Between Land and Sea: Mangroves and Mollusks along Brazil's Mangal Coast

Judith A. Carney [1]

ABSTRACT

Westerners have long viewed mangroves as forbidding, pestilential landscapes. While modern medicine transformed their deadly reputation, the perception lingered of an environment that was little more than a tropical wasteland. The 1992 Earth Summit in Rio de Janeiro profoundly changed this view by drawing attention to the ecosystem as a habitat crucial to the life cycles of many species and endangered fauna yet increasingly at risk from deforestation. Conservation initiatives in the years since the Rio Summit, however, seldom recognize mangroves as a habitat that has also long supported human life. This is evident in the shell middens found along mangrove coasts and in the historical record of shellfish harvested for dietary protein. With a focus on Brazil, this article examines the shellfish that sustained Amerindians, enslaved Africans, and their descendants along the *mangal* coast since pre-Columbian times. The discussion contends that Brazil's mangrove forests cannot be separated from the history of the tropical peoples who have successively lived in and managed this ecosystem from ancient times to the present. Finally, the article concludes that a research focus on shellfish suggests broader linkages to South Atlantic history.

Keywords: Mangroves; Human Habitat; Edible Shellfish; Coastal Brazil; African Diaspora; South Atlantic History.

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[1] Department of Geography, University of California Los Angeles; carney@geog.ucla.edu

When Portuguese mariners reached the coast of Senegal in the 1440s, they encountered a vast and entirely unfamiliar forest along West Africa's continental edge. Submerged for part of the day, this forest thrived in the intertidal zone between land and sea. Low tides exposed the aerial prop roots that anchored the trees in the mud below. The vegetation's impenetrable thickets hosted swarms of biting insects, restricting seafarers to small vessels traversing a maze of featureless waterways. With no word in the Portuguese language to describe such a forbidding and alien landscape, Portuguese mariners borrowed the local African word for it, *mangue*, from the Senegambian Wolof (Vannucci 1999). In this way, *mangue* entered the Portuguese language as a loan word. As voyages across the Indian and Atlantic Oceans brought the Portuguese repeatedly into contact with mangroves, they applied anew the Wolof name to this tropical vegetation. Eventually, *mangue* became *mangle* in Spanish and *mangrove* in English.

Until fairly recently, Europeans considered mangroves to be an irredeemably pestilential environment – one that cut down trespassers with grievous and mortal fevers. Centuries ago a sea shanty warned mariners venturing along western Africa's mangrove coast of the dangers lurking there:

> Beware and take care of the Bight of Benin. There's one comes out for forty goes in (Lloyd 1949, 19).

The iconic *Rhizophora* mangrove that Europeans associated with deadly miasma, features as a kind of cautionary signpost in a nineteenth-century drawing of this coast (Figure 01). Only in the nineteenth century's last decades did mangroves begin to shed their hostile reputation, mostly due to advances in western medicine. By the end of the twentieth century an environment long deprecated by Europeans finally earned recognition as a vital sanctuary for marine and avian species, many of them endangered. The shift in perception climaxed at the Rio de Janeiro Earth Summit in 1992, when representatives urged protection of a biodiverse ecosystem increasingly under threat from human activities (UNEP-UNESCO 1992; Glaser 2003; Cormier-Salem 2006).

Since the 1980s mangroves have been disappearing at a rate of one to two percent per annum – a loss that exceeds terrestrial rainforest destruction (Valiela et al. 2001; Duke et al. 2007; Polidoro et al. 2010). This habitat loss is of grave concern. Mangroves form in the mudflats between solid land and open sea, their roots trapping sediments that stabilize the edges of continents. They serve as a vegetative buffer against shoreline erosion and so are indispensable to protecting coastlines from rising sea levels (IPCC 2009, 2013). Mangroves are vital to terrestrial and aquatic life: they provide a nursery for spawning fish, a refuge for threatened and endangered marine species, and a flyway for migrating birds. Recent scientific research also draws attention to the "blue carbon" role of mangroves. Large amounts of carbon are naturally sequestered in the vegetation and underlying mud; if disturbed, the potential release could be massive, contributing significantly to atmospheric stores of carbon and undermining efforts to combat global warming (Chmura et al 2003; Pendleton et al. 2012; Lau 2013). Across the world, mangroves are being destroyed from coastal urban expansion, road and port construction, timber and firewood extraction, petroleum exploration and spills, salt harvesting, and aquaculture – especially shrimp farming (FAO 2007; Carney et al. 2014).

