of Cruzeiro do Sul. *Cahiers Agricultures* **21**(1): 25-33.

Ehleringer JR, Casale JF, Lott MJ and Ford VL. 2000. Tracing the geographical origin of cocaine. *Nature* **408**(6810): 311-312.

Escolhas Institute. 2020. New Amazon Gold Rush. Escolhas. Sao Paulo.

Escolhas Institute. 2021. Qual o real impacto socioeconomico da exploracao de ouro e diamantes na Amazonia? Sao Paulo, Instituto Escolhas: 14.

Etter A, McAlpine C and Possingham H. 2008. Historical patterns and drivers of landscape change in Colombia since 1500: A regionalized spatial approach. *Annals of the Association of American Geographers* **98**(1): 2-23.

Faleiros G and Isensee e Sá M. 2019. Madeira River dams may spell doom for Amazon's marathon catfish: Studies. Mongabay, 25 March 2019. https://news.mongabay.com/2019/03/brazil-madeira-river-dams-may-spell-doom-for-amazons-marathon-catfish-studies/

Fasolo C. 2021. 'Cheque em branco' para a grilagem, PL 2633 segue ao Senado. Instituto Socioambiental. Available at: https://www.socioambiental.org/pt-br/noticias-socioambientais/cheque-em-branco-para-a-grilagem-pl-2633-segue-ao-senado/

Fausto C and Heckenberger M. 2007. Time and memory in Indigenous Amazonia: anthropological perspectives. Gainesville, University Press of Florida.

Fearnside PM. 1986. Agricultural plans for Brazil's Grande Carajas Program: lost opportunity for sustainable local development? *World Development* **14**(3): 385-409.

Fearnside PM. 1987. Deforestation and international economic development projects in Brazilian Amazonia. *Conservation Biology* **1**(3): 214-221

Fearnside PM. 1989. Forest management in Amazonia: The need for new criteria in evaluating development options. *Forest Ecology and Management* **27**(1): 61-79.

Fearnside PM. 1995. Sustainable development in Amazonia. pp. 207-224. In: Kosinski LA. (ed.) Beyond Eco-92: Global Change, the Discourse, the Progression, the Awareness. International Social Science Council (ISSC), United Nations Educational and Scientific Organization (UNESCO), Paris, France & Editora Universitária Candido Mendes (Educam), Rio de Janeiro, RJ, Brazil. 227 pp.

Fearnside PM. 1999. Social impacts of Brazil's Tucuruí Dam. *Environmental Management* **24**(4): 483-495

Fearnside PM. 2001a. Environmental impacts of Brazil's Tucuruí Dam: Unlearned lessons for hydroelectric development in Amazonia. *Environmental Management* **27**(3): 377-396.

Fearnside PM. 2001b. Land-tenure issues as factors in environmental destruction in Brazilian Amazonia: The case of southern Pará. *World Development* **29**(8): 1361-1372

Fearnside PM. 2006. Dams in the Amazon: Belo Monte and Brazil's hydroelectric development of the Xingu River basin. *Environmental Management* **38**: 16-27.

Fearnside PM. 2007. Brazil's Cuiaba-Santarem (BR-163) Highway: The environmental cost of paving a soybean corridor through the Amazon. *Environmental Management* **39**(5): 601-614.

Fearnside PM. 2008. The roles and movements of actors in the deforestation of Brazilian Amazonia. *Ecology and Society* **13**(1): art. 23.

Fearnside PM. 2009. Brazil's environmental policies for the Amazon: Lessons from the last 20 years. Conference on "Environmental Policy, Social Movements, and Science for the Brazilian Amazon" University of Chicago.

Fearnside PM. 2012a. Brazil's Amazon forest in mitigating global warming: Unresolved controversies. *Climate Policy* **12**(1): 70-81.

Fearnside PM. 2012b. A tomada de decisão sobre grandes estradas amazônicas. pp. 59-75. In: A. Bager (ed.) Ecologia de Estradas: Tendências e Pesquisas. Editora da Universidade Federal de Lavras, Lavras, Minas Gerais, Brazil. 313 pp.

Fearnside PM. 2014. Impacts of Brazil's Madeira River Dams: Unlearned lessons for hydroelectric development in Amazonia. *Environmental Science & Policy* **38**: 164-172.

Fearnside PM. 2015. Highway construction as a force in destruction of the Amazon forest. pp. 414-424 In: van der Ree R, Smith DJ and Grilo C. (eds.) Handbook of Road Ecology. John Wiley & Sons Publishers, Oxford, UK. 552 pp.

Fearnside PM. 2016. Environmental and Social Impacts of Hydroelectric Dams in Brazilian Amazonia: Implications for the Aluminum Industry. *World Development* **77**: 48-65.

Fearnside PM. 2017a. Planned disinformation: The example of the Belo Monte Dam as a source of greenhouse gases. pp. 125-142. In: Issberner LR and Lena F (eds.) Brazil in the Anthropocene: Conflicts between Predatory Development and Environmental Policies. Routledge, Taylor & Francis Group, New York, U.S.A. 368 pp.

Fearnside PM. 2017b. Brazil's Belo Monte Dam: Lessons of an Amazonian resource struggle. *Die Erde* **148** (2-3): 167-184.

Fearnside PM. 2020. Environmental justice and Brazil's Amazonian dams. pp. 85-126. In: Robins NA and Fraser B (eds.), Landscapes of Inequity: The Quest for Environmental Justice in the Andes/Amazon Region. University of Nebraska Press, Lincoln, NE, USA. 414 pp.

Fearnside PM and Figueiredo AMR. 2015. China's influence on deforestation in Brazilian Amazonia: A growing force in the state of Mato Grosso. pp. 229-265. In: Ray R, Gallagher K, López A and Sanborn C. (eds.) China and Sustainable Development in Latin America: The Social and Environmental Dimension. Anthem Press, New York, USA. 367 pp.

Fearnside PM, Figueiredo AMR and Bonjour SCM. 2013. Amazonian forest loss and the long reach of China's influence. *Environment Development and Sustainability* **15**(2): 325-338.

Fearnside P, Laurance WF, Bergen S, *et al.* 2012. The future of Amazonia: models to predict the consequences of future infrastructure in Brazil's multi-annual plans. *Novos Cadernos* **15**: 25-52.

Fellet J and Pamment C. 2021. Facebook rainforest ads: Inquiry ordered into Amazon land sales. BBC News. Available at: https://www.bbc.com/news/technology-56272379

Fernandez FJ, Alvarez-Vazquez LJ, Garcia-Chan N, *et al.* 2015. Optimal location of green zones in metropolitan areas to control the urban heat island. *Journal of Computational and Applied Mathematics* **289**: 412-425.

Ferrante L and Fearnside PM. 2020. The Amazon's road to deforestation. *Science* **369**(634-634): 525.

Ferrante L, Gomes M and Fearnside PM. 2020. Amazonian Indigenous peoples are threatened by Brazil's Highway BR-319. *Land Use Policy* **94**: 104548.

Ferrante L, Andrade MB and Fearnside PM. 2021. Land grabbing on Brazil's Highway BR-319 as a spearhead for Amazonian deforestation. *Land Use Policy* **108**: 105559.

Ferreira MR. 2005. A ferrovia do diabo. São Paulo, Melhoramentos.

