

Chapter 4

The Hileia Baiana: An Assessment of Natural and Historical Aspects of the Land Use and Degradation of the Central Corridor of the Brazilian Atlantic Forest



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Abstract The exuberant, pristine forest originally occupying an area stretching along today's southern Bahia to the northern portion of Espírito Santo states was coined as the Hileia Baiana and represents a unique and highly diverse biota that, in addition to high levels of endemics, suffered the influence of past connections to the Amazonian biome. Herein we made an effort to present the key social, economic, and historical aspects that ultimately determined the current land use of this region. From the first colonial territorial division that encompasses two hereditary captaincies, Ilhéus in the north and Porto Seguro in the south, the occupation process was fomented by the exploration of the brazilwood and the sugarcane plantation. Unlike the northeastern territories encompassing the Recôncavo and Zona da Mata, where sugar mills multiplied between the sixteenth and seventeenth centuries, in Ilhéus and Porto Seguro, the production declined. In this territory, the production of cassava flour, the food basis of the colonial population, was developed, being more vigorous in the captaincy of Ilhéus due to the greater proximity of the consumer markets of Bahia and Pernambuco. At the same time, the presence of large stocks of valuable timber encouraged the exploitation of such strategic resource to the metropolitan naval industry. In the nineteenth century, the favorable foreign market promoted a new sugarcane cycle and the introduction of new export crops, coffee, and cacao. In Ilhéus, cacao plantations expanded in the second half of the nineteenth century, making the old headquarters of the captaincy the nucleus of a producing area that, in the twentieth century, also extended to territories of the former captaincy of Porto Seguro. Along the nineteenth and the twentieth centuries, Ilhéus – in the south of what is now the state of Bahia – consolidated itself as a major cacao-producing region, while the occupation and the strengthening of the economy of the two regions earlier encompassing the Porto Seguro captaincy (extreme south of Bahia and north of Espírito Santo) were only solidified during the twentieth century.

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Five hundred years of colonization and successive economic cycles significantly reduced and degraded the native vegetation, but these forests are still significant reservoirs of the regional biota that inhabits the few remaining forests – legally protected or not – and the complex mosaic of different land uses that comprise the dominant human-modified landscapes. What is left still faces several threats regarding deforestation, fragmentation, and chronic disturbances that, if not adequately curbed, will probably jeopardize the long-term conservation of such important natural assets.

Keywords Hileia Baiana · Atlantic Forest · Cacao plantation · Logging · Biodiversity · Ilhéus · Porto Seguro · Espírito Santo

The mass of vegetation accumulates around the visitor with an impenetrable strength to the rays of the sun, pouring with force from their own entrails, multiplying in ever new vaulted compartments, closing finally over our heads in a shaded and compact cover, woven by vines interlaced and supported by climbing plants; the eye is no more able to recognize where the plants begin or finish; the place from where the roots sprout fall hidden in a mass of plants of different species that branch out in front of us... (von Habsburg, 1867)

4.1 The Natural Features of the Hileia Baiana

Although rarely used in scientific literature in the last decades, the expression “Hileia Baiana” was applied by Andrade-Lima (1966) to describe the resemblance of the lowland forests located in the south of Bahia and north of Espírito Santo states to the exuberant Amazonian forests or “Hileia Amazônica,” a term coined by the German naturalist Alexander von Humboldt (Magalhães and Maio 2007). It corresponds to a rather well-defined region of the coastal Atlantic Forest of northeastern Brazil, agreeing to a region of what Carnaval and Moritz (2008) and Martins (2011) called the “Bahia refuge,” a stretch of the Atlantic Forest remarkably stable during the Pleistocene and Holocene periods. It corresponds too to the “Bahia endemism area,” one of the five main endemism areas of the Brazilian Atlantic Forest described by da Silva and Casteleti (2003).

The regional geomorphology is composed of Quaternary sands deposited along the littoral, the coastal “tabuleiros” on the Barreiras Formation of Oligocene sediments and inland, and an alternation of hills and valleys with several mountains of medium altitude (up to 1000 m) formed between 300 and 200 million years ago and roughly parallel to the littoral (Barbosa et al. 2003). The climate is wet tropical of the Af climatic region in Köppen’s classification (1936), with average monthly temperatures ranging between 20 and 25 °C, locally characterized by a strong gradient of rainfalls from around 1600 to 2000 mm along the coast to less than half of that inland. The main vegetation formations, from east to west, occupy a narrow zone up to 50 km wide within the coastal forest belt and vary in composition depending on elevation, soils, and drainage (Thomas et al. 1998). According to Thomas and

Barbosa (2008), natural formation encompasses a complex mosaic of physiognomies including (1) the “open restinga,” comprising open, savanna-like formation growing on sandy soils where cashew (*Anacardium occidentale* L.) is one of the main characteristic trees; (2) the “restinga forest,” which is a shrubby woodland of small trees with a closed canopy where one of the most characteristic species in the Hileia Baiana is the piassava palm (*Attalea funifera* Mart.); (3) the “coastal tabuleiros,” physiognomies that shelter two types of vegetation living on moister clay soils: the open tabuleiros, sometimes called “campos nativos,” which form open clearings within tabuleiro forest, and the tabuleiro forest itself; (5) the “tropical moist forest,” comprising the main vegetal formation of the Hileia Baiana, with the “tropical lowland moist forest” or “mata higrófila sul-baiana,” which grows at low elevations (until 100 m); (6) the “submontane tropical moist forest,” a formation occurring up to 600 m elevation; and (7) the “submontane and montane deciduous seasonal forests” known as “mata de cipó” or liana forest in southwestern Bahia, which are usually distributed in areas with 800–1000 mm of orographic-driven rainfalls per year well distributed in dry and rainy seasons.

The coastal zone was submitted to alternative sea-level changes during the Quaternary (Suguio et al. 2005), according to the climatic changes. Dominguez et al. (1982) reconstituted the detailed history of alluvial and sand deposition according to the Quaternary sea regressions and transgressions along the coast of several regions of Brazil, responsible for the formation of the estuary of the Jequitinhonha River and many portions of the coast of Bahia. The climatic changes and a range of biotic and geographic evidences originated the Theory of Refuges of Quaternary (Haffer 1969) responsible for a fragmentation of the forest by open dry formations such the savannas (Vanzolini and Williams 1981; Martins 2011), accounting itself for the increase in the species richness of the Atlantic Forest by a succession of vicarious processes. Evidence shows the occurrence of two active forest corridors, which are discontinuous in time between the Amazon Forest and the Atlantic Forest since Oligocene but more intensive during Pleistocene (Batalha-Filho et al. 2013; Ledo and Colli 2017).

The Hileia Baiana shelters one of the five centers of endemism along the Atlantic Forest biome (Silva and Casteleti 2003), harboring one of the most diverse areas for plants and animals in the world. For plant species, the region represents one of the richest spots (Martini et al. 2007). Systematic, long-term inventories from a single reserve in Espírito Santo report that the area contains ~17% of the angiosperm species estimated for the entire biome (Peixoto et al. 2008). In a single forest hectare, Thomaz and Monteiro (1997) detected 443 tree species in Espírito Santo, while Thomas et al. (1998) reported 454 in a forest fragment in Bahia, which was near to the forests in which Martini et al. (2007) surveyed a striking number of 144 species in plots of only 0.1 ha. Endemism rates are between 18.9% and 28.1% of local flora (Thomas et al. 1998; Amorim et al. 2008), and Euphorbiaceae, Lauraceae, Sapotaceae, and Myrtaceae are especially the most diverse plant families, including many endemic species (Amorim et al. 2008). A recent revision encompassing the north of Espírito Santo and most of the coastal forests in Bahia state highlighted the uniqueness of this flora, identifying 547 endemic tree species from 69 families, with

7 endemic genera (Ostroski et al. 2018). Populations of a range of trees are especially interesting for regional history, landscape, and conservation, such as the brazilwood [*Paubrasilia echinata* (Lam.) Gagnon, H.C. Lima & G.P. Lewis], the jacarandá-da-Bahia or Brazilian rosewood [*Dalbergia nigra* (Vell.) Allemão ex. Benth.], the juçara palm [*Euterpe edulis* (Mart.)], and the jequitibá (*Cariniana* spp.), species until today representing valuable economic resources like food, timber, and other uses (Dean 1995; Mattos-Silva et al. 2008).

Similar levels of speciose and endemism can be reported for the fauna, including vertebrates and invertebrates. In the “Hileia Baiana,” 59 bat species are known from inventories carried out in the south of Bahia state (Faria et al. 2006b) and 12 primate species (Pinto 1994). For birds, Laps (2006) reported 333 species, including 17 species threatened, in Una Biological Reserve and its surrounding areas (Bahia), while Srbek-Araujo et al. (2014) registered 391 species – 44% of the bird species occurring within the Atlantic Forest – from ~30 years of inventories in a single protected area in Espírito Santo state. Sixty-one species of snakes were found in the single cacao-producing region, with 19 of them endemic of the Atlantic Forest (Argolo 2004). There is only partial data about the invertebrate diversity of the Hileia Baiana, particularly on the cacao-producing region, but all the available information suggests that the fauna is unique and rich, at least for the major components of animal biomass such as springtails, spiders, mites, termites, and ants but also for onychophores, isopods, or gastropods (Delabie et al. 2017). For example, at least 250 species of spiders are known for the Hileia Baiana (Delabie et al. 2017), as much as 429 ant species are known for the whole strata of the vegetation only for the single municipality of Ilhéus with 1.712 km² (Delabie et al. 1998) and 391 ant species living only on the ground were sampled in 11 landscapes of south of Bahia (Santos et al. 2017). In this region, the several types of cacao agroforests are responsible for the conservation of a large proportion of native species (Delabie et al. 2007; Cassano et al. 2014), among them many endemic ones, including some threatened by extinction. It is also the case near Porto Seguro where the monotypic endemic ant genus *Diaphoromyrma* survives in a couple of forest fragments completely surrounded by an ocean of eucalyptus plantations (Fernández et al. 2009).

4.2 Forests and Territory: Land-Use Changes along the Colonial Period

When the Portuguese arrived in Brazil, on April 22, 1500, the region encompassing the Hileia Baiana was inhabited by Amerindians from different ethnic groups. The brief meeting of the old and new world civilizations was described with details in a famous letter written by the clerk Pero Vaz de Caminha to King D. Manuel, a moment that sealed the destiny of the territory in general and its natural resources in particular. From the beginning, it was clear that the lavish and pristine coastal forests harbored a rich stock of valuable woods, the most precious being the brazilwood, a tree prized as a natural red dye. Indeed, its exploitation yielded a profitable

trade to the crown due to its high quality and local abundance. Since the beginning of the sixteenth century and for a long time, brazilwood harvesting was the main economic activity carried out by the Portuguese in Brazil. This huge richness has also attracted the attention of other nations eager to have their share of the profitable resources on the new, unprotected territory, forcing the once reluctant Portugal to take possession of the land.