Figure 01. Map of Bight of Benin with Rhizophora mangrove and silk cotton tree

Source: The Rhizophora mangrove is depicted on lower left in intertidal zone along with the silk cotton tree to the right as an upland tree. "Map of West African Coastal Areas, mid-19th century;" Image Reference UVA22, as shown on www.slaveryimages.org, compiled by Jerome Handler and Michael Tuite, and sponsored by the Virginia Foundation for the Humanities and the University of Virginia Library.

The Rio Earth Summit in 1992 established an environmental milestone by raising public awareness of mangroves' vulnerability and elevating them to a global conservation priority (Polidoro et al. 2010). Nonetheless, a recent United Nations' report warned that this carbon-rich forest is disappearing three-to-five times faster than other forest types and ranked mangroves among the world's most threatened ecosystems (van Bochove et al. 2014). Policy initiatives have sought to counter the deforestation trend by encouraging conservation set-asides and marine protected areas. While the attitudinal shift in mangroves over the past century from hostile milieu to species sanctuary is welcome, there is a lingering North-South dissonance in perceptions of this tropical ecosystem. Conservation biologists from developed countries emphasize mangrove biodiversity and the protection of aquatic and avian species found within. However, they too often fail to recognize that the ecosystem is also a habitat of humans – one that has long provided coastal peoples of the Old and New World tropics crucial subsistence support.

Mangroves played a vital role in the settlement history of Brazil. Before the arrival of Europeans, the ecosystem supported significant Amerindian populations. Their numbers catastrophically declined during the colonial period, accelerated by forced labor and vulnerability to introduced diseases. Africans were enslaved and forcibly migrated to replace them in Brazil. Africans who were settled near the coastline encountered an environment that attracted rather than repulsed: mangrove mudflats supplied abundant fish and shellfish for daily subsistence, wood for cooking, salt, honey, medicine, and at times, refuge from bondage. The African presence ensured that Brazil's mangrove coastline remained a continuously inhabited and human-utilized environment, albeit with new linkages to Africa.

The significance of the mangrove ecosystem in the settlement history of Brazil is evident by examining shellfish consumption. Across the Old and New World tropics shell debris mounds and middens attest to an ancient and collective human presence in mangrove swamplands. For thousands of years coastal societies actively gathered seafood such as fish, crab, mollusks, gastropods, turtles, and manatees for sustenance (Cormier-Salem 2006). In tropical Asia and West Africa ancient inhabitants established rice plots in mangrove clearings and encouraged useful palms on field margins (Cormier-Salem 2006). Shell middens in mangrove forests of Asia, West Africa, and Brazil indicate at least 5,000 years of continuous habitation in the period prior to European overseas expansion (Linares 1971; Higham 1989; Suguio et al. 1992; Dean 1995). Discarded oyster and clam shells accumulating over millennia left a visible landscape vestige in the extensive middens the Portuguese encountered in mangrove swamps between Senegal and Guinea-Bissau (Cormier-Salem 1999). During their explorations of Brazil's mangrove coastline, they also found similar middens and shell mounds. On each side of the South Atlantic, mangroves sheltered many common genera of shellfish and crustaceans, many of them edible, which provided another thread linking tropical Atlantic coastal peoples, seafood, and habitat.

The importance of shellfish to the subsistence strategies of people who depend upon mangrove environments is often obscured in contemporary global conservation initiatives that aim to protect non-human species but too often deprive traditional user groups of their customary access (Beymer-Ferris and Bassett 2012; Cormier-Salem and Panfili 2016). Brazil, in contrast, has a long history of protecting these rights by adjudicating mangroves as common property. The very metabolism of the tidal *mangal* ecosystem, which places it under water part of the day, frustrated efforts during the colonial period to define its geographic limits as private property. So did the significance of the environment for slave sustenance. Conflicts over mangrove access resolved historically in favor of granting the poor the rights they sought (Miller 2003 p.236-237). Today, 77% of Brazil's mangrove forest is under federal, state or county governance (Magris and Barreto 2010, 549). Poor communities living near the *mangal* remain dependent on its shellfish and fish for dietary protein.