Florentino M and Amantino M. 2012a. Fugas, quilombos e fujões nas Américas (séculos XVI-XIX) centuries). *Análise Social* **203**: 236-267.

Florentino M and Amantino M. 2012b. A morphology of 'quilombos' in the Americas, sixteenth-nineteenth centuries. *Historia Ciencias Saude-Manguinhos* **19**: 259-297.

Fogel B. 2019. 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 Report on the Americas 51(2): 153-158.

Fontana LB and Grugel J. 2016. The Politics of Indigenous Participation Through Free Prior Informed Consent: Reflections from the Bolivian Case. *World Development* **77**: 249-261.

Foresta RF. 1991. The Limits of Providence: Amazon Conservation in the Age of Development. Gainesville, University of Florida Press, Gainesville, 1991.

Forsberg BR, Melack JM, Dunne T, *et al*. 2017. The potential impact of new Andean dams on Amazon fluvial ecosystems. *PLoS ONE* **1**(8): art. e0182254.

Foweraker J. 1981. The Struggle for Land: A Political Economy of the Pioneer Frontier in Brazil 1930 to the Present Day. Cambridge: Cambridge University Press.

Frank AG. 1966. The development of underdevelopment. New York.

Gallagher KP and Yuan F. 2017. Standardizing Sustainable Development: A comparison of development banks in the Americas. *The Journal of Environment & Development* **26**(3): 243-271.

Garfield S. 2010. The environment of wartime migration: Labor transfers from the Brazilian Northeast to the Amazon during World War II. *Journal of Social History* **43**(4): 989-+.

Garfield S. 2013. In Search of the Amazon. Durham, North Carolina: Duke University Press.

Garrett RD and Rausch LL. 2016. Green for gold: social and ecological tradeoffs influencing the sustainability of the Brazilian soy industry. *The Journal of Peasant Studies* **43**(2): 461-493.

Gatti LV, Basso LS, Miller JB, *et al*. 2021. Amazonia as a carbon source linked to deforestation and climate change. *Nature* **595**: 388-393.

Gauthier C and Moran EF. 2018. Public policy implementation and basic sanitation issues associated with hydroelectric projects in the Brazilian Amazon: Altamira and the Belo Monte dam. *Geoforum* **97**: 10-21.

Gerlak AK; Saguier M, Mills-Novoa M, *et al*. 2020. Dams, Chinese investments, and EIAs: A race to the bottom in South America? *Ambio* **49**(1): 156-164.

Global Initiative Against Transnational Organized Crime. 2016. El Crimen Organizado y la Minería Ilegal del Oro en América Latina. GIAT Crime - GIATC, Geneva.

Godfrey B and Browder J. 1997. Rainforest Cities: Urbanization, Development and Globalization of the Brazilian Amazon. New York: Columbia University Press.

Gomez CJL, Sanchez-Ayala L and Vargas GA. 2015. Armed conflict, land grabs and primitive accumulation in Colombia: micro processes, macro trends and the puzzles in between. *Journal of Peasant Studies* **42**: 255-274.

Goodman J. 2010. The devil and Mr. Casement: one man's battle for human rights in South America's heart of darkness. New York, Farrar, Straus and Giroux.

Gootenberg P. 2017. Cocaine Histories and Diverging Drug War Politics in Bolivia, Colombia, and Peru. *A Contracorriente: una revista de estudios latinoamericanos* **15**(1): 1-35.

Gootenberg P and Campos I. 2015. Toward a new drug history of Latin America: A research frontier at the center of debates. *Hispanic American Historical Review* **95**(1): 1-35.

Gootenberg P and Dávalos LM. 2018. The Origins of Cocaine: Colonization and Failed Development in the Amazon Andes, Routledge.

Grajales J. 2011. The rifle and the title: paramilitary violence, land grab and land control in Colombia. *Journal of Peasant Studies* **38**: 771-792.

Grajales J. 2015. Land grabbing, legal contention and institutional change in Colombia. *Journal of Peasant Studies* **42**: 541-560.

Gregory G and Coomes OT. 2019. Protected areas fund rural household dispersal to urban areas in riverine Amazonia. *Human Ecology* **47**(2): 291-301

Greenpeace. 2003. State of Conflict: An Investigation into the Landgrabbers, Loggers and Lawless Frontiers in Pará State, Amazon. Amsterdam, The Netherlands: Greenpeace International. 53 pp. Available at: http://www.greenpeace.org/international/press/reports/state-of-conflict

Guedes GR, Brondizio ES, Barbieri AF, *et al*. 2012. Poverty and Inequality in the Rural Brazilian Amazon: A Multidimensional Approach. *Human Ecology* **40**(1): 41-57.

Guerra RMN. 2002. É possivel atingir a sustentabilidade nos assentamentos de reforma agrária na Amazônia Legal? O caso do PDS São Salvador no estado do Acre. Master's Thesis, Universidade de Brasilia, Brasilia.

Guidry JA, Kennedy MD and Zald MN. 2000. Globalizations and social movements: culture, power, and the transnational public sphere. Ann Arbor: University of Michigan Press.

Guilhon N. 1987. Confederados em Santarem: Saga Americana na Amazônia. Rio de Janeiro, Presença.

Hagopian F and Mainwaring SP. 2005. The third wave of democratization in Latin America: advances and setbacks, Cambridge University Press.

Hall AL. 2000. Amazonia at the crossroads: the challenge of sustainable development. London, Institute of Latin American Studies.

Harris M and Nugent S. 2004. Some other Amazonians: perspectives on modern Amazonia. London, Institute for the Study of the Americas.

Hawthorne W. 2010. From Africa to Brazil: Culture, identity, and an Atlantic slave trade, 1600–1830. Cambridge University Press.

Hecht SB. 1993. The Logic of Livestock and Deforestation in Amazonia. *Bioscience* **43**(10): 687-695.

Hecht SB. 2007. Factories, forests, fields and family: Gender and neoliberalism in extractive reserves. *Journal of Agrarian Change* **7**(3): 316-347.

Hecht S. 2009. The New Rurality: Forest Recovery, Peasantries and the Paradoxes of Landscape. *Land Use Policy*.

Hecht SB. 2012. From eco-catastrophe to zero deforestation? Interdisciplinarities, politics, environmentalisms and reduced clearing in Amazonia. *Environmental Conservation* **39**(1): 4-19.

Hecht S. 2013. The Scramble for the Amazon and the Lost Paradise of Euclides da Cunha. Chicago, University of Chicago Press.

Hecht S. 2014a. The Social Lives of Forests: Successions and Forest Transitions: Theorizing Forest Resurgence. In: Social Lives of Forests. Hecht SB, Padoch C and Morrison K. Chicago, University of Chicago Press.

Hecht S. 2014b. Trends in Migration, Urbanization and Remittances, and Their Effects on Tropical Forests. Bogor, Indonesia, International Forestry Center (CIFOR): 55.

Hecht SB and Cockburn A. 1989. The fate of the forest: developers, destroyers, and defenders of the Amazon. London; New York, NY: Verso.

Hecht SB and Cockburn A. 2011. The fate of the forest: developers, destroyers, and defenders of the Amazon. Revised 5th edition. University of Chicago, Chicago, Illinois.