Nevertheless, the continental scale of the new territory severely limited the capacity of the crown to occupy the land. The strategy adopted by the King D. João III was to divide the land into large territories, starting from the coast until the western limit of the territory, the so-called Hereditary Captaincies. Each captaincy was granted to a donee or a private recipient representing well-provided entrepreneurs that could explore the territory and its resources in exchange for setting the infrastructure, rules, and share of the profits with the crown. Between 1534 and 1566, the crown distributed 14 Hereditary Captaincies, 2 of which generally comprising the north and south limits of the Hileia Baiana, the captaincies of São Jorge dos Ilhéus and Porto Seguro, respectively (Fig. 4.1).

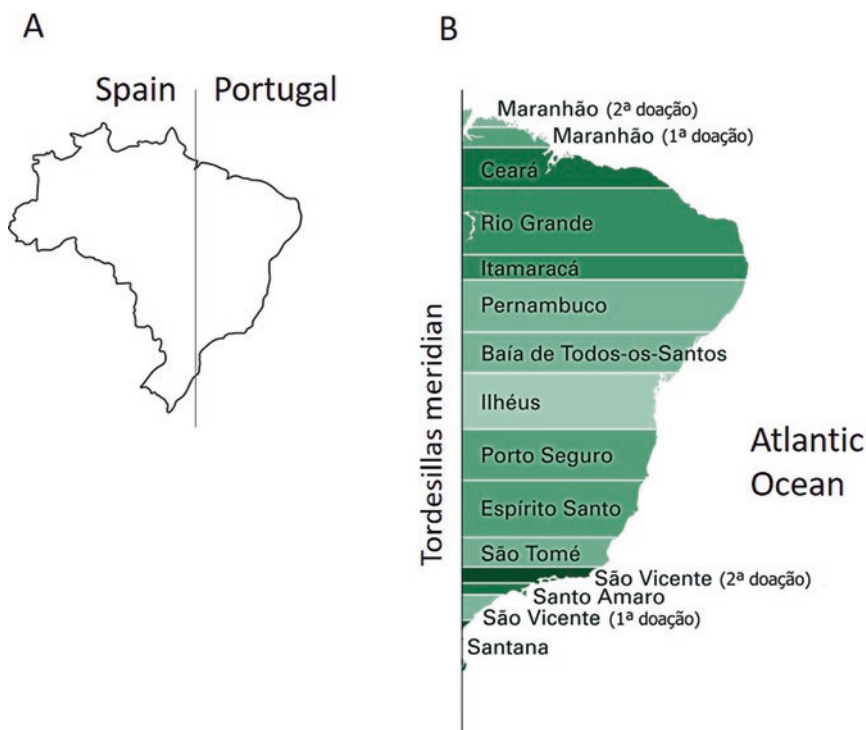


Fig. 4.1 Representation of the (a) territorial division of Tordesillas treaty, the imaginary line (black bar) separating western lands under Spain dominion while the east side comprised the Portuguese America, (b) in which each hereditary captaincy of the XVI century is depicted by different shades of green

As depicted in Fig. 4.2, which makes reference of main localities cited in this chapter, the territory corresponding to both captaincies extended, roughly, from the current municipality of Valença in the north, which divided the captaincy of Bahia with that of Ilhéus, until the mouth of the Doce River, which delimited the captaincies of Porto Seguro and Espírito Santo. The Jequitinhonha River, in turn, circumscribed the boundaries between the two. From the second half of the nineteenth century, the territories would be integrated with that of Bahia, forming a single captaincy, which also includes the north of the Doce River. The territories of Ilhéus and Porto Seguro would yet remain as a circumscription of the homonymous counties created in the 1760s, which lasted until the first half of the nineteenth century, when both became cities.

The beneficiaries of the first captaincies were families intimately connected with conquest and overseas business, well aware of the economic potential of the lands they received from the King. For instance, Jorge de Figueiredo Corrêa, the donee of the Ilhéus captaincy, was not a conqueror but rather an active participant in the enterprises in charge of reporting every commercial transaction overseas. This certainly assured him privileged information for choosing his fair share of the Brazilian coast (Coelho Filho 2000). His allotment was replete on valuable woods, including large stocks of brazilwood. The territory was well served by a hydrographic network and natural harbors, making the region convenient for the flourishing enterprise of sugar mills. On the other hand, the donee of the neighbor Porto Seguro captaincy, Pero de Campos Tourinho, came to Brazil with his family and, for more than a decade, traded brazilwood, before engaging in the promotion of sugar production, which was also favored by the geography of his allotment (Souza 1939).

In addition to the rich forest, fertile soil, and a convenient hydrographic system, the coast comprising both captaincies harbored indigenous populations of the Tupi ethnicity. From the bay of Camamu in the north to the Doce River in the south most tip of this land, the Tupiniquim ethnic group predominated, forming an area densely occupied by villages. They became the main allies of the Portuguese settlers, but such a relationship could not guarantee the hegemony of colonizers in the deal with the natives. Indeed, the French traffickers rivaled with the Portuguese and even co-opted Lusitanian authorities and settlers for their interests in the acquisition of brazilwood. Thus, the exploitation of such precious dye, which guided the first actions of contact and colonization in the territories of the captaincies of Ilhéus and Porto Seguro, eventually became a source of conflict (Dias 2016).

For the indigenous populations occupying the coast, the alliances with Europeans guaranteed, at first, their strengthening against the traditional internal enemies. However, throughout the sixteenth century, the primitive barter system was decisive to the dismantling of the Tupi villages, despite preserving the communitarian character of those societies. With the intensification of resource exploitation in the period of the captaincies, competition for indigenous labor put more and more tools and weapons into the hands of natives, eventually saturating the junk market. In addition to broadening its bargaining power, trade has changed the economy of the native populations by facilitating such tasks as clearing the forest, hunting, and producing canoes. Relieved at these activities, they were able to invest more time

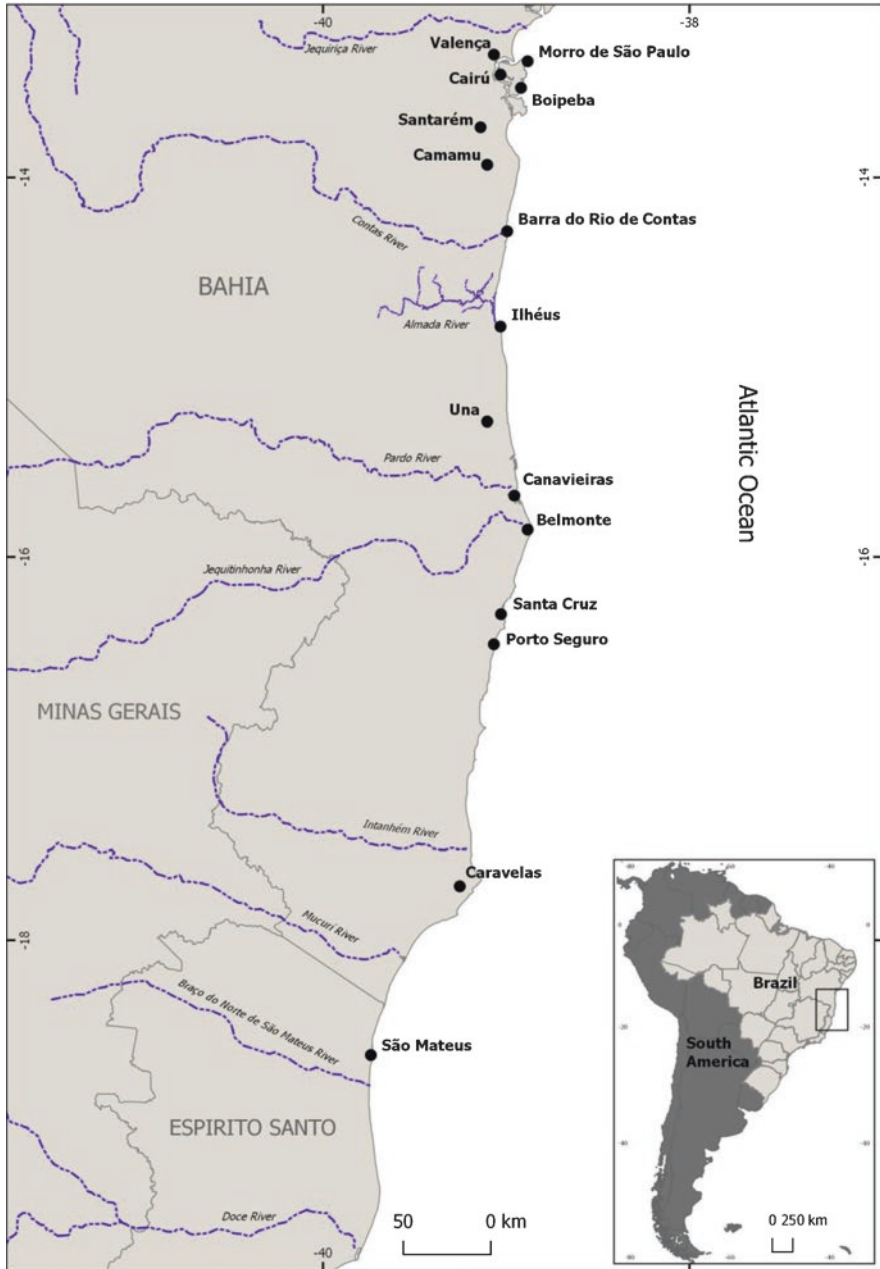


Fig. 4.2 Depiction of the north-south limits of the Hileia Baiana, highlighting the main rivers and the original name (until the nineteenth century) of the main localities cited in the text

focusing on intertribal wars, fueling the slave-rescue market, while de-structuring villages (Schwartz 1988).

The establishment of the first sugar mills in the 1540s would intensify the interdependence between Portuguese and natives. The situation of the latter worsened by the epidemics of smallpox and measles that, in the 1560s, swept the coast from which today lies the states of Espírito Santo and Bahia. The Jesuits, the Catholic order with the official monopoly upon the indigenous labor, reported the demise of nearly two-thirds of their village Amerindians during these outbreaks (Campos 2006). More and more, the colonists began to practice the “jumps”, that is, incursions to the inner lands (*sertões*) for pursuing new slaves. Thus, the barter system was compromised by the disarrangement of the indigenous communities and by the low population. The emptiness left by the decreasing of the Tupi population attracted hordes of other indigenous, fierce tribes from the interior, identified as Aimorés. The attacks directed at the Portuguese settlements seriously compromised the existence of the incipient urban centers and the functioning of the sugar mills.

The Portuguese Crown concentrated its investments in the defense and administration of the capital city of Salvador and its surroundings (herein *Recôncavo*), attracting the people and the assets capable of setting up sugar mills. At the same time, Ilhéus and Porto Seguro donees, dependent on private investment, were unable to cope with the obstacles represented by the lack of labor, by the incursions of the Amerindians, and by the conflicts between residents and natives. In the final years of the sixteenth century, the number of mills drastically reduced in these last captaincies. In Porto Seguro, which had five sugar mills in 1570, only one remained in 1612 (Carrara 2007). The danger of the Aimoré besetment in the forests neighboring the Portuguese settlements also paralyzed the brazilwood business. Peace was only observed between 1602 and 1603, yet another difficulty, this time in the external sphere, further prevented the development of colonization in those villages: the war imposed by the Dutch corsairs. From the first decade of the seventeenth century, foreign fleets significantly limited the transit of Portuguese vessels along the coast of Bahia. Such high risk hindered sugar production from crossing the Atlantic Ocean, resulting in many mills quitting production. For instance, in the village of São Jorge dos Ilhéus, of the eight existing mills in the 1570s, only half were operating in 1629 (Dias 2011). From 1649, Portugal imposed the so-called fleet system for the transatlantic trade, which requires that all ships leaving the country should first gather on the main ports (e.g., Salvador) and then sail in convoys. Such rule determined the closing of the last mills in that village, except Santana mill which belonged to the Jesuits. The survival of this unit was only possible by the Jesuit strategy of keeping in parallel to the manufacture of sugar a food production, such as cassava flour, rice, beans, and fish, destined for the domestic market. Santana mill, as defined by the priest Felipe Franco who managed the business between 1656 and 1674, was an exception as a production unit of sugarcane plantation and farm.¹

¹Franco F (1659) Carta do Pe. Felipe Franco para o Pe. Reitor, Ilhéus, 29 de setembro de 1659. Arquivo Nacional da Torre do Tombo (Lisboa), Fundo Cartório dos Jesuítas, Maço 68, n. 306.