Shellfish middens attest to the longstanding occupation of Brazil's mangroves and to a tropical environment inhabited by people who often existed at the margins of the Atlantic world. Situated between terrestrial and aquatic spaces, where the land is neither solid nor liquid, the "in-between-ness" of the mangrove swamp shaped a distinctive habitat during the colonial period for those who found themselves between two continents and two social states, free and enslaved. The cumulative historical occupation of Brazil's mangroves countered European narratives of a pestilential, insalubrious landscape.

THE MANGROVE ECOSYSTEM OF THE SOUTH ATLANTIC

Brazil accounts for about half the mangrove coverage found in South America (FAO 2007, 43) (Figure 02). Mangroves extend 6800 kilometers along the country's long coastline from Amapá state, which borders French Guiana, southward to the subtropical state of Santa Catarina (Herz 1991; Varela et al. 2007; Cunha-Ligon et al. 2011). A recent estimate of Brazil's mangrove coverage is 11,143.986 km^2 (Magris and Barreto 2010). Shrimp mariculture projects have contributed to mangrove deforestation in the Northeast states of Ceará and Rio Grande do Norte and in the South, as have urbanization, port development, and petrochemical development elsewhere along the coastline (FAO 2007, 46). But significant stands of structurally complex mangrove forest remain along Brazil's north coast, especially along the coastline between Pará and Maranhão states and in the state of Amapá (Schaeffer-Novelli et al. 1990; Magris and Barreto 2010).

In western Africa, whence originated the majority of enslaved Africans sent to Brazil, mangrove forests extend along the coastline of 19 countries located between latitudes 15 degrees north and south of the equator. Today, estimated forest coverage of the region from Mauritania to Angola is nearly double that of Brazil, a little over 20,142 km2. While a major driver of mangrove loss in Brazil is forest conversion to commercial shrimp farms (Queiroz et al. 2013; Tenório et al. 2015), in Atlantic Africa it is the firewood demand for cooking. Population movements to seaboard cities, road construction, and port development aggravate anthropogenic pressure on these forests. Oil exploration and spills in Nigeria (which holds the most extensive coverage in Africa) have not only damaged coastal mangroves but also the associated shellfishery, in turn depriving local populations of a crucial source of dietary protein (Corcoran et al. 2007; Carney et al. 2014).

Figure 02. Mangrove Coverage of Brazil and Western Africa

Source: The Author.

MANGROVES AS FOOD FORESTS

When the Portuguese initially encountered mangrove forests along the Atlantic African littoral, the towering *Rhizophora* trees made a distinct impression. They were occasionally drawn by seafarers as sentinels against the deadly fevers harbored within (Figure 01). But attracting their attention from an early date were the tree's aerial roots, which supported thick clusters of edible oysters. In the early period of maritime voyages, when destinations and food supplies were uncertain, the mangrove stood out as a source of available, and recognizable, protein. Probably the first drawing of the mangrove dates to 1577, when the English seaman Richard Madox drew the "oyster tree" he saw in the Sierra Leone estuary (Figure 03) (Madox 1976, facing 145).

Figure 03. Drawing of *Rhizophora* mangrove with oysters, sixteenth century

Fig. 10. Madox's sketch of the palmito and the oyster tree

Source: Madox 1976.

Today we recognize the tree as the *Rhizophora* mangrove, which hosts the cupped oysters of the indigenous *Crassostrea gasar* species (Figure 04).