Hecht SB, Kandel S, Gomes I, *et al*. 2006. Globalization, Forest Resurgence, and Environmental Politics in El Salvador. *World Development* **34**: 308-323

Hecht S, Morrison K and Padoch C. 2014. From fragmentation to forest resurgence: paradigms, representations and practices. In: The Social Lives of Forests. Hecht S, Morrison K and Padoch C. (Eds) Chicago, Univeristy of Chicago: 1-10.

Hecht S, Yang AL, Sijapati B, *et al*. 2015. People in Motion, Forests in Transition: trends in Migration urbanization and remittances and their effects on tropical forest. Bogor, CIFOR.

Hecht S and Rajão R. 2020. From "Green Hell" to "Amazonia Legal": Land use models and the re-imagination of the rainforest as a new development frontier. *Land Use Policy* **92**.

Heckenberger MJ. 2009. Lost Cities of the Amazon. *Scientific American* **301**(4): 64-71.

Heckenberger MJ, Russell JC, Toney JR and Schmidt MJ. 2007. The legacy of cultural landscapes in the Brazilian Amazon: implications for biodiversity. *Philosophical Transactions of the Royal Society B-Biological Sciences* **362**(1478): 197-208.

Herrera Celemin. 1975. Proyecto Radargrametrico del amazonas, sus metas y su proyeccion en la economia nacional. *Boletin de La Sociedad Geográfica de Colombia* **29**(107). Available at: https://www.sogeocol.edu.co/documentos/pro_radarm.pdf

Hilson G and Laing T. 2017. Gold mining, indigenous land claims and conflict in Guyana's hinterland. *Journal of Rural Studies* **50**: 172-187.

Hite AB. 2004. Natural resource growth poles and frontier urbanization in Latin America. *Studies in Comparative International Development* **39**(3): 50-75.

Hochstetler K. 2014. The Brazilian national development bank goes international: innovations and limitations of BNDES' Internationalization. *Global Policy* **5**(3): 360-365

Hochstetler K and Keck M. 2007. Greening Brazil: Environmental Activism in State and Society. Durham: Duke University Press.

Howard J, Trotz MA, Thomas K, *et al*. 2011. Total mercury loadings in sediment from gold mining and conservation areas in Guyana. *Environmental Monitoring and Assessment* **179**(1-4): 555-573.

HRW. 2019. Human Rights Watch. World Report 2019. Events of 2018.

Ibáñez AM and Moya A. 2010. Vulnerability of Victims of Civil Conflicts: Empirical Evidence for the Displaced Population in Colombia. *World Development* **38**(4): 647-663.

Ibáñez AM and Velez CE. 2008. Civil Conflict and Forced Migration: The Micro Determinants and Welfare Losses of Displacement in Colombia. *World Development* **36**(4): 659-676.

IBGE. 2018. Population Census. Fertility and Migration. IBGE.

IHU. 2012. Movimentos sociais repudiam Medida Provisória que diminui áreas protegidas na Amazônia. IHU Notícias. Available at: http://www.ihu.unisinos.br/noticias/510033-movimentos-sociais-e-organizacoes-da-sociedade-civil-lancam-carta-de-repudio-a-medida-provisoria-que-diminui-areas-protegidas-na-amazonia.

IMAZON. 2017. Amazon Institute of People and the Environment. Activities Report 2017.

Intrator J. 2011. From Squatter to Settler: Applying the Lessons of Nineteenth Century US Public Land Policy to Twenty-first Century Land Struggles in Brazil. *Ecology Law Quarterly* **38**(1): 179-232.

Ioris AA. 2017. Places of agribusiness: displacement, replacement, and misplacement in Mato Grosso, Brazil. *Geographical Review* **107**(3): 452-475.

Irga PJ, Burchett MD and Torpy FR. 2015. Does urban forestry have a quantitative effect on ambient air quality in an urban environment? *Atmospheric Environment* **120**: 173-181.

Jaichand V and Sampaio AA. 2013. Dam and Be Damned: The Adverse Impacts of Belo Monte on Indigenous Peoples in Brazil. *Human Rights Quarterly* **35**(2): 408-447.

Jepson W. 2006a. Private agricultural colonization on a Brazilian frontier, 1970-1980. *Journal of Historical Geography* **32**: 839-863.

Jepson W. 2006b. Producing a modern agricultural frontier: Firms and cooperatives in Eastern Mato Grosso, Brazil. *Economic Geography* **82**(3): 289-316.

Jerez FAG, Müller J and Olavarria M. 2015. Between Two Pasts: Dictatorships and the Politics of Memory in Bolivia. *Latin American Perspectives* **42**(3): 120-39.

Johnson EL, Saunders JA, Mischke S, *et al*. 2003. Identification of Erythroxylum taxa by AFLP DNA analysis. *Phytochemistry* **64**(1): 187-197.

Kanai JM. 2014. Capital of the Amazon Rainforest: Constructing a Global City-region for Entrepreneurial Manaus. *Urban Studies* **51**(11): 2387-2405.

Killeen TJ. 2007. A Perfect Storm in the Amazon Wilderness: Development and Conservation in the Context of the Initiative for the Integration of the Regional Infrastructure of

South America (IIRSA). Arlington, Conservation International.

Kingstone PR and Power TJ. 2000. Democratic Brazil: actors, institutions, and processes. Pittsburgh, PA, University of Pittsburgh Press.

Klein H and Luna F. 2016. Brazil 1964-1985: The military regimes of Latin America in the Cold War. New Haven, Yale University Press.

Klein HS and Luna FV. 2018. Feeding the world: Brazil's transformation into a modern agricultural economy. Cambridge University Press.

Klinger J. 2018. Safeguarding Sustainable Development: BNDES, Fundo Amazonia, and Sustainable Development in the Northwestern Brazilian Amazon. GEGI Background Paper 004. Boston: Global Development Policy Center/Boston University.

Kohlhepp G. 2001. Amazonia 2000: An evaluation of three decades of regional planning and development programmes in the Brazilian Amazon region. *Amazoniana-Limnologia Et Oecologia Regionalis Systemae Fluminis Amazonas* **16**(3-4): 363-395.

Kolen J, de Smet E and de Theije M. 2018. We are all Garimpeiros: Settlement and Movement in Communities of the Tapajós Small-Scale Gold Mining Reserve. *The Journal of Latin American and Caribbean Anthropology* **23**(1): 169-188.

La Torre López L and Huertas B. 1999. All we want is to live in peace: lessons learned from oil operations in indigenous territories of the Peruvian Amazon. Lima Amsterdam, "Racimos de Ungurahui" Working Group; Netherlands Committee for IUCN.

Lagunes PF and Svejnar J. 2020. Corruption and the Lava Jato Scandal in Latin America, Routledge.

Lambin EF, Gibbs HK, Heilmayr R, *et al*. 2018. The role of supply-chain initiatives in reducing deforestation. *Nature Climate Change* **8**: 109-116.

Latrubesse EM, Arima EY, Dunne T, *et al*. 2017. Damming the rivers of the Amazon basin. *Nature* **546**: 363-369

Laurance WF, Camargo JLC, Fearnside PM, *et al*. 2018. An Amazonian rainforest and its fragments as a laboratory of global change. *Biological Reviews* **93**: 223-247.

Laurance WF, Lovejoy TE, Vasconcelos HL, *et al*. 2002. Ecosystem Decay of Amazonian Forest Fragments: a 22-Year Investigation. *Conservation Biology* **16**: 605-618.