The historiography of the last 40 years has shown that self-sustaining sugar mills in colonial Brazil are real exceptions (Linhares and Silva 1981; Barickman 2003; Amantino 2018). The mercantile production of food began as soon as the first colonial settlements were established. With the process of concentration of sugar mills in the northern captaincy of Bahia and the increasing substitution of indigenous labor for that of the enslaved Africans, the production of food in that zone diminished, while the demand increased. On the coast of Ilhéus, a captaincy increasingly isolated from the export economy, settlers of modest conditions were established, unable to claim land in the dynamic sugar zone and thus participate directly in that business. As regular or irregular tenants, or simply landowners with no land titles, they began to produce cassava flour, the main staple food. Such situation contributed to consolidating the colonial settlement on the banks of the navigable rivers that orbited not only on the village of Ilhéus but also in other urban nuclei founded between the end of the sixteenth and the beginning of the seventeenth century (i.e., Cairu, Boipeba Island, and Camamu). The geography of these territories articulated a network of rivers, bays, and natural harbors, promoting a very convenient connection with Salvador and its surroundings.

During the Dutch domination in the northern captaincies, the militias hired to defend the country were concentrated in Salvador, extending significantly the number of mouths to be fed. For this reason, the colonial administration adopted a policy of concentrating the cassava flour production in the Ilhéus captaincy. As unbelievable as it might sound, a series of top-down, draconian measures were imposed on the captaincy. This included preventing the production of export crops, such as sugarcane and tobacco, under penalty of imprisonment of the offenders; regulating the amount of flour that each village should send directly to the central government in Salvador, according to its corresponding productive capacity; appointing local agents and commissioners of the capital to carry out the trade; and establishing a maximum price per bushel (~36.3 liters) to be paid to producers, always below the potential market value. These measures comprised the so-called “conchavo das farinhas”² or “collusion of flour”, which was in force until 1738. Consequently, the so-called lower villages consolidated their agrarian profile of the internal supply zone for the central government (Dias 2011).

The long period in which such measures lasted, far beyond the end of the conflicts with the Dutch, points to the structural dependence established between the dynamic zone of sugar production – and the overseas trade – and the area designated for food production. Interestingly, a regional market was established that allowed the participation of small producers in the slave system. For most farmers, however, the advantage of this ever-increasing demand for the flour they produced did not

²Another possible English translation for the Portuguese term “conchavo” would be “incumbency” as, in this case, it refers to certain obligation to be fulfilled by some agreed commitment. After agreeing among themselves, the authorities from the administrative capital of Salvador legally forced flour producers from the villages of Cairu, Camamu, and Boipeba to produce and sell fixed quantities of flour, under fixed prices, to Salvador. Only after meeting this demand could producers sell to other markets.

reinforce the expansion of their productive forces, given the limitation represented by the pricing established under the “collusion of flour.” Most farmers were limited to producing more due to a small number of slaves, on average two or three per unit.³ Some peasants were even more restricted, counting only with the family labor. Under these meager conditions, flour producers were also unable to expand their cultivating area, as labor scarcity prevented new clearings in the forest. These producers were left with the early-growth forests (*capoeiras*), thus submitted to a true regime of rotation of fragments of forest, in different levels of regeneration.

On average, productive units in Ilhéus village occupied 220 m of riverfront, and in most cases, property depths were not even measured given that farmers did not have the capacity to exploit the forest beyond the *capoeiras* along the river.⁴ Therefore, farms were usually elongated, with lands beyond 3 km from the river usually untouched by axes and fire. This pattern was repeated in other places of the Ilhéus captaincy. Under these conditions, the overall increase in production was only possible with the incorporation of new producers and the expansion of the plantations along the margins of navigable rivers of the coastal zone, as was the case of the Contas River, the northern limit of the captaincy. At the end of the eighteenth century, its banks were already occupied at a distance of 42 km (seven leagues) from the mouth of Contas River, and the village of Barra do Rio de Contas (today the Itacaré city) was the second largest producer of flour in the Ilhéus captaincy, behind only of Camamu village.⁵

The expansion of subsistence agriculture, required to prevent supplying crises in the capital and the Recôncavo, nevertheless implied the destruction of the timber resources so valuable to the royal fleet. Ilhéus authorities, like the squire Francisco Nunes da Costa and Baltasar da Silva Lisboa, were emphatic in denouncing this situation. The latter was appointed “Judge Conservator” of the Ilhéus forests, one of the first positions specifically created by the Brazilian bureaucracy to deal with conservation of natural resources (Padua 2002). He was given the task of implementing a conservation plan that included the withdrawal of farmers from their lands, from which they had no legitimate title. The flour producers could plant only in the *capoeiras*. The opening of new clearings in the forest was conditional on a procedure to save the valuable, hard-wooded timbers. Carpenters were employed to make the inspection and mark the trees that should be cut before burning. The reaction of peasants and local potentate farmers, some of them very influential in the high sphere of colonial rule, reversed the conservation plan as the Judge Lisboa lacked the political strength required to continue his actions (Morton 1978).

³Relação da planta da mandioca da Vila de Cairu, 1786. Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos. Ms. 512 (34, doc. 31).

⁴TOMBO das terras pertencentes à S.M. desde o rio Aqui até Canavieiras; Auto ou tombo feito em uma e outra margem do rio Taípe... das terras de Mapendipe da Comarca de Ilhéus (1798–1799). Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos. Ms. 512 (53), doc. 42; I, 31, 21, 35.

⁵Lisboa BS (1808). Memória acerca da abertura de uma estrada pela costa desde a V. de Valença até o Rio Doce apresentada ao Príncipe Regente por Baltazar da Silva Lisboa em 1808. Biblioteca Nacional do Rio de Janeiro, Seção de Manuscritos. Ms. 512 (58, doc.52).

The best performing zone was located in the northern territories of the captaincy of Ilhéus, which in the course of the eighteenth century combined the traditional flour production with timber exploitation. From the beginning of the previous century, logging for naval and civil construction was carried out as an economic activity in the lands exploited by the Jesuits. However, in the second decade of the eighteenth century, the crown began its participation in the timber business by appointing local administrators to carry out the tasks of cutting, transport, and trade. Timber was destined for the royal shipyards of Lisbon, but a significant part of the logs was used in smaller shipyards, spread by the ports that served to the hinterland of flour, between the captaincy of Ilhéus and Bahia (Miller 2000; Dias 2011).

The presence of forests with large reserves of hard-wooded timber, suited for the construction sector such as the vinhático (*Plathymenia foliolosa* Benth.), canarywood (*Centrolobium* spp.), sucupira (e.g., *Bowdichia virgilioides* Kunth), and angelim [e.g., *Andira antheimia* (Vell.) Benth., *A. fraxinifolia* Benth.], and the presence of rivers facilitating the flow of wooden pieces were determining factors in the choice of the sites to be explored. In 1725, the logging units were initially composed by two cutting mills, or simply “cuts”: one at the site called Maricoabo (currently in the municipality of Valença) and another at Taperoá. Later, as the forests closest to the best ports were overexploited, other cuts appeared on the banks of the Mapendipe, Una, and Jequié rivers. In the navigable limit of the rivers, the port-yard was established, from where the wood already benefited was transported in small boats, until the port of the bar. From this point forward, the conveyance was made by larger boats, as in the case of plows and sums (Dias 2011). It is also worth mentioning that the timber sector in Ilhéus was not limited to the extraction and primary processing of the woods. It involved a more sophisticated industry supplying products of higher aggregate values such as finished goods for shipbuilding (Dias 2010).

Following the trails opened by chariot convoys used in the inland transport of the woods, new squatters were established, with their fields and slaves. At the end of the eighteenth century, communications between vicinal ports, cutting areas, and incipient settlements were well established. From a zone in which flour production was traditionally carried out with vitality, logging activity expanded significantly. Despite the conflicts between the authorities responsible for the preservation of the wood resources and the flour producers who had to burn down the forest for farming (Morton 1978), soon a network of small urban nuclei formed the so-called Royal Road (see in Fig. 4.2).

In the Porto Seguro captaincy, which was further away from the economic center represented by Salvador, the domestic supply of food and the logging activity remained, however, on a much smaller scale than in the Ilhéus captaincy, then a main supplier of goods to the capital. The exploitation of brazilwood remained the economic activity that most mobilized capital and labor during the seventeenth and eighteenth centuries. Only in the last decades of the 1970s, due to the effect of the administrative, economic, and urban reforms carried out in Portugal, Porto Seguro region experienced the economic growth fueled by both agriculture and logging. After the crown changed the capital from Salvador to Rio de Janeiro (1763), Porto Seguro suddenly became closer to the consuming center. The increased demand for

subsistence products and services by the new capital triggered an unprecedented demographic growth. For instance, the village of Caravelas, located south of Porto Seguro, went from 360 inhabitants in 1764 to 2300 in 1817. For the same reason, the town of São Mateus (today north of the state of Espírito Santo) jumped from 345 to 3000 inhabitants in the same period.

As expected, the migration of the political and economic center slowed the occupation rate in the territories of the north of Porto Seguro and in the southern territories of the Ilhéus captaincy. In the last years of the eighteenth century, the forests bordering the delta of Pardo and Jequitinhonha rivers still appeared as immense reserves of what was considered the best brazilwood stocks in the Portuguese dominions in America, as well as other species of wood with a wide use in naval and civil construction, such as the tapinhoã (*Mezilaurus navalium* (Allemão) Taub. ex Mez, Lauraceae) and the Brazilian rosewood (*Dalbergia nigra* (Vell.) Fr.All. ex Benth, Fabaceae). This forested region served as a refuge for the indigenous migrant populations from the backlands, such as the Camacã and Pataxó Amerindian groups. However, in the last years of that century, the advance of colonization put these groups in contact with small farmers and loggers. Many of these Amerindians, especially the Camacãs, were employed in the timber industry, inhabiting the village of Belmonte and other small settlements in the Pardo River estuary, where the village of Canavieiras began to flourish. The result of these contacts was very similar to that observed a little more than two centuries earlier with the Tupi Amerindians: their near extinction by the contamination of biological agents against which they had no immunity. This seems to have been the fate of many Camacãs who made alliances with the Portuguese to protect themselves from their Botocudo and Pataxó enemies. In Mogiquçaba, where they had been settled around 1760, they were gone when German Prince Maximilian de Wied-Neuwied visited the region in 1815 (Wied 1989: 212–227). Instead of indigenous people, there were 18 Africans employed in crafting ropes from the piassava palm tree (*Attalea funifera* Mart., Arecaceae). In Belmonte, in turn, only a few Amerindians joined the 600 inhabitants who produced flour, corn, sugarcane spirits (cachaça), and hardwood. Others, “fleeing from the mosquitos,” had migrated to the village of Canavieiras to work in sawmills in 1799. In 1815, however, the scientist Prince did not discriminate them among the white and brown population.