Lavalle B. 1999. Frontiers, colonization and Indian manpower in Andean Amazonia (16th-20th centuries): The construction of Amazon socioeconomic space in Ecuador, Peru and Bolivia (1792-1948). *Caravelle-Cahiers du Monde Hispanique et Luso-Bresilien* **73**: 315-316.

Leal A, de Sá MER, Nascimento NSF and de Sousa Cardoso W. 2012. Produção mineral no estado do Pará e reflexos na (re) produção da miséria: Barcarena, Marabá e Parauapebas. Rev. *Políticas Públicas* **16**: 157–167.

Leino T and Lodenius M. 1995. Human hair mercury levels in Tucuruí area, State of Pará, Brazil. *The Science of the Total Environment* **175**: 119-125

León AC, Araújo I, Rezende G and Sobrinho FLA. 2015. Planejamento regional no Brasil: a experiência da SUDAM. Observatorium: *Revista Eletrônica de Geografia* **7**(18).

Levis C, Flores BM, Moreira PA, *et al*. 2018. How people domesticated Amazonian forests. *Frontiers in Ecology and Evolution* **5**: 171.

Lewis JA. 2008. The power of knowledge: information transfer and acai intensification in the peri-urban interface of Belem, Brazil. *Agroforestry Systems* **74**(3): 293-302.

Little P. 2014. Mega Development Projects in Amazonia. A geopolitical and socio-environmental primer. Lima: DAR.

Livesley SJ, McPherson GM and Calfapietra C. 2016. The Urban Forest and Ecosystem Services: Impacts on Urban Water, Heat, and Pollution Cycles at the Tree, Street, and City Scale. *Journal of Environmental Quality* **45**(1): 119-124.

Lovejoy TE and Nobre C. 2018. Amazon tipping point. *Science Advances* **4**: art. eaat2340.

Luciak IA. 2001. After the Revolution: gender and democracy in El Salvador, Nicaragua, and Guatemala. Baltimore, Johns Hopkins University Press.

MacLaughlin C. 1973. African Slavery and economic development in Amazonia 1700-1800. Slavery and Race Relations in Latin America. R. Brent. Westport, Greenwood Press.

Madaleno I. 2000. Urban agriculture in Belem, Brazil. *Cities* **17**(1): 73-77.

Maezumi SY, Alves D, Robinson M, *et al*. 2018. The legacy of 4,500 years of polyculture agroforestry in the eastern Amazon. *Nature plants* **4**(8): 540.

Magalhães SB and da Cunha MC. (Eds.). 2017. A Expulsão de Ribeirinhos em Belo Monte: Relatório da SBPC. Sociedade Brasileira para o Progresso da Ciência (SBPC), São Paulo, SP, Brazil. 448 pp, http://portal.sbpcnet.org.br/livro/belomonte.pdf

Mahanty S, Suich H and Tacconi L. 2013. Access and benefits in payments for environmental services and implications for REDD+: lessons from seven PES schemes. *Land Use Policy* **31**: 38-47.

Maheu-Giroux M, Casapia M, Soto-Calle VE, *et al*. 2010. Risk of malaria transmission from fish ponds in the Peruvian Amazon. *Acta Tropica* **115**(1-2): 112-118.

Maia AG and Buainain AM. 2015. O novo mapa da população rural brasileira. Confins. *Revista franco-brasilera de geografia* **25**.

Maisonnave F and de Almeida L. 2020. Esperança de regularização faz com que grileiros transformem castanhais em pasto no AM. Folha de São Paulo, 26 July 2020. http://temas.folha.uol.com.br/amazonia-sob-bolsonaro/da-castanha-ao-pasto/esperanca-de-regularizacao-faz-com-que-grileiros-transformem-castanhais-em-pasto-no-am.shtml

Mansur AV, Brondízio ES, Roy S, *et al*. 2016. An Assessment of Urban Vulnerability in the Amazon Delta and Estuary: A multi-Criterion Index of Flood Exposure, Socio-Economic Conditions and Infrastructure. *Sustainability Sciences*: 1-16

Mansur AV, Brondizio ES, Roy S, *et al*. 2018. Adapting to urban challenges in the Amazon: flood risk and infrastructure deficiencies in Belém, Brazil. *Regional Environmental Change* **18**(5): 1411-1426.

Manzi M and Coomes OT. 2009. Managing Amazonian palms for community use: A case of aguaje palm (Mauritia flexuosa) in Peru. *Forest Ecology and Management* **257**(2): 510-517.

Massey DS, Fischer MJ and Capoferro C. 2006. International migration and gender in Latin America: A comparative analysis. *International Migration* **44**(5): 63-91.

May RH. 2015. Dorothy Stang: monkeys cry and the poor die, earth stewardship as liberation ecology. Earth Stewardship, Springer: 407-418.

McAfee K. 2012. The Contradictory Logic of Global Ecosystem Services Markets. *Development and Change* **43**: 105-131.

McKay BM. 2017. Agrarian extractivism in Bolivia. *World Development* **97**: 199-211.

McKay B and Colque G. 2016. Bolivia's soy complex: the development of 'productive exclusion'. *The Journal of Peasant Studies* **43**(2): 583-610.

McMahon RJ, Ekbladh D, Rotter A, *et al.* 2017. Foreign Policy at the Periphery: The Shifting Margins of US International Relations Since World War II, University Press of Kentucky.

McNeish JA. 2013. Extraction, protest and indigeneity in Bolivia: the TIPNIS effect. *Latin American and Caribbean ethnic studies* **8**(2): 221-242.

Menton M and Cronkleton P. 2019. Migration and forests in the Peruvian Amazon. Bogor City: Center for International Forestry Research (CIFOR): 25.

Meyfroidt P, Börner J, Garrett R, *et al.* 2020. Focus on leakage and spillovers: informing land-use governance in a telecoupled world. *Environmental Research Letters* **15**(9): 090202.

Miller BA and Reidinger RB. 1998. Comprehensive River Basin Development: The Tennessee Valley Authority, World Bank Publications.

Miranda Neto JQ. 2015. Mobilidade de Trabalho e Reestruturação Urbana em Cidades Médias: UHE Belo Monte e as transformacoes na cidade de Altamira Para. III Simposio Internacional Cidades Medias, Rio de Janeiro.

Molano AA. 2019. Selva Adentro: Una Historia Oral de la Colonización del Guaviare. Ancora Editores Ltda, Banco de la Republica, Colombia

Monex. 2021. MONEX Live Gold Spot Prices. Available at: https://www.monex.com/gold-prices, Accessed on August 31, 2021.

Mønsted M. 1974. Francois Perroux's Theory of "Growth Pole" and "Development" Pole: A Critique. *Antipode* **6**(2): 106-113.

Morales S and Morales O. 2019. From bribes to international corruption: the Odebrecht case. Emerald Emerging Markets Case Studies.

Moreno G. 1999. O processo histórico de acesso à terra em Mato Grosso. *Geosul* **14**(27): 67-90.

Murphy LL. 2001. Colonist farm income, off-farm work, cattle, and differentiation in Ecuador's northern Amazon. *Human Organization* **60**(1): 67-79.

Nasuti S, Eloy L, Raimbert C and Tourneau FM. 2015. Can Rural-Urban Household Mobility Indicate Differences in Resource Management within Amazonian Communities? *Bulletin of Latin American Research* **34**(1): 35-52.

Neeleman G, Neeleman R and Davis W. 2013. Tracks in the Amazon: The day-to-day life of the workers on the Madeira-Mamoré Railroad, University of Utah Press.

Negret PJ, Sonter L, Watson JEM, *et al.* 2019. Emerging evidence that armed conflict and coca cultivation influence deforestation patterns. *Biological Conservation* **239**.

Neo Mondo. 2018. Governo usa força nacional para manter ilegalidades na construção de hidrelétricas no rio Teles Pires. Neo Mondo, 22 March 2018. http://www.neomondo.org.br/2018/03/22/governo-usa-forca-nacional-para-manter-ilegalidades-na-construcao-de-hidreletricas-no-rio-teles-pires/

Nepstad D, Schwartzman S, Bamberger B, *et al.* 2006. Inhibition of Amazon deforestation and fire by parks and indigenous lands. *Conserv. Biol.* **20**: 65–73.

Nobre P, Malagutti M, Urbano DF, *et al.* 2009. Amazon Deforestation and Climate Change in a Coupled Model Simulation. *Journal of Climate* **22**(21): 5686-5697.

Nogueira EM, Yanai AM, de Vasconcelos SS, *et al.* 2018. Brazil's Amazonian protected areas as a bulwark against regional climate change. *Regional Environmental Change* **18**(2): 573-579.

Odinetz-Collart O. 1987. La pêche crevettiere de Macrobrachium amazonicum (Palaemonidae) dans le Bas-Tocantins, après la fermeture du barrage de Tucuruí (Brésil). *Revue d'Hidrobiologie Tropical* **20**(2): 131-144.

Oliveira GLT. 2013. Land Regularization in Brazil and the Global Land Grab. *Development and Change* **44**(2): 261-283.

Oliveira GL. 2021. The refraction of Chinese capital in Amazonian entrepôts, and the infrastructure of a global sacrifice zone. In: China in South America Post-2020. Amar P, Rofel L, Fernandez C, *et al.* (eds.).

Oliveira G and Hecht S. 2016. Sacred Groves, Sacrifice Zones and Soy Production: Globalization, Intensification and Neo-Nature in South America. *The Journal of Peasant Studies* **43**(2): 251–85

Oliveira GDL and Myers M. 2021. The tenuous co-production of China's Belt and Road Initiative in Brazil and Latin America. *Journal of Contemporary China*: 1-19.

Orta A. 2015. Earth Politics: Religion, Decolonization, and Bolivia's Indigenous Intellectuals. *Americas* **72**(3): 490-492.

Osorio AL. 1992. The Colonization of the Amazon. Austin, Texas: University of Texas Press.

Pacheco P. 2009. Agrarian Reform in the Brazilian Amazon: Its Implications for Land Distribution and Deforestation. *World Development* **37**(8): 1337-1347.

Padoch C, Brondizio ES, Costa S, *et al.* 2008. Urban Forest and Rural Cities: Multi-sited Households, Consumption Patterns, and Forest Resources in Amazonia. *Ecology and Society* **13**(2).

Padoch C and Pinedo-Vasquez M. 2010. Saving slash-and-burn to save biodiversity. *Biotropica* **42**: 550–552.

Padoch C, Pinedo-Vasquez M, Steward A, *et al.* 2014. Urban Residence, Rural Employment and the Future of Amazonian Forests. In: The Social Lives of Forests. Pp. 322-335. B. H. S, Morrison K, Padoch C. Chicago, University of Chicago Press.

Padua MTJ and Quintao ATB. 1982. Parks and biological reserves in the Brazilian Amazon. *Ambio*: 309-314.

Paerregaard K. 2015. The resilience of migrant money: how gender, generation and class shape family remittances in Peruvian migration. *Global Networks-a Journal of Transnational Affairs* **15**(4): 503-518.

Parry L, Day B, Amaral S and Peres C. 2010. Drivers of Rural Exodus from Amazonian Headwaters. *Population and Environment* **32**(2): 137–176.

Parssinen M, Schaan D and Ranzi A. 2009. Pre-Columbian geometric earthworks in the upper Purus: a complex society in western Amazonia. *Antiquity* **83**(322): 1084-1095.

Pellegrini L, Arsel M, Orta-Martínez M and Mena CF. 2020. International Investment Agreements, Human Rights, and Environmental Justice: The Texaco/Chevron Case from the Ecuadorian Amazon. J*ournal of International Economic Law* **23**(2): 455-468.

Perrault-Archambault M and Coomes OT. 2008. Distribution of agrobiodiversity in home gardens along the Corrientes River, Peruvian Amazon. *Economic Botany* **62**(2): 109-126.

Perroux F. 1955. Note sur la notion de Pole de Croissance. *Economie Applique* **8**: 307-320.

Peluso NL. 2012. What's Nature Got To Do With It? A Situated Historical Perspective on Socio-natural Commodities. *Development and Change* **43**(1): 79-104.

Peluso NL. 2017. Plantations and mines: resource frontiers and the politics of the smallholder slot. *Journal of Peasant Studies* **44**(4): 954-989.

Peluso DM and Alexiades MN (2005). Indigenous urbanization and Amazonia's post-traditional environmental economy. *Traditional dwellings and settlements review*: 7-16.

Pereira AK and Gomide A. 2019. Os Desafios Da Gestão de Projetos de Infraestrutura No Brasil Contemporâneo: Ambiente Institucional e Novos Instrumentos de Políticas Públicas. *Cadernos Adenaur, Infraestrutura e Desenvolvimento no Brasil* **20**(2): 9–29.

Pereira HS, Vinhote MLA, Zingra AFC and Takeda WM. 2015. A multifuncionalidade da agricultura Familiar no Amazonas: Desafios para a inovação sustentável. *Terceira Margem: Amazônia* **1**: 59-74.

Perz SG, Leite F, Simmons C, *et al*. 2010. Intraregional Migration, Direct Action Land Reform, and New Land Settlements in the Brazilian Amazon. *Bulletin of Latin American Research* **29**(4): 459-476.

Pinedo-Vasquez M, Barletti Pasqualle J, del Castillo Torres D and Coffey K. 2002. A tradition of change: The dynamic relationship between biodiversity and society in sector Muyuy, Peru. *Environmental Science & Policy* **5**: 43-53.

Pinedo-Vasquez M and Padoch C. 2009. Urban and rural and in-between: Multi-sited households, mobility and resource management in the Amazon floodplain. Mobility And Migration In Indigenous Amazonia: Contemporary Ethnoecological Perspectives. Alexiades M. Oxford and New York, Berghahn.

Pinedo-Vasquez M, Zarin DJ, Coffey K, *et al*. 2001. Post-boom logging in Amazonia. *Human Ecology* **29**(2): 219-239.

Pinsky VC, Kruglianskas I and Victor DG. 2019. Experimentalist governance in climate finance: the case of REDD+ in Brazil. *Climate Policy* **19**(6): 725-738.

Pinto-Ledezma JN and Mamani MLR. 2014. Temporal patterns of deforestation and fragmentation in lowland Bolivia: implications for climate change. *Climatic Change* **127**(1): 43-54.