Again, the decimation of the main “human energy converters” of that forest economy prevented the intensification of the ax’s work. Employing more valuable assets in these unsafe forests, such as African slaves, was too risky. In addition, these alien captives did not have the knowledge and skills of the natives to select, cut, chop, and transport the timber. In view of the low technical and demographic level employed in both selective extractivism and slash-and-burn agriculture, the forest had the opportunity to regenerate itself, especially those species that, after being cut, sprout from the stumps, such as brazilwood. Indeed, until the first half of the nineteenth centuries, deforestation probably did not exceed 8% of the entire biome (Cabral 2014). This resilience prevented the extinction of even this most commercially endangered tree species, whose populations, although weakened, were able to remain viable throughout the colonial period and even in the following

century. In a more general context, it can be said that the Atlantic Forest of southern Bahia obstinately resisted the attacks of that rustic extractive economy and domestic supply. The greatest and most evident losses from this period were in human lives and cultures, not in forests.

Regarding the demographic expansion, the counties of Ilhéus and Porto Seguro had the lowest population in Bahia at the end of the eighteenth century. Even in areas where the colonial economy expanded more vigorously, the urban network was limited to no more than 20 km bordering the coast. In addition, this was only in a few strategic points where private and clerical agents and authorities tried to conquest and expand territorial domination against the resistant groups of Amerindians who insisted on remaining in the forest. The impulse for this new venture came from the foreign market, which had extended the demand for Brazilian sugar after the destabilization of the Antillean production. In the territories of the old captaincies of Ilhéus and Porto Seguro, there were many forested lands available, and the settlement remained rarefied, unlike the old sugar zone of the Recôncavo, on the surroundings of the Bahia captaincy.

In the year 1808, a pivotal event occurred, marking the destiny of the entire country. Fleeing from the Napoleonic invasion, the Portuguese court moved from Lisbon to Rio de Janeiro. An immediate consequence was the opening of the ports, making the demand for the lands of southern Bahia to increase. There was also an impulse of occupation and territorial domination from the hinterland, where, at that time, considerable cattle production was already taking place. It was necessary, therefore, to descend the troops to the coast, in demand of the ports and the markets constituted there. Indigenous people were placed in strategic locations with the purpose of establishing contacts with the still autonomous groups and attracting them to the new settlements.

4.3 Three Forest Regions and Their Distinctive History and Land-Use Dynamics

From the last decade of the colonial period, the territory along the Hileia Baiana remained relatively low populated, which somehow explained the maintenance of massive forest stands. Indeed, in the nineteenth century, no more than 30,000 people inhabited the former captaincies of Porto Seguro and Ilhéus, most of them concentrated in a few coastal villages. The Amerindians occupied more remote stands (Cabral 2014). However, the development of the agricultural frontiers defined differences in the land-use dynamic and development within the territory. Herein we will describe key aspects and differences of the land use of three distinct regions, today comprising the southern Bahia and the northern tip of Espírito Santo states. Within Bahia state, the dynamic of the forest was different in two stretches, one between the Contas and Jequitinhonha rivers and the second extending from this north limit to the Mucuri River on the south. These regions are coined here as the southern and extreme south of Bahia and north of Doce River, respectively.

4.3.1 *The Forests of Southern Bahia*

In addition to the new sugar mills, other export crops contributed to the expansion of the agricultural frontier in the territory of the former Ilhéus captaincy in the early years of the nineteenth century, with emphasis on coffee and cacao (Mahony 1996). As the first was gradually abandoned, most of the territory of the Hileia Baiana experienced an economic stagnation for most of the nineteenth century, particularly the region covering the province of Porto Seguro and north of Doce River. By contrast, the region encompassing the Ilhéus province was marked by a single cash crop, the cacao tree (*Theobroma cacao* L., Malvaceae). Although the birthplace of the species is still a matter of controversy, it probably has its origin in the upper Amazon region and then spread to Central and other parts of South America (Motamayor et al. 2008). It is also debatable the date and place of the introduction of cacao cocoa in Bahia. The most popular version accounts that the crop was first grown in 1746 in what today is the Canavieiras municipality after the botanist Louis Frédéric Warneaux sent the first seeds from the state of Pará, where the crop was cultivated since 1679 (Andrade 2003). Nevertheless, the earliest official report comes from the naturalist Manuel Ferreira da Câmara who experimentally planted cacao in the 1780s on his farm in Camamu village (Câmara 1789). Despite such dispute, during the next two and a half centuries, its cultivation contributed to forging the regional culture (Rocha 2008).

The first plantations started along with the fertile and more humid soils near the rivers around Ilhéus. From the Almada and Cachoeira River basins, the cacao crop spread inland and to the north. At first, cocoa was grown on the small-scale family unit, following the classic slash-and-burn agricultural practice (Ruf and Schroth 2004; Piasentin and Saito 2014). According to Bondar (1939), after cleaning and burning the native vegetation, seeds were planted together with annual food crops such as cassava and corn, which provided shade for seedlings. After the harvesting of the staple food, cacao shrubs were eventually shaded by the spontaneous growth of pioneer tree species for 7–10 years, after which the shade was removed and cacao was kept at the full sun (Piasentin and Saito 2014). The crop was labor intensive, requiring many hands not only to clean the forest and establish the planting but requiring a constant workforce for the digging, pruning, and thinning for controlling the shade. Usually, such labor was conducted by diarist Amerindians (mainly Camacã ethnic group) and by African slaves.

Due to favorable climatic conditions and being free from its native pests, from 1810 to 1910, cacao production experienced a striking expansion in the region. In the middle of the nineteenth century, when sugar production was in crisis due to increased foreign competition and lower prices, cacao was already the main product exported from Ilhéus. In 1867, more than 31,000 arrobas of cacao (~455 tons) were exported at a price/ton of ~2.5 times higher than the 10,000 arrobas (~150 tons) of sugar (Ribeiro 2017).

At the end of the nineteenth century, the banks of the Almada River owned some of the most important cacao farms in Bahia, and the plantations expanded toward

the present municipalities of Uruçuca (formerly Água Preta) and Itajuípe (formerly Pirangi). Gradually, cacao also spread along the western border in the territories of the present municipalities of Itabuna (formerly Tabocas) and Buerarema (formerly Macuco). To the south of Ilhéus, a new agricultural frontier also driven by cacao began to advance in the second decade of the nineteenth century in the territories of the current municipalities of Una and Canavieiras (Dias and Araujo 2016; Ribeiro 2017).

The rising prices of cacao beans on the international market in the second half of the nineteenth century attracted both the capital and migrants to work on the farms. The plantation was further boosted by an influx of capital from the decaying sugar sector (Lamberti 2017). Regarding labor force, two important migratory waves also promoted the economic and demographic expansion in the region. The first one came from overseas and brought Europeans in the condition of new owners, but also in that of poor settlers, to be installed in agricultural colonies. In addition to the Europeans, the region received migrants from the Middle East, mainly Arabs, Lebanese, and Syrians. The second migratory wave came from the interior of the northeast, especially from Sergipe and northern Bahia, where many refugees from the droughts migrated, trying their luck on the new agricultural front (Lyra 2007). In parallel with this migratory pressure, external demand for cacao increased. As a result, southern Bahia would become, in the last decades of the nineteenth century, the main cacao-producing area in Brazil.

The incomplete census of 1872 registered a total population of 10,692 inhabitants within the Ilhéus district. To this population, the following year would add almost 2,000 immigrants from the north of Europe, introduced in the agricultural colonies of Una and Comandatuba villages. Already in 1881, the year of the elevation of Ilhéus from village to the category of city, only this municipality had a population of approximately 10,000 inhabitants, of which 977 were slaves. Of this total, only 1042 free and 65 slaves lived within the urban nucleus. From the following decade, there will be an even faster growth of the internal migration to the south of Bahia, boosting the expansion of cacao by interior territories and in the coastal zones, as much of the north as of the south. The “cacao region” also presented the highest relative growth of the population of Bahia in the period 1890–1920, with rates exceeding 100%, as was the case of municipalities such as Ilhéus (725.9%), Itacaré (402.7%), Marau (403.8%), Belmonte (240.3%), and Canavieiras (344.6%) (Silva et al. 1989). In that context, this region within the Atlantic Forest was beginning a new cycle of deforestation and transformation, irreversible and of great proportions.

It was only at the beginning of the twentieth century that farmers started to grow cocoa as agroforests. From that moment until 1976, the vast majority of the plantations occurred in a traditional and local mode of cultivation regionally known as “cabruca.” The word is probably short for “cabrocagem,” meaning the drilling of the forest. Indeed, as cacao (*Theobroma cacao*) is an understory species, farmers removed the entire original understory layer to plant cacao shrubs, but a few canopy trees were left for shade. At first glance, these shaded plantations resemble the original forest, only thinned and with a homogenous understory of cocoa trees. Cabrucas

soon replaced vast lands of native forests, but compared with other land uses such as coffee or sugar, their presence assured the maintenance of a green tapestry of forest cover. Despite the significant changes compared with the original forests, this farming mode, often enriched by exotic shading trees, still keeps a structurally complex, multi-strata environment that is known to harbor many species of plants and animals (Cassano et al. 2009, 2014).

From 1911 to 1929, this crop became not only the most important agricultural product in Bahia (Virgens-Filho et al. 1993), but in some periods, production represented 20% of public incomes in the country (May and Rocha 1996). As a commodity, prices fluctuate internationally according to its supply and demand. In the case of cacao, the market is highly controlled by a few industries, so demand, not supply, largely determines the price. Because of the high volatility of cocoa's international market prices, aggravated by variations of exchange rates, farmers were consistently kept vulnerable to cyclical crisis, becoming chronically in debt. Uncertainties on climatic conditions, pests, and other endogenous features are also important factors regulating production and, in many cases, aggravated debts (see Caldas and Perz 2013). For instance, after the stock market *crash* of 1929, cacao prices in 1933 were only 30% of those from 1927 (Rocha 2008). Traditionally, farmers used to compensate for the low prices not by an intensification and technological input but rather by expanding the crop area (Costa and Soares 2016).