Piperno D and Pearsall D. 1998. The origins of Agriculture in the Lowland Tropics. New York, Academic Press.

Plowman T. 1981. Amazonian coca. *Journal of Ethnopharmacology* **3**(2-3): 195-225.

Plowman T. 1984. The Ethnobotany of Coca (Erythroxylum spp., Erythroxylaceae). Advances in Economic Botany 1, Ethnobotany in the Neotropics, pp. 62-111.

Praeli YS. 2019. Madre de Dios: Seven Brazil nut concessions investigated for illegal timber extraction. Mongabay. Published on 20 Feb 2019. Available at: https://news.mongabay.com/2019/02/madre-de-diosseven-brazil-nut-concessions-investigated-f

PRODES. 2020. Monitoramento do Desmatamento da Floresta Amazônica Brasileira por Satélite. INPE. Available at: http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes

Rajão R, Soares-Filho B, Nunes F, *et al*. 2020. The rotten apples of Brazil's agribusiness. *Science* **369**(6501): 246-248

Randell H. 2017. Forced Migration and Changing Livelihoods in the Brazilian Amazon. *Rural Sociology* **82**(3): 548-573.

Ray R, Gallagher KP and Sanborn CA. 2019. (Eds.) Development Banks and Sustainability in the Andean Amazon. Routledge.

Redo D, Millington AC and Hindery D. 2011. Deforestation dynamics and policy changes in Bolivia's post-neoliberal era. *Land Use Policy* **28**(1): 227-241.

Rendon M, Sandin L and Fernandez C. 2020. Illegal Mining in Venezuela: Death and Devastation in the Amazonas and Orinoco Regions. Available at: https://www.csis.org/analysis/illegal-mining-venezuela-death-and-devastation-amazonas-and-orino. Accessed on: July 3, 2020.

Reydon BP, Fernandes VB and Telles TS. 2020. Land governance as a precondition for decreasing deforestation in the Brazilian Amazon. *Land use policy* **94**: 104313.

Richards P, Pellegrina H, VanWey L and Spera S. 2015. Soybean development: The impact of a decade of agricultural change on urban and economic growth in Mato Grosso, Brazil. *PLoS One* **10**(4): e0122510.

Richards P and VanWey L. 2015. Where Deforestation Leads to Urbanization: How Resource Extraction Is Leading to Urban Growth in the Brazilian Amazon. *Annals of the Association of American Geographers* **105**(4): 806-823.

Rivasplata Cabrera F, Marcos-Ibáñez MT, Wiegering C, *et al*. 2015. Inversión de empresas brasileras en América Latina: Camargo Correa, Odebrecht y OAS. AAS, CDES, CEDLA, DAR, IBASE, Bogotá, Colombia.

Rivera NR and Campos JD. 2008. Territory and new ruralities. A theoretical review on the transformation of the country-city relationships. *Eure-Revista Latinoamericana De Estudios Urbano Regionales* **34**(102): 77-95.

Roberts JT. 1995. Trickling down and scrambling up: The informal sector, food provisioning and local benefits of the Carajás mining "Growth Pole" in the Brazilian Amazon. *World Development* **23**(3): 385-400.

Rodrigues LFS. 2019. Mineração ilegal Bolivar (Venezuela) e Madre de Diós (Peru): novo paradigma de segurança ambiental na América do Sul. UFRGS Digital Repository.

Rodrigues RA and Fearnside PM. 2014. Índios Waimiri-Atroari impactados por tutela privada na Amazônia Central. *Novos Cadernos NAEA* **17**(1): 47-73

Roller HF. 2010. Colonial collecting expeditions and the pursuit of opportunities in the Amazonian Sertão, c. 1750–1800. *The Americas* **66**(4): 435-467.

Roller HF. 2014. Amazon Routes: Indigenous Mobility and Colonial Communities. Palo Alto, Stanford University Press.

Rospigliosi R, Blondet C and Lloréns JA. 2004. El consumo tradicional de la hoja de coca en el Perú. Lima: Instituto de Estudios Peruanos.

Rostain S. 2009. Between the Orinoco and the Amazon: ceramic age in the Guyanas. Anthropologies of Guayana. Whitehead N and Aleman S. Tucson, Arizona, Univeristy of Arizona: 36-54.

Rostow WW. 1971. The stages of economic growth; a non-communist manifesto. Cambridge Eng., University Press.

Rudel TK. 2007. Changing Agents of Deforestation: From State-Initiated to Enterprise Driven Processes, 1970–2000. *Land Use Policy* **24**(1): 35–41.

Salles V. 1971. O negro no Pará sob o regime da escravidão. Rio de Janeiro, Fundação Getulio Vargas.

Salles V. 2005. O negro no Pará sob o regime da escravidão. Rio de Janeiro,, Fundação Getulio Vargas.

Sales Y. 2017. A cidade mais violenta do país: em 15 anos, taxa de homicídios em Altamira aumentou 6 vezes. Ponte, 26 June 2017. https://ponte.org/altamira-a-mais-violenta/

Sanchez-Ribas J, Parra-Henao G, and Guimarães AE. 2012. Impact of dams and irrigation schemes in Anopheline (Diptera: Culicidae) bionomics and malaria epidemiology. *Rev. Inst. Med. Trop. S. Paulo* **54**(4).

Sánchez-Cuervo A and Aide TM. 2013. Consequences of the Armed Conflict, Forced Human Displacement, and Land Abandonment on Forest Cover Change in Colombia: A Multi-scaled Analysis. *Ecosystems* **16**(6): 1052-1070.

Santos RE, Pinto-Coelho RM, Drumond MA, *et al*. 2020. Damming Amazon Rivers: Environmental impacts of hydroelectric dams on Brazil's Madeira River according to local fishers' perception. *Ambio* **49**(10).

Santos SBM, Britto RC and Castro ER. (Eds.). 1996. Energia na Amazônia. Belém, Pará, Brasil: Museu Paraense Emílio Goeldi, Universidade Federal do Pará, & Associação de Universidades Amazônicas. 966 pp.

Santos-Granero F and Barclay F. 1998. Selva central: history, economy and land use in Peruvian Amazonia. Washington; London, Smithsonian Institution Press.

Santos-Granero F and Barclay F. 2000. Tamed frontiers: economy, society, and civil rights in upper Amazonia. Boulder, CO, Westview Press.

Salerno T. 2017. Cargill's corporate growth in times of crises: how agrocommodity traders are increasing profits in the midst of volatility. *Agriculture and Human Values* **34**(1): 211-222.

Salisbury DS and Fagan C. 2011. Coca and conservation: cultivation, eradication, and trafficking in the Amazon borderlands. *Geojournal* **11**.

Schmink M. 1982. Land Conflicts in Amazonia. American Ethnologist 9: 341-357. Schmink, M., & Wood, C. H. (Eds.). (1991). Frontier Expansion in Amazonia.

Schmink M and García M. 2015. Under the canopy: Gender and forests in Amazonia. Occasional Paper 121. Bogor, Indonesia: CIFOR.

Schmink M and Wood CH. 1992. Contested frontiers in Amazonia. New York: Columbia University Press.

Schmink M, Hoelle J, Gomes CVA and Thaler GM. 2017. From contested to 'green' frontiers in the Amazon? A long-term analysis of São Félix do Xingu, Brazil. *The Journal of Peasant Studies* **46**(2).

Scott JC. 1998. Seeing Like a State. New Haven: Yale University Press.

Sears RR, Cronkleton P, Villanueva FP, *et al*. 2018. Farm-forestry in the Peruvian Amazon and the feasibility of its regulation through forest policy reform. *Forest Policy and Economics* **87**: 49-58.

Sears RR, Padoch C and Pinedo-Vasquez M. 2007. Amazon forestry tranformed: Integrating knowledge for smallholder timber managemet in eastern Brazil. *Human Ecology* **35**(6): 697-707.

Seguridad, Justicia y Paz. 2021. Metodología del ranking 2020 de las 50 ciudades más violentas del mundo. Available at: http://www.seguridadjusticiaypaz.org.mx/sala-de-prensa/1597-metodologi-a-del-ranking-2020-de-las-50-ciudades-ma-s-violentas-del-mundo

Serrano Moreno, JE, Telias D and Urdinez F. 2020. Deconstructing the Belt and Road Initiative in Latin America. Asian Education and Development Studies.

Silva ANR, Azevedo Filho MAN, Sorratini JA, *et al*. 2015. A comparative evaluation of mobility conditions in selected cities of the five Brazilian regions. *Transport policy* **37**: 147-156.

Silva CHL, Celentano D, Rousseau GX, *et al*. 2020. Amazon forest on the edge of collapse in the Maranhao State, Brazil. *Land Use Policy* **97**.

Silva DO, Guerrero AFH, Guerrero CH and Toledo LM. 2008. 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.

Silva JMC, Prasad S and Diniz-Filho JAF. 2017. The impact of deforestation, urbanization, public investments, and agriculture on human welfare in the Brazilian Amazonia. *Land Use Policy* **65**: 135-142.

Silva Junior CHL, Pessôa ACM, Carvalho NS, *et al*. 2021. The Brazilian Amazon deforestation rate in 2020 is the greatest of the decade. *Nature Ecology & Evolution* **5**(2): 144-145.

Silva GdC. 1957. Aspectos geopolíticos do Brasil. Rio de Janeiro: Biblioteca do Exército.

Silva GdC. 1967. Geopolítica do Brasil. Rio de Janeiro: J. Olympio.

Silva GdC. 2003. Geopolitica e poder. Rio de Janeiro: UniverCidade.

Silva H. 2009. Socio-Ecology of Health and Disease: The Effects of Invisibility on the Caboclo Populations of The Amazon. *Amazon Peasant Societies in a Changing Environment*: 307-333.

Silveira LB and Wiggers R. 2013. Protegendo a floresta, reconfigurando espaços na Amazônia: o caso do Projeto de Assentamento Extrativista Santa Maria Auxiliadora, Humaitá (AM). *Rev. Adm. Pública* **47**(3)

Simão BP and Athayde S. 2016. Resiliência socioecológica em comunidades deslocadas por hidrelétricas na Amazônia: o caso de Nova Mutum Paraná, Rondônia. *Sustentabilidade em Debate* **7**(2): 104-117

Simmons CS, Famolare L, Macedo MN, *et al*. 2018. Science in support of Amazonian conservation in the 21st century: the case of Brazil. *Biotropica* **50**: 850-858.

Simmons C, Walker R, Perz S, *et al*. 2010. Doing it for Themselves: Direct Action Land Reform in the Brazilian Amazon. *World Development* **38**(3): 429-444.

Skidmore TE. 1986. Politics in Brazil, 1930-1964: an experiment in democracy. New York, Oxford University Press.

Soares-Filho B and Rajão. 2018. Traditional conservation strategies still the best option. *Nature Sustainability* **1**: 608–610.

Sobreiro T. 2014. Urban-Rural Livelihoods, Fishing Conflicts and Indigenous Movements in the Middle Rio Negro Region of the Brazilian Amazon. *Bulletin of Latin American Research.*

Sousa Júnior W and Reid J. 2010. Uncertainties in Amazon hydropower development: Risk scenarios and environmental issues around the Belo Monte dam. *Water Alternatives* **3**(2): 249-268.

LADB Staff. 2007. Brazilian Rancher Sentenced to 30 Years for Murder of US Nun Dorothy Stang. Latin America Digital Beat.

Studart R. 2000. Financial opening and deregulation in Brazil in the 1990s Moving towards a new pattern of development financing? *The Quarterly Review of Economics and Finance* **40**(1): 25-44.

Sudério MO. 2020. Experiências em planejamento regional no estado do Amazonas: entre a SPVEA e a SUDAM/SUFRAMA (1953-1985). PhD Dissertation. Universidade de Brasilia, Brasilia.

Svampa M. 2019. Neo Extractivism in Latin America. New York, Cambridge University Press.

Tacoli C and Mabala R. 2010. Exploring mobility and migration in the context of rural-urban linkages: why gender and generation matter. *Environment and Urbanization* **22**(2): 389-395.

Tadei WP, Scarpassa VM and Rodrigues IB. 1991. Evolução das populações de Anopheles e de Mansonia, na área de influência da Usina Hidrelétrica de Tucuní (Pará). *Ciência e Cultura* **43**(7, Suplemento): 639-640.

Taussig M. 1984. Culture of Terror - Space of Death - Casement, Roger Putumayo Report and the Explanation of Torture. *Comparative Studies in Society and History* **26**(3): 467-497.

Thaler GM, Viana C, and Toni F. 2019. From frontier governance to governance frontier: The political geography of Brazil's Amazon transition. *World Development* **114**: 59-72.

Torras M. 2019. Welfare, inequality, and resource depletion: A reassessment of Brazilian economic growth, Routledge.

Torres J. 1996. Agricultural modernization and resource deterioration in Latin America. *Environmental Impacts of Macroeconomic and Sectoral Policies*: 257 – 287.

Torres M and Branford S. 2018. Amazon Besieged: By dams, soya, agribusiness and land-grabbing. Practical Action Publishing.

Tritsch I and FM Le Tourneau. 2016. Population densities and deforestation in the Brazilian Amazon: New insights on the current human settlement patterns. *Applied Geography, Elsevier* **76**: 163 - 172.

UEA AW. 2010. Terras e territórios na Amazônia: demandas, desafios e perspectivas. Universidade de Brasília.

Ulmer GL. 2021. Precarity, migration and extractive labour in the Peruvian Amazon. Handbook of Culture and Migration, Edward Elgar Publishing.

UNODC. 2005. Coca cultivation in the Andean region. A survey of Bolivia, Colombia and Peru. Available at: http://www.unodc.org/unodc/en/crop-monitoring/index.html

UNODC (UN Office of Drug Control). 2015. Annual Report. Geneva

Uriarte M, Pinedo-Vasquez M, DeFries RS, *et al*. 2012. Depopulation of rural landscapes exacerbates fire activity in the western Amazon. *Proceedings of the National Academy of Sciences of the United States of America* **109**(52): 21546-21550.

Urteaga-Crovetto P. 2012. The broker state and the 'inevitability'of progress: The Camisea project and Indigenous peoples in Peru. In: The Politics of Resource Extraction: 103-128. Palgrave Macmillan, London.

Vadjunec J and Schmink M (eds). 2012. Amazonian Geographies: Emerging Identities and Landscapes. London and New York: Routledge. Also published as a special Issue of Journal of Cultural Geography.