In the 1950s, the situation of the cacao sector was meager, with production continuously dropping and leading to a serious stagnation on the regional economy. As a response, in 1957, the federal government created the Executive Commission of the Cacao Plantation Crop (CEPLAC), a federal agency aimed to organize the sector by providing planning, financial, and technological assistance. In 1962, CEPLAC carried out a widespread policy to modernize plantations under the framework of the green revolution (Johns 1999). Among other things, the strategy included subsidized loans conditioned to the adoption of a technological package that included the combined reduction of shade levels with an increase in the use of agrochemical, specifically fertilizers, and pesticides (Johns 1999). Under the technical supervision of CEPLAC, in 1964, the cacao farming expanded over the native vegetation, mostly from areas occupied by old-growth or secondary forests (Piasentin and Saito 2014). Under this system, known as “derruba total” (full removal), cacao shrubs were planted together with the exotic *Erythrina* trees, nitrogen-fixing species that also provide partial shade. In addition, from 1967 to 1986, CEPLAC launched a plan to renew the traditional plantations, through a massive thinning of old cabruças. Surveys in 61 properties within the core region of cocoa plantation reported the presence of 171 different tree species, an average of 76 trees/ha (Alvim and Pereira 1965). The target was to eliminate 50–60% of the shade trees from the traditional plantations, thus reducing the average density of shade to 25 individuals trees/ha or less than a third of the regional average (Alvim and Pereira 1965). Johns (1999) estimated that the full implementation of such policy would have led to the removal of 25.8 million canopy trees, yet the author presented compelling evidence and reasons for the low compliance of the landowners to this shade clearance. Yet, until the 1960s, there were relatively more native forests than cocoa plantations.

The rehabilitation measures succeeded, leading to an increase in regional production from 88,000 tons in the early 1960s to nearly 400,000 tons in 1987 (Santos Filho et al. 2008). It was achieved by a significant rise in *productivity* levels – 220 kg/ha in 1962 to 740 kg/ha in 1980 (Rocha 2008) – with cacao farming spreading through nearly 600,000 ha in Bahia. The economic success of such a two-pronged strategy encompassing intensification and full removal came at a cost: driving a massive forest loss (Alger and Caldas 1994). During the 1970s, cacao achieved peak prices of US\$ 4000/ton, suddenly stimulating the entering of new producers from Africa and Asia. The increment of the areas devoted to cacao farming led to successive records of harvesting, ultimately dropping the prices to less than US\$ 800/ton (Martins 2007).

In 1989, the region was hard hit by a pest outbreak, after the criminal introduction of the fungus known as witch’s broom (Pereira et al. 1990). This introduction was probably motivated by political reasons, not yet satisfactorily explained, and was later described as “agroterrorism” (Caldas and Perz 2013), greatly contributing to aggravate the social crisis throughout the region. The fungus (*Moniliophthora perniciosa* (Stahel) Aime & Phillips-Mora, *Marasmiaceae*) provoked the crash of the regional production, reduced to 1/4, or 96,000 tons annually (Pereira et al. 1990). The disease was a game-changer, although several factors have also contributed to the unprecedented crisis faced by the sector in Bahia (Alger and Caldas 1994). For instance, as international prices crashed down to less than half of the production costs, the shortage of subsidies and credit maintained the low level of technological input of the farms. Bankrupt landowners abandoned their properties, dismissing nearly 250,000 workers that fled to urban zones. Between 1980 and 2000, the rural population of southern Bahia dropped from 45% to 24% (Caldas and Perz 2013), and the lack of economic alternatives put the region in an unprecedented economic stagnation.

During this harsh time, logging not farming became the leading driver for deforestation. Wood exploitation has always been a pervasive activity well illustrated by the brazilwood cycle and the constant extraction of other high-quality timber. In the cacao region, logging activity increased during the periods in which the cacao farming expanded. However, in the 1970s, the opening of a state road (BA 001) and a main federal highway (BR 101) encouraged the arrival of a new cycle of wood exploration. After exhausting the regional stock of woods from the forests of northern Espírito Santo and the extreme south of Bahia (see below), many lumber companies eagerly settled in the cacao region, taking advantage of the timber stocked within the cabruças. Decapitalized by the successive crisis, cacao farmers sold large quantities of trees, after which some properties were converted to pastures. According to Mesquita (1997), in 1971, forests comprised 11,000 km² of the region, but 10 years and 230 sawmills later, the forest was reduced to 20%. In 1996, a group of specialists concluded that the logging industry in the region was not sustainable, and despite some legal victories, the activity somehow continued (Mesquita 1997). It would take an extra decade for the publication of the Federal Decree 6660 (21 November 2008) finally regulating the full, legal protection of the entire biome.

In addition to native forests, a relevant part of the regional biota is reported within the cabruças (Faria et al. 2006a, 2007; Cassano et al. 2009). The forested nature of this crop translates in a biodiversity-friendly matrix that allows movement for many species throughout the landscape (Faria et al. 2007; Cassano et al. 2009), mitigating the negative effects of forest loss and fragmentation (Pardini et al. 2009). But similar to what happened during the 1960s, there is a growing effort to increase local productivity by decreasing shade levels in cabruças. This intensification is currently supported by a state law, which defines that a minimum of 40 native trees/ha must be kept in each cabruça (Portaria No. 10.225/2015, Bahia state), a value much lower than the average of 197 trees/ha found in those traditional cabruças (see Sambuichi et al. 2012 or Schroth et al. 2015). The structural simplification of plantations is expected to negatively affect biodiversity and ecosystem services in this region. The removal of shade trees will not only reduce local tree diversity, but it is estimated that if this thinning policy is extended for all the existing cabruças, it will lead to an estimated regional releasing of 21,000 tons of carbon, an amount equivalent of 2/3 of all carbon stored in region's native forests (Schroth et al. 2015). Although the identification of synergies and trade-offs between management intensification and the conservation role of traditional cabruças is still under debate (Schroth et al. 2016), current efforts to improve the regional viability of cacao include other strategies. Among them, we highlight the introduction of more productive, genetically modified varieties, the niche market for organic crops, and the creation of new business models like the so-called “tree-to-bar” or “bean-to-bar”, in which factories within local farms or in the region, respectively, allow the production of chocolate, the final product with a higher aggregated value (Assad 2017).

4.3.2 The Forests on the Extreme South of Bahia

Limited north and south by two massive forested areas, the region between the Jequitinhonha and Mucuri rivers remained apart from the economic growth experienced by the cacao region during the nineteenth century. With few and distant villages concentrated along the coastal zone, connected by precarious roads and by the sea, the region continued low populated and economically isolated from the consumer market. The arrival of a railroad linking the mining areas of Minas Gerais state to the coast, in 1882, encouraged a migratory flux from the hinterland, increasing the economic activities in the area (Giffoni 2006). The region also experienced the introduction of cacao, though it was irrelevant for bringing similar economic prosperity experienced in southern Bahia (Cerqueira-Neto 2013).

A significant occupation of the territory and its economic development started only in the 1950s, with the arrival of the BR 5 highway connecting the area with the north of Espírito Santo. Logging was the first business opening the devastation of large areas of forests. For instance, the arrival of a company called BRALANDA (Brasil Holanda SA) in 1952, with new technology capable of extracting and

processing a large stock of timber, marked the setting of a new industry based on wood exploitation that led to an unprecedented rate of regional deforestation. As woods were extracted, the degraded forest was cleared and burnt, and the agricultural frontier expanded largely with coffee and cattle ranching. The latter economic activity was a key driver consolidating the regional development, opening vast areas of pastures at the expense of the Atlantic Forests (Amorim and Oliveira 2007).

This development was accelerated when the old BR 5 was enlarged to form the BR 101, a national highway that completely integrated this territory to most developed states and consuming centers (Amorim and Oliveira 2007). This important logistical infrastructure boosted the logging business at the point that, at the end of the 1970s, the city of Eunápolis was considered the “Meca” of the logging business in Bahia (Mesquita 1997). The pace of deforestation was astonishing, as illustrated in Fig. 4.3. As pointed by Cerqueira-Neto (2013), despite some efforts, the region was never economically integrated on the cacao-producing region led by southern Bahia, but rather “The history of the region showed that it was the loggers from Espírito Santo and cattle ranchers from Minas Gerais states the main actors who have modified and landscape of the far South, both in rural and in urban areas.”

In the 1980s, large reforestation programs using exotic trees such as *Pinus* were implemented first devoted to supplying wood for the steel industries of Minas Gerais and Espírito Santo states, and later came the *Eucalyptus* to supply the raw material for pulp mills. Today several national and multinational pulp companies are installed in the region and are supplied by an area larger than 450,000 ha of *Eucalyptus* plantations. The few forest remnants are only testimonies of the once exuberant formation of the original Hileia Baiana, today immersed in landscapes dominated by pastures, agriculture, and forest plantations. The current regional economy heavily relies on the pulp industry but also on diversification of agricultural production and new activities such as tourism, with the city of Porto Seguro representing an important destiny.

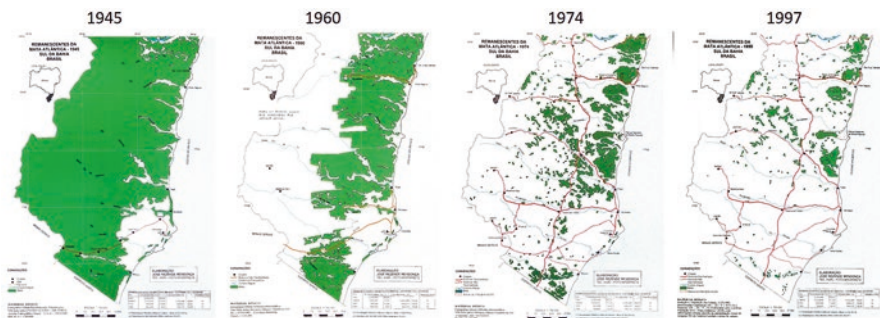


Fig. 4.3 Time series showing the progressive loss of native forests (green) in the extreme south region of the state of Bahia, Brazil, from 1945 to 1997 (Reproduced from Mendonça et al. 1993)

4.3.3 *The Forests on the North of Doce River*

With the ending of the monarchy period by the Proclamation of the Republic in 1889, the forests from the north of Doce River that once belonged to the Porto Seguro captaincy were incorporated to the Espírito Santo state, originally comprising a captaincy itself. Until the first half of the nineteenth century, sugarcane was still the main economic activity in that state, a region with a few populated villages scattered along the coast, a stretch hardly exceeding 20 km (Saint-Hilaire 1974). However, it was the coffee production, starting in 1847, that allowed a broader and significant occupation of this territory, particularly its inner parts. Indeed, the population jumped from 49,092 people in 1856 to 82,137 inhabitants in less than 30 years (Macedo and Magalhaes 2011). As expected, this rapid growth triggered radical changes in the social, demographic, and economic structure of this territory. Moreover, most of these transformations were limited to the south, central, and inner parts of the state, as the expansion of coffee plantations was a direct result of the extension of the agriculture frontier from São Paulo and Minas Gerais states (Batista 2017). The vast, unexploited land of this new frontier allowed farmers to set larger properties, perfect to follow the production model of plantations, where large properties are devoted to produce and export a single crop, labored by slaves. Meanwhile, the presence of the Doce River imposed a natural barrier to the inflow of human occupation to the north. A map from 1878 still designated this northern region as a “Little-known land inhabited by indigenous people” (Egler 1962). Despite some controversy regarding the actual role played by natives in curbing new settlements, the existence of endemic diseases has also contributed to explaining why the region, that accounted for 47% of the state territory, concentrated less than 12% of the population in 1872 (Macedo and Magalhaes 2011). For these reasons, the original forest remained largely intact until the first decade of the twentieth century. As pointed by Egler (1962), the Doce River marked the physical segregation between an occupied territory in the south and an unknown, uninhabited block of forests in the north. In other words, the river was a major barrier to the occupation of a vast part of the territory, and the forests were left relatively intact.