Vadjunec V, Schmink M and Gomes CV. 2011. Rubber tapper citizens: Emerging places, policies, and shifting identities in Acre, Brazil. *Journal of Cultural Geography* **28**(1): 73-98.

Valverde O and Dias CV. 1967. A Rodovia Belem-Brasilia Estudo de Geografia Regional. Fundação IBGE.

Van der Hoff R, Rajão R and Leroy P. 2018. Clashing interpretations of REDD+ "results" in the Amazon Fund. *Climatic Change* **150**: 433-445.

Van Dijck P. 2008. Troublesome construction: The rationale and risks of IIRSA. *Revista Europea de Estudios Latinoamericanos y del Caribe*: 101-120

VanWey LK and Richards PD. 2014. Eco-certification and greening the Brazilian soy and corn supply chains. *Environmental Research Letters* 9(3).

Verner D. 2013. Poverty in the Brazilian Amazon. Washington DC, World Bank.

Vilela T, Malky Harbb A, Brunera A, *et al*. 2020. A better Amazon road network for people and the environment. *Proceedings of the National Academy of Sciences* **117**: 7095-7102.

Villas-Bôas A, Garzón BR, Reis C, *et al*. 2015. Dossiê Belo Monte: Não há condições para a licença de operação. Brasília, DF, Brasil: Instituto Socioambiental (ISA). Available at: http://t.co/zjnVPhPecW

Visser O, Clapp J nd Isakson SR. 2015. Introduction to a Symposium on Global Finance and the Agri-food Sector: Risk and Regulation. *Journal of Agrarian Change* **15**(4), 541-548.

Vogt ND, Pinedo-Vasquez M, Brondizio ES, *et al*. 2015. 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. *Society & Natural Resources* **28**(10): 1043-1058.

Vogt N, Pinedo-Vasquez M, Brondizio ES, *et al*. 2016. Local ecological knowledge and incremental adaptation to changing flood patterns in the Amazon delta. *Sustainability Science* **11**(4): 611-623.

Walker R, Arima CSE, Miyoshi YG, *et al*. 2019. Avoiding Amazonian Catastrophes: Prospects for Conservation in the 21st Century. *One Earth* **1**(2): 202-215.

Watling J, Iriarte J, Mayle FE, *et al*. 2017. Impact of pre-Columbian "geoglyph" builders on Amazonian forests. *Proceedings of the National Academy of Sciences of the United States of America* **114**(8): 1868-1873.

Webb J, Coomes OT, Ross N and Mergler D. 2016. Mercury concentrations in urine of amerindian populations near oil fields in the peruvian and ecuadorian amazon. *Environmental Research* **151**: 344-350.

Weißermel S. 2020. Towards a conceptual understanding of dispossession–Belo Monte and the precarization of the riverine people. *Novos Cadernos NAEA* **23**(1).

Weinhold D, Killick E and Reis EJ. 2013. Soybeans, Poverty and Inequality in the Brazilian Amazon. *World Development* **52**: 132-143.

Weinstein BS. 1983. The Amazon rubber boom, 1850-1920. Stanford, Calif., Stanford University Press.

Weisser SC. 2001. Investigation of the history of mercury contamination in the Balbina Reservoir, Amazon, Brazil. Masters thesis in environmental toxicology, Universität Konstanz, Konstanz, Germany, 66 pp.

Well J. 1980. Coca and tropical colonization in Bolivia: The adaptiveness of a cash crop. *Central Issues in Anthropology* **2**(1): 15-25.

West TAP, Börner B, Sills EO, and Kontoleon A. 2020. Overstated carbon emission reductions from voluntary REDD+ projects in the Brazilian Amazon. *PNAS* **117**(39): 24188-24194

West TA and Fearnside PM. 2021. Brazil's conservation reform and the reduction of deforestation in Amazonia. *Land use policy* **100**: 105072.

Wesz Jr VJ. 2016. Strategies and hybrid dynamics of soy transnational companies in the Southern Cone. *Journal of Peasant Studies* **43**(2): 286-31.

Whitehead NL. 1990. The Mazaruni pectoral: a golden artefact discovered in Guyana and the historical sources concerning native metallurgy in the Caribbean, Orinoco and Northern Amazonia. *Journal of Archaeology and Anthropology* **7**: 19-38.

Whitehead NL. 1994. The ancient Amerindian polities of the Amazon, the Orinoco, and the Atlantic coast: a preliminary analysis of their passage from antiquity to extinction. Amazonian Indians from prehistory to the present: *Anthropological perspectives*: 33-53.

Whitten Jr NE, Whitten DS and Chango A. 1997. Return of the Yumbo: The Indigenous caminata from Amazonia to Andean Quito. *American Ethnologist*: 355-391.

Wilson J, Bayón M and Diez H. 2015. Manta-Manaus: Interoceanic fantasies and the real of planetary urbanization. CENEDET Working Papers# 4.

WinklerPrins AM. 2002. House-lot gardens in Santarém, Pará, Brazil: Linking rural with urban. *Urban Ecosystems* **6**(1-2): 43-65.

WinklerPrins AM and de Souza PS. 2005. Surviving the city: urban home gardens and the economy of affection in the Brazilian Amazon. *Journal of Latin American Geography* **4**(1): 107-126.

Wójcik D, Knight E, O'Neill P and Pažitka V. 2018. Economic geography of investment banking since 2008: The geography of shrinkage and shift. *Economic Geography* **94**(4): 376-399.

Yanai AM, Fearnside PM, Lima de Alencastro Graca PM and Nogueira EM. 2012. Avoided deforestation in Brazilian Amazonia: Simulating the effect of the Juma Sustainable Development Reserve. *Forest Ecology and Management* **282**: 78-91.

Yanai AM, Graça PMLA, Escada MIS, *et al*. 2020. Deforestation dynamics in Brazil's Amazonian settlements: Effects of land-tenure concentration. *Journal of Environmental Management* **268**: art. 110555.

Yanai AM, Nogueira EM, de Alencastro Graça PML. *et al*. 2017. Deforestation and Carbon Stock Loss in Brazil's Amazonian Settlements. *Environmental Management* **59**: 393–409.

Zhouri A. (Ed). 2011. As Tensões Do Lugar: Hidrelétricas, Sujeitos e Licenciamento Ambiental. Belo Horizonte: Editora UFMG.

Zibechi R. 2015. Interconexión sin integración: 15 años de IIRSA. El Comercio 15.

Zimmerer KS. 2006. Globalization and new geographies of conservation. Chicago, University of Chicago Press.

Zimmerer KS. 2014. Conserving agrobiodiversity amid global change, migration, and nontraditional livelihood networks: the dynamic uses of cultural landscape knowledge. *Ecology and Society* **19**(2).

CONTACT INFORMATION

SPA Technical-Scientific Secretariat New York
475 Riverside Drive, Suite 530
New York NY 10115
USA
+1 (212) 870-3920
spa@unsdsn.org

SPA Technical-Scientific Secretariat South America
Av. Ironman Victor Garrido, 623
São José dos Campos – São Paulo
Brazil
spasouthamerica@unsdsn.org

WEBSITE theamazonwewant.org
INSTAGRAM @theamazonwewant
TWITTER @theamazonwewant