The situation started to change in 1906 when a railway finally connected these northern lands to the central, more developed portion of the territory. This event suddenly brought more people to the region and, at the same time, the first sawmills that explore the forests for railroad ties, while coffee plantations significantly expanded that in 1920 the region became the leading producer on the state (Macedo and Magalhaes 2011). However, a significant increase in the influx of people and goods occurred only after the construction of the first bridge over the Doce River, in 1928. A wave of migrants from the central and southern parts pushed the forest further north, replacing the native areas by coffee plantations. Most properties were small, established as family units that have to be self-sufficient, not necessarily highly productive. Cacao was also another important cash crop dating back to the 1880s, but only after 1917, farming spread significantly over the native forests,

forming a cacao-producing zone around the Linhares municipality (Santos-Lima et al. 2018).

Despite such attempts to settle and develop the region, the forests from the northern tip of Espírito Santo remained relatively unexplored until 1950 when compared with other regions along the Atlantic Forest. This dynamic, however, changed fast and dramatically. The progressive urbanization and industrialization of the country rapidly increased the national demand for wood. Suddenly, the large remaining forest tracts, that once precluded development, now provided new opportunities for the economic expansion of the region. In the 1960s, the region had 1700 working sawmills, supplying raw material for a range of sectors such as construction, furniture, and steel industry (Dean 1995). Forests were rapidly lost as they were first logged, cleaned, and then burned for agriculture and, increasingly, for pastures. For instance, between 1950 and 1975, cattle farming increased the unprecedented proportion of 681% (Bergamim 2016). Together, these activities severely reduced the once pristine forests, leaving behind a vast range of the lowland forests logged, degraded, and cleared.

Deforestation accelerated in 1971 after the arrival of the BR 101. By the end of the twentieth century, most of the native forests vanished, and the wood became rarer and more expensive to exploit due to the higher costs to assess the ever-distant stock areas. Between 1967 and 1986, a large government initiative promoted the occupation of large areas of forestry, mainly the monocultures of *Eucalyptus* and *Pinus*, rapidly transforming the region into a major pole of wood and paper industry (Siqueira et al. 2004). In fact, due to the right climatic conditions and implanted infrastructure, the region achieved the world's highest productivity level of *Eucalyptus*, with the state in general, and this region in particular, leading the world rank of cellulose exports. In addition to agriculture, in which coffee is a major source of income, pastures and extensive areas are devoted to forestry. Although the mining industry is more concentrated upstream of the Doce River Valley, in November 2015, an area of 650 km along the valley received 35 million m³ of mining rejects after a dam, located in the municipality of Mariana, collapsed (Hatje et al. 2017). The "Mariana disaster" killed 19 people and led to unprecedented destruction and contamination of aquatic and terrestrial ecosystems (Magris et al. 2019).

4.4 The Challenge of Conserving What Remains

The Hileia Baiana suffered an intensive process of human occupation, an ultimate result of the dynamism of the historical, social, and ecological systems described here. Land use was, and still is, chiefly driven by the establishment of commodities and, thus, highly influenced by the boom and bust of such unpredictable economic cycles.

What is left from the native forests is still under severe pressure including not only the effect of habitat loss and its fragmentation but also chronic disturbances. According to the 2016 annual report of the NGO SOS Mata Atlântica, the Atlantic Forest remaining in the entire states of Espírito Santo and Bahia comprises 2,005,710 ha and 483,172 ha, respectively (SOS Mata Atlântica and INPE 2017). Although this figure represents a significant reduction from its original cover, by far, the region encompasses the largest extent of the northern portion of this biome. It is also impressive that inventories still confirm that the region, despite such aggressions, harbors high levels of biodiversity, part of which is endemic or remains unknown. It is not uncommon to observe that tree inventories rarely identify more than 80% of the samples, quite often having a high number of new species still waiting to be described and named.

During the 1980s and 1990s, Brazil made a significant effort to increase the representation of protected areas, some along the Hileia Baiana (Mittermeier et al. 2005). Despite their importance, these spaces are limited in size, and a considerable part of the extant biodiversity exists in modified areas. To increase the connectivity among the isolated fragments (protected or unprotected remnants) and the surrounding mosaic of different land uses, these areas are immersed in the current “Central Corridor of the Atlantic Forest” (CCAF), an instrument prioritizing public policies of conservation enforced by the federal government (Fig. 4.4). The polygon of the CCAF comprises a land of ~112,135 km², of which 32.9% is covered by native forests under different successional stages and disturbance levels (<http://map-biomas.org/>), with only 2.5% legally protected by 45 protected areas (municipal, state, and federal protected units under IUCN categories Ia, II, and III).

Biodiversity within the extant fragments and the surrounding mosaic land uses that characterize the anthropogenic landscapes is constantly exposed to many threats. Habitat remnants immersed in more deforested landscapes experience significant changes including the shrinkage of forest structure (Rocha-Santos et al. 2016), selective extinctions (Morante-Filho et al. 2015; Benchimol et al. 2017a), and alteration of ecological processes (Menezes et al. 2016; Benchimol et al. 2017b; Rocha-Santos et al. 2017; Morante-Filho et al. 2018) which are key to maintain the functionality of the system. Fire, logging, and hunting are also important vectors of chronic disturbance that further cause biodiversity erosion not only in this region but also for the entire biome (Tabarelli et al. 2010). Except for some large, well-protected conservation units in Espírito Santo and extreme southern Bahia, medium- and large-sized mammals are rare or absent from most fragments within this corridor (Canale et al. 2012), with serious consequences for the functioning and regeneration of these forests (Culot et al. 2017). There is an urgent need to reverse this scenario and ensure the maintenance of biodiversity and the ecological integrity of remaining systems that are also facing the likely and unprecedented effects of climate change.

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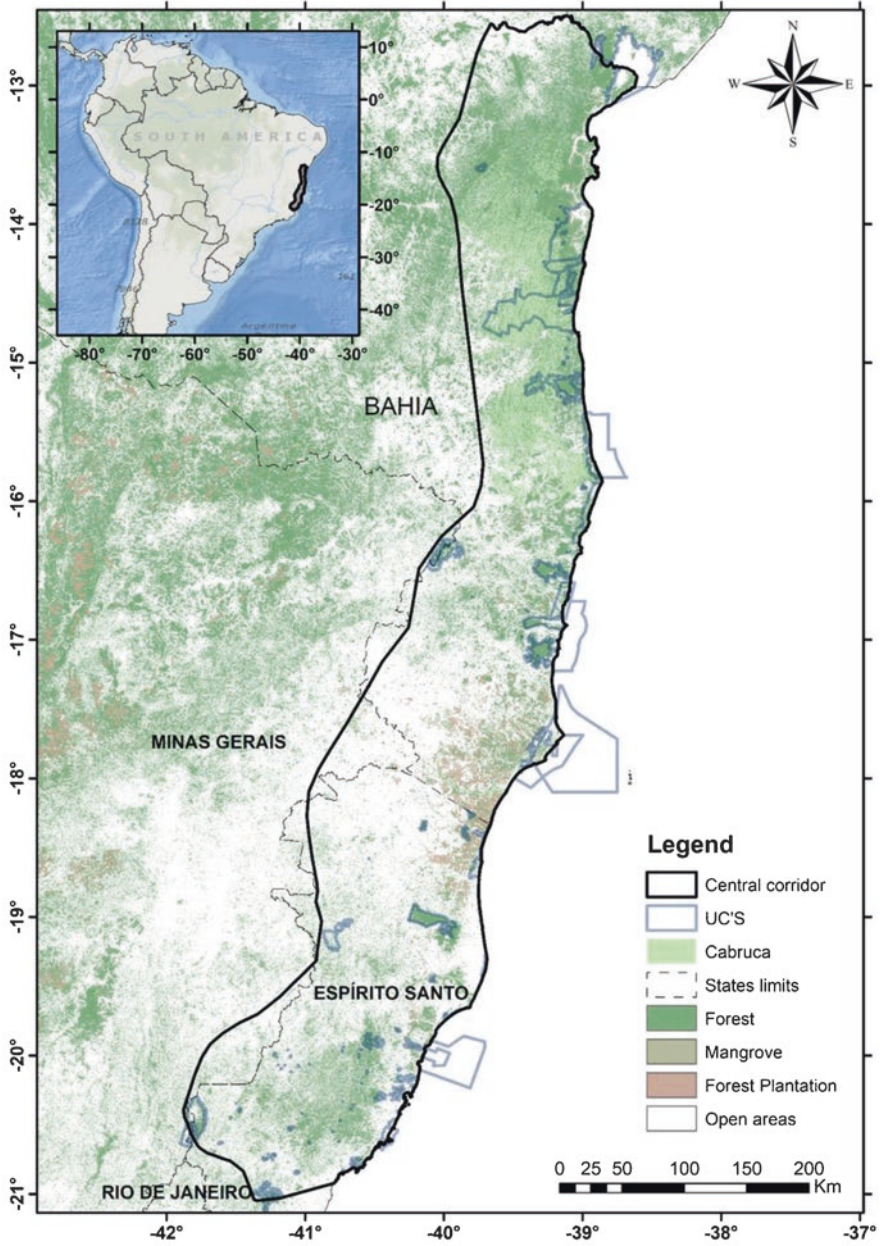


Fig. 4.4 Limits of the Central Corridor of the Atlantic Forest, depicting the current location of forest remnants and other main land uses, and the contour of main conservation units (UCs). (Source: MapBiomias <http://mapbiomas.org/>)

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References

- Alger K, Caldas M (1994) The declining of the cocoa economy in the Atlantic forest of southern Bahia, Brazil: conservation attitudes of cocoa planters. *Environmentalist* 14(2):107–119
- Alvim PT, Pereira CP (1965) Sombra e espaçamento nas plantações de cacau no Estado da Bahia. In: Relatório anual 1964. Centro de Pesquisas do Cacau, Comissão Executiva do Plano da Lavoura Cacaueira, Itabuna, Brasil, pp 18–19
- Amantino MS (2018) A Companhia de Jesus na cidade do Rio de Janeiro. O caso do Engenho Velho, século XVIII. Paço Editorial, Jundiá
- Amorim RR, Oliveira RC (2007) Degradação ambiental e novas territorialidades no extremo sul da Bahia. *Caminhos de Geografia* 8(22):18–37
- Amorim AM, Thomas WW, Carvalho AMV, Jardim JG (2008) Floristics of the Una biological reserve, Bahia, Brazil. In: Thomas WW (ed) *The Atlantic coastal Forest of northeastern Brazil. Memoirs of The New York Botanical Garden*, New York, pp 67–146
- Andrade MP (2003) Ilhéus: Passado e Presente, 2nd edn. Editus, Ilhéus
- Andrade-Lima D (1966) Vegetação. In: Instituto Brasileiro de Geografia e Estatística & Conselho Nacional de Geografia, ed. *Atlas Nacional do Brasil*, Rio de Janeiro, 11p
- Argolo AJS (2004) As Serpentes dos Cacaueiros do Sudeste da Bahia. Editus, Ilhéus, 250p
- Assad L (2017) Cacau no Brasil: uma oportunidade que (ainda) não se concretizou. *Ciência e Cultura* 69(2):11–13
- Barbosa JSF, Correa-Gomes LC, Marinho MM, da Silva FCA (2003) Geologia do segmento sul do Orógeno Itabuna-Salvador-Curaçá. *Rev Bras Geociências* 33(1-Suplemento):33–47
- Barickman BJ (2003) Um contraponto baiano: açúcar, fumo, mandioca e escravidão no Recôncavo, 1780–1860. *Civilização Brasileira*, Rio de Janeiro
- Batalha-Filho H, Fjeldså J, Fabre PH, Miyaki CY (2013) Connections between the Atlantic and the Amazonian forest avifaunas represent distinct historical events. *J Ornithol* 154:41–50
- Batista MR (2017) O processo de transição da mão de obra escrava para a livre e a imigração no Espírito Santo do século XIX. In: VI Congresso Internacional UFES Paris/ Est, Vitória, pp 912–930
- Benchimol M, Mariano E, Faria D, Rocha-Santos L, Pessoa MS, Gomes F, Talora D, Cazetta E (2017a) Translating plant community responses to habitat loss into conservation practices: Forest cover matters. *Biol Conserv* 209:499–507
- Benchimol M, Talora DC, Mariano E, Oliveira TL, Leal A, Mielke MS, Faria D (2017b) Losing our palms: the influence of landscape-scale deforestation on Arecaceae diversity in the Atlantic forest. *Forest Ecol Mang* 304:314–322
- Bergamim MC (2016) A pequena propriedade rural no Espírito Santo: constituição e crise de uma agricultura familiar. In: Congresso da Sociedade Brasileira de Economia, Administração e Sociologia Rural, 44, 2006. Sober, Fortaleza/Anais/Brasília, DF
- Bondar G (1939) *A Cultura de Cacau na Bahia*. Livraria Duas Américas, Salvador, Bahia
- Cabral DC (2014) *Na Presença da Floresta: Mata Atlântica e História Colonial*. Garamond/FAPERJ, Rio de Janeiro
- Caldas M, Perz S (2013) Agro-terrorism? The causes and consequences of the appearance of witch's broom disease in cocoa plantations of southern Bahia, Brazil. *Geoforum* 47:147–157
- Câmara MF (1789) Ensaio de descrição física e econômica da Comarca de São Jorge dos Ilhéus. *Memórias Econômicas da Academia de Ciências de Lisboa* 1:304–350
- Campos JS (2006) *Crônicas da Capitania de São Jorge dos Ilhéus*, 3rd edn. Editus, Ilhéus

- Canale GR, Peres CA, Guidorizzi CE, Gatto CAF, Kierulff MCM (2012) Pervasive defaunation of forest remnants in a tropical biodiversity hotspot. *PLoS One* 7:e41671
- Carnaval AC, Moritz C (2008) Historical climate modelling predicts patterns of current biodiversity in the Brazilian Atlantic Forest. *J Biogeogr* 35:1187–1201
- Carrara AA (2007) Fiscalidade e estrutura agrária: Ilhéus, Porto Seguro e Espírito Santo, séculos XVI-XVIII. In: Dias MH, Carrara AA (eds) *Um lugar na história: a capitania e comarca de Ilhéus antes do cacau*. Editus, Ilhéus, pp 15–46
- Cassano CR, Schroth G, Faria D, Delabie JHC, Bede L (2009) Landscape and farm scale management to enhance biodiversity conservation in the cocoa producing region of southern Bahia, Brazil. *Biodivers Conserv* 18:577–603
- Cassano CR, Schroth G, Faria D, Delabie JHC, Bede L, Oliveira LC, Mariano-Neto E (2014) Desafios e recomendações para a conservação da biodiversidade na região cacauceira do sul da Bahia. *CEPLAC/CEPEC Boletim Técnico* 205. 54p
- Cerqueira-Neto SPG (2013) Construção geográfica do extremo sul da Bahia. *Rev Geogr* 30(1):243–263
- Coelho Filho LW (2000) A capitania de São Jorge e a década do açúcar (1541–1550). Vila Velha, Salvador
- Costa FM, Soares NS (2016) *Cacau riqueza de pobres (1ª edição)*. Ilhéus-Ba Editus 286p
- Culot L, Bello C, Batista JLF, do Couto HTZ, Galetti M (2017) Synergistic effects of seed disperser and predator loss on recruitment success and long-term consequences for carbon stocks in tropical rainforests. *Sci Rep* 7:7662
- Dean W (1995) *With broadax and firebrand - the destruction of the Brazilian Atlantic Forest*. University of California Press, Berkeley, 482 p
- Delabie JHC, Andrade A, Silva APS, Brescovit AD, Jahyny BJB, Jared C, Mariano CSF, Castañón-Meneses G, Carvalho JTL, Lopes JMS, Boccardo L, Antoniazzi MM, Santos PP, Bouzan RS, Calvanese V, Reis YT (2017) Fauna fóssil e da serapilheira associada ao cultivo do cacau no Sudeste da Bahia. In: Souza JO Jr (ed) *Cacau: Cultivo, Pesquisa e Inovação*. Ilhéus, Editus
- Delabie JHC, Jahyny B, Nascimento IC, Mariano CSF, Lacau S, Campiolo S, Philpott SM, Leponce M (2007) Contribution of cocoa plantations to the conservation of native ants (Insecta: Hymenoptera: Formicidae) with a special emphasis on the Atlantic Forest fauna of southern Bahia, Brazil. *Biodivers Conserv* 16:2359–2384. <https://doi.org/10.1007/s10531-007-9190-6>
- Delabie JHC, Mariano CSF, Nascimento IC (1998) As formigas do Município de Ilhéus (Insecta: Hymenoptera: Formicidae). *Especiaria* 1(2):133–152
- Dias MH (2010) A floresta mercantil: exploração madeireira na capitania de Ilhéus no século XVIII. *Rev Bras Hist* 30:193–214
- Dias MH (2011) *Farinha, madeiras e cabotagem: a capitania de Ilhéus no antigo sistema colonial*. Editus, Ilhéus
- Dias MH (2016) O pau-brasil na Bahia colonial: zonas de ocorrência, condições de exploração e impactos ambientais. In: Cabral DC, Bustamante AG (eds) *Metamorfozes florestais: culturas, ecologias e as transformações históricas da Mata Atlântica*. Prismas, Curitiba, pp 151–175
- Dias MH, Araujo GS (2016) Ocupação territorial em uma fronteira indígena do sul da Bahia: Una e Olivença em meados do século XIX. *Territórios & Fronteiras* 9:215–135
- Dominguez JML, Martin L, Bittencourt ACSP (1982) Evolução paleogeográfica do delta do rio Jequitinhonha durante o quaternário: influência das variações do nível do mar. In: Suguio K, Meis MR, Mousinho DE, Tessler MG (eds) *Atas do Quarto Simpósio do Quaternário no Brasil*. CTCQ-SBG, Rio de Janeiro, pp 69–92
- Egler WA (1962) A zona pioneira ao norte do Rio Doce. *Rev Bras Geogr* 167:147–180
- Faria D, Laps RR, Baumgarten J, Cetra M (2006a) Bat and bird assemblages from forests and shade cacao plantations in two contrasting landscapes in the Atlantic Forest of southern Bahia, Brazil. *Biodivers Conserv* 15:587–612
- Faria D, Paciencia MLB, Dixo M, Laps RR, Baumgarten J (2007) Ferns, frogs, lizards, birds and bats in forest fragments and shade cacao plantations in two contrasting landscapes in the Atlantic forest, Brazil. *Biodivers Conserv* 16:2335–2357

- Faria D, Soares-Santos B, Sampaio E (2006b) Bats from the Atlantic rainforest of southern Bahia, Brazil. *Biota Neotrop* 6(2):1–13
- Fernández F, Delabie JHC, Nascimento IC (2009) *Diaphoromyrma*, a new myrmicine ant genus (Hymenoptera: Formicidae) from north eastern Brazil. *Zootaxa* 2204:55–62
- Giffoni JMS (2006) Trilhos Arrancados: História da Estrada de Ferro Bahia e Minas (1878–1966). PhD Thesis, Universidade Federal de Minas Gerais, Belo Horizonte
- Haffer J (1969) Speciation in Amazonian forest birds. *Science* 165:131–137
- Hatje V, Pedreira RMA, De Rezende CE, Schettini CAF, De Souza GC, Marin DC, Hackspacher PC (2017) The environmental impacts of one of the largest tailing 748 dam failures worldwide. *Sci Rep* 7:1–13
- Johns ND (1999) Conservation in Brazil's chocolate forest: the unlikely persistence of the traditional cocoa agroecosystem. *Environ Manag* 23:31–47
- Köppen W (1936) Das Geographisches System der Klimate. In: Köppen W, Geiger W (eds) *Handbuch der Klimatologie (Kapitel 3 V.1)*. Teil. C. Ebr. Bornträger, Berlin
- Lamberti F (2017) Economic history of cocoa in Southern Bahia its role on economy, society and culture. Master Dissertation - Escola de Administração de Empresas de São Paulo, Fundação. 80p
- Laps RR (2006) Efeito da fragmentação e alteração do hábitat na avifauna da região da Reserva Biológica de Una, Bahia, PhD Thesis, Universidade Estadual de Campinas, São Paulo
- Ledo RMD, Colli GR (2017) The historical connections between the Amazon and the Atlantic Forest revisited. *J Biogeogr* 44:2551–2563. <https://doi.org/10.1111/jbi.13049>
- Linhares MY, Silva FCT (1981) História da agricultura brasileira. Brasiliense, São Paulo
- Lyra HB (2007) A 'crise' de mão-de-obra e a criação de colônias agrícolas na Bahia: 1850–1889. In: Dias MH, Carrara AA (eds) *Um lugar na história: a capitania e comarca de Ilhéus antes do cacau*. Editus, Ilhéus, pp 233–305
- Macedo FC, Magalhaes DF (2011) Formação econômica do Espírito Santo: do isolamento econômico à inserção aos mercados nacional e internacional. *Rev Hist Reg* 16(1):61–99
- Magalhães RCS, Maio MC (2007) Desenvolvimento, ciência e política: o debate sobre a criação do Instituto Internacional da Hiléia Amazônica. *História, Ciências, Saúde – Manguinhos*, Rio de Janeiro 14:169–189
- Magris RA, Marta-Almeida M, Monteiro JÁ, Ban NC (2019) A modelling approach to assess the impact of land mining on marine biodiversity: assessment in coastal catchments experiencing catastrophic events (SW Brazil). *Sci Total Environ* 659:828–840
- Mahony MA (1996) The world cacao made: society, politics and history in Southern Bahia, Brazil, 1822–1919. PhD dissertation, Yale University, Yale
- Martini AMZ, Fiaschi P, Amorim AMA, Paixão JL (2007) A hot-point within a hot-spot: a high diversity site in Brazil's Atlantic Forest. *Biodivers Conserv* 16:3111–3128
- Martins FM (2011) Historical biogeography of the Brazilian Atlantic Forest and the Carnaval-Moritz model of Pleistocene refugia: what do phylogeographical studies tell us? *Biol J Linn Soc* 104 (3:499–509
- Martins PTA (2007) Os reflexos da crise da lavoura cacauzeira nos ecossistemas de manguezal do município de Ilhéus, Bahia. *Geografia (Londrina)* 16(1):39–49
- Mattos-Silva LA, Jardim JG, Thomas WW, Santos TS (2008) Common names of vascular plants of the Atlantic coastal forest region of southern Bahia, Brazil. In: Thomas WW (ed) *The Atlantic coastal Forest of northeastern Brazil*. The New York Botanical Garden Press, Bronx, New York, pp 245–318
- May PH, Rocha RB (1996) O sistema agrossilvicultural do cacau-cabruca. In: Lopes IV, Bastos Filho GS, Biller D, Bale M (eds) *Gestão ambiental no Brasil: experiência e sucesso*. Editora FGV, Rio de Janeiro, pp 35–62
- Mendonça JR, de Carvalho AM, Mattos Silva LA, Thomas WW (1993) 45 Anos de Desmatamento no Sul da Bahia, Remanescentes da Mata Atlântica – 1945, 1960, 1974, 1990. Projeto Mata Atlântica Nordeste, CEPEC, Ilhéus
- Menezes I, Cazetta E, Morante-Filho JC, Faria D (2016) Forest cover and bird diversity: drivers of fruit consumption in forest interiors in the Atlantic Forest of southern Bahia, Brazil. *Trop Conserv Sci* 9:549–562

- Mesquita CAB (1997) Exploração madeireira no sul da Bahia: situação atual e perspectivas. In: Revista dos Mestrados em Direito Econômico da Universidade Federal da Bahia. Ed. Especial de Direito Ambiental, pp 121–135
- Miller S (2000) Fruitless tress: Portuguese conservation and Brazil's colonial timber. Stanford University Press, Stanford
- Mittermeier RA, Fonseca GAB, Rylands AB, Brandon K (2005) Uma breve história da conservação da biodiversidade no Brasil. Megadiversidade 1(1):4–21
- Morante-Filho JC, Faria D, Mariano-Neto E, Rhodes J (2015) Birds in anthropogenic landscapes: the responses of ecological groups to forest loss in the Brazilian Atlantic Forest. PLoS One 10:e0128923
- Morante-Filho JC, Arroyo-Rodrigues V, Pessoa MS, Cazetta E, Faria D (2018) Direct and cascading effects of landscape structure on tropical forest and non-forest frugivorous birds. Ecol Appl 28:2024–2032
- Morton FWO (1978) The royal timber in late colonial Bahia. Hispanic Am Hist Rev 58:41–61
- Motamayor JC, Lachenaud P, Da Silva E, Mota JW, Loor R, Kuhn DN, Brown JS, Schnell RJ (2008) Geographic and genetic population differentiation of the Amazonian chocolate tree (*Theobroma cacao* L). PLoS One 3(10):e3311
- Ostroski P, Saiter FZ, Amorim AM, Fiaschi P (2018) Endemic angiosperms in Bahia Coastal Forests, Brazil: an update using a newly delimited area. Biota Neotrop. 18(4):e20180544. <https://doi.org/10.1590/1676-0611-BN-2018-0544>
- Pardini R, Faria D, Accacio GM, Laps RR, Mariano-Neto E, Paciencia MLB, Dixo M, Baumgarten J (2009) The challenge of maintaining Atlantic forest biodiversity: a multi-taxa conservation assessment of specialist and generalist species in an agro-forestry mosaic in southern Bahia. Biol Conserv 142:1178–1190
- Padua JA (2002) Um sopro de destruição: pensamento político e crítica ambiental no Brasil escravista (1786–1888). Jorge Zahar, Rio de Janeiro, 318p
- Peixoto AL, Silva IM, Pereira OJ, Simonelli M, Jesus RM, Rolim SG (2008) Tabuleiro forests north of the Rio Doce: their representation in the Vale do Rio Doce natural reserve, Espírito Santo, Brazil. Mem New York Bot Gard 100:319–350
- Pereira JL, Ram A, Figueiredo JM, Almeida LCC (1990) First occurrence of witches' broom disease in the principal cocoa growing region of Brazil. Trop Agr 67:188–189
- Piasentin FB, Saito CH (2014) Os diferentes métodos de cultivo de cacau no sudeste da Bahia, Brasil: Aspectos históricos e percepções. Boletim Do Museu Paraense Emilio Goeldi: Ciências Humanas Belém 9(1):61–78. <https://doi.org/10.1590/S1981-81222014000100005>
- Pinto LPS (1994) Distribuição geográfica, população e estado de conservação de mico-leão-da-cara-dourada, *Leontopithecus chrysomelas* (Callitrichidae, Primates). Master thesis, Universidade Federal de Minas gerais, Belo Horizonte
- Ribeiro ALR (2017) *In Memoriam*: urbanismo, literatura e morte. Editus, Ilhéus
- Rocha LB (2008) A região cacauzeira da Bahia – dos coronéis à vassoura-de-bruxa: saga, percepção, representação. Editus, Ilhéus, 255p
- Rocha-Santos L, Benchimol M, Mayfield MM, Faria D, Pessoa MS, Talora D, Mariano E, Cazetta E (2017) Functional decay in tree community within tropical fragmented landscapes: effects of landscape-scale forest cover. PLoS ONE (Electronic) 12:e0175545, 2017
- Rocha-Santos L, Pessoa MS, Cassano CR, Talora D, Orihuela RL, Mariano E, Morante-Filho JC, Faria D, Cazetta E (2016) The shrinkage of a forest: landscape-scale deforestation leading to overall changes in local forest structure. Biol Conserv 196:1–9
- Ruf F, Schroth G (2004) Chocolate forests and monocultures: a historical review of cocoa growing and its conflicting role in tropical deforestation and forest conservation. In: Schroth G, Fonseca GAB, Harvey CA, Gascon C, Vasconcelos H, Izac AMN (eds) Agroforestry and biodiversity conservation in tropical landscapes. Island Press, Washington
- Saint-Hilaire A (1974) Viagem ao Espírito Santo e Rio Doce. Belo Horizonte Itatiaia; São Paulo: EDUSP; Niteroi: EDUFF
- Sambuichi RHR, Vidal DB, Piasentin FB, Jardim JG, Viana TG, Menezes AA, Mello DLN, Ahnert D, Baligar VC (2012) Cabruca agroforests in southern Bahia, Brazil: tree component, management practices and tree species conservation. Biodivers Conserv 21:1055–1077

- Santos Filho LP, Pires JL, Ruiz MAM, Valle RR, Afonso JMC, Marrocos PCL, Freire ES (2008) Produção de cacau e a vassoura-de-bruxa na Bahia. *Agrotropica* 20:73–82
- Santos RJ, Koch EBA, Leite CMP, Porto TJ, Delabie JHC (2017) An assessment of leaf-litter and epigeic ants (Hymenoptera: Formicidae) living in different landscapes of the Atlantic Forest biome in the state of Bahia, Brazil. *J Insect Biodivers* 5(19):1–19
- Santos-Lima S, Souza CAS, Patrocínio NGRB, Silva RA, Santos RSG, Gramacho KP (2018) Favorabilidade, distribuição e prevalência da vassoura-de-bruxa do cacauzeiro no estado do Espírito Santo, Brasil. *Agrotropica* 30(1):5–14
- Schroth G, Bede LC, Paiva AO, Cassano CR, Amorim AM, Faria D, Mariano-Neto E, Martini AMZ, Sambuichi RHR, Lôbo RN (2015) Contribution of agroforests to landscape carbon storage. *Mitig Adapt Strat Gl* 20:1175–1190
- Schroth G, Jeusset A, Gomes AS, Florence CT, Coelho NAP, Faria D, Läderach P (2016) Climate friendliness of cocoa agroforests is compatible with productivity increase. *Mitig Adapt Strat Gl* 21:67–80
- Schwartz S (1988) Segredos internos. Companhia das Letras, São Paulo
- Silva JMC, Casteleti CH (2003) Estado da biodiversidade da Mata Atlântica brasileira. In: Galindo-Leal C, Gusmão-Câmara I (eds) *Mata Atlântica, Biodiversidade, Ameaças e Perspectivas*. Fundação SOS Mata Atlântica, Conservação Internacional, Belo Horizonte, pp 43–59, 471p
- Silva SCB, Leão SO, Silva BCN (1989) Urbanização e metropolização no estado da Bahia: evolução e dinâmica. UFBA Press, Salvador
- Siqueira JDP, Lisboa RS, Ferreira AM, Souza MFR, Araújo E, Lisboa Júnior L, Siqueira MM (2004) Estudo ambiental para os programas de fomento florestal da Aracruz Celulose S.A. e extensão florestal do Governo do Estado do Espírito Santo. *Floresta, Edição Especial*, pp 3–67
- SOS Mata Atlântica, INPE. (2017). Atlas dos remanescentes florestais da Mata Atlântica – Período de 2015–2016. Fundação SOS Mata Atlântica and Instituto Nacional de Pesquisas Espaciais 63p. <http://sosma.org.br/projeto/atlas-da-mata-atlantica/dados-mais-recentes/>
- Souza JBO (1939) Pau-brasil na história nacional. Companhia Editora Nacional, Rio de Janeiro
- Srbek-Araujo AC, Simon JE, Magnago GR, Pacheco JF, Fonseca PSM, Whitney BM, Silveira LF (2014) A avifauna da Reserva Natural Vale, Linhares, Espírito Santo, Brasil. *Ciencia & Ambiente* 49:169–191
- Suguio K, Angulo RJ, Carvalho AM, Corrêa ICS, Tomazelli LJ, Willwock JÁ, Vital H (2005) Paleoníveis do mar e paleolinhas de costa. In: Souza CRG, Suguio K, Oliveira MAS, Oliveira PE (eds) *Quaternário do Brasil*. Ribeirão Preto, Holos, pp 114–129
- Tabarelli M, Aguiar AV, Ribeiro MC, Metzger JP, Peres CA (2010) Prospects for biodiversity conservation in the Atlantic Forest: lessons from aging human-modified landscapes. *Biol Conserv* 143(10):2328–2340
- Thomas WW, Barbosa MRV (2008) Natural vegetation types in the Brazilian Atlantic coastal forest north of the Rio Doce. *Mem N Y Bot Gard* 100:6–20
- Thomaz LD, Monteiro R (1997) Composição florística da mata Atlântica de encosta da Estação Biológica de Santa Lucia, município de Santa Tereza, ES. *Boletim do Museu de Biologia Mello Leitão* 7:3–48
- Thomas WM, Carvalho AMV, Amorim AMA, Garrison J, Arbeláez AL (1998) Plant endemism in two forests in southern Bahia, Brazil. *Biodivers Conserv* 7:311–322
- Vanzolini PE, Williams EE (1981) The vanishing refuge: a mechanism for ecogeographic speciation. *Papéis Avulsos de Zoologia* 34:251–255
- Virgens-Filho AC, Santos AHC, Figueroa GES, Isensee HCF, Silva IM, Abreu JM, Melo JRV, Cruz IP (1993) A CEPLAC e a crise da lavoura cacauzeira. CEPLAC, Ilhéus, 30p
- Wied, MPv (Maximiliano, príncipe de Wied-Neuwied) (1989) *Viagem ao Brasil*. Itatiaia/USP Press, Belo Horizonte