Similar mangrove species are found on each side of the tropical Atlantic. The red mangrove – prized for its rot-resistant timber but also as firewood, charcoal, and for tannin – is represented by three species: *Rhizophora mangle, R. harrisonii,* and *R. racemosa.* It grows alongside marine brackish water and can reach 40 meters in height. *Rhizophora* is distinguished by the tree's divaricating prop roots, which fan out finger-like from the trunk, before plunging into the water. *Rhizophora* is the ecosystem's dominant species: the roots trap suspended sediments and build soil, which stabilizes the low-lying

Atlantic coastline and protects the seaboard from the erosive effects of storm surges. Its aerial roots provide fish and marine animals such as turtles and manatees spawning grounds and nurseries to raise their young. The tree, and the tidal mudflats in which it anchors, are an ideal habitat for many types of edible shellfish besides oysters. These include whelks, cockles, mussels, clams, crabs, and sea snails.

Figure 04. *C. gasar* oysters growing on *Rhizophora* mangroves in The Gambia

Photo credit: Richard Rosomoff, November 2015.

Within the mangrove ecosystem, the second most common tree is the black mangrove, represented by two species: *Avicennia germinans*, and *A. schaueriana*. The latter is not found in western Africa. *Avicennia* grows on the landward side of the mangrove forest, in the hyper-saline soils that accumulate in areas not reached by diurnal tides. *Avicennia* averages 1.5 meters in height and is distinguished by the array of aerial roots (pneumatophores) that push through the soil surface, their tips resembling snorkels. The pneumatophores enable adaptation to the high salt concentration of the substrate. The two remaining mangrove species are *Laguncularia racemosa* – the white mangrove – and *Conocarpus erectus*, the grey mangrove, which grow in brackish water lagoons (FAO 2007).

COASTAL PEOPLES AND *MANGAL* RESOURCES IN BRAZIL

When the Portuguese arrived along the Brazilian coastline, they encountered Tupi-Guaraní and Jê speaking linguistic groups. Amerindians were soon enslaved and put to work cultivating new export crops such as sugarcane and tobacco. By the early seventeenth century, forced labor and introduced diseases had decimated the coastal native populations (Hemming 1984). The pace at which this demographic collapse occurred was startling. The French settlement of São Luís, Maranhão, for example, was initially established in 1612 but reclaimed by the Portuguese nine years later; by 1627 an observer reported that "there is not a single Indian village left. Within a hundred leagues of [Grão] Pará there is not a single Indian who is not at peace or who has not been domesticated by the Portuguese." In 1652 Brazilian-born priest Antônio Vieira wrote that "the entire region of Maranhão has been worn down, depopulated and reduced to one or two scanty villages, and vast numbers of people have been wiped out" (quotes from Marcílio 1984, 42-43). Hemming (1984, 487-501) estimates Brazil's Amerindian population at 2.4 million in 1500, but since then others suggest 5 million as likely more accurate (Rubens Nodari pers. comm. 12 November, 2016). By the nineteenth century, native numbers had been reduced by two-thirds over the entire colony (Marcílio 1984, 45). The plantation economy depended upon forced labor, initially Indian and then African. Father Vieira promoted legislation in 1680 that shifted the labor demand to forced migrants by authorizing the importation at reasonable costs "every year five or six hundred Negroes" to replace lost Indian slaves (Kiemen 1948, 167-68).

The ancient and extensive shell middens left by Brazil's coastal populations were known as *sambaquis*, and they bear witness to thousands of years of nutritional support provided by the mangrove ecosystem. Colonial sources in Bahia note hundreds of them, some as much as 350 meters long and 25 meters high (Dean 1995; Miller 2003). Historian Warren Dean mentions one of the largest containing "120,000 cubic meters of shells," which he estimated "would have provided daily ration for 100 persons for 500 years" (Dean 1995, 24). *Sambaquis* of similar dimensions have been reported from other mangrove areas in Brazil, including Santa Catarina, where the vegetation reaches its southern-most extension (Fairbridge 1976; Suguio 1992). So monumental were these shell formations that colonists "thought them the remains of primitive pyramids" (Miller 2003, 233-34). The mounds were plundered by the Portuguese as a source of lime and shell mortar for colonial building projects. Jesuit Fernão Cardim, who arrived in Brazil in 1583, remarked in his 1601 history of Brazil's land and climate that "a single mountain [of shells] built …the College of Bahia, the governor's palaces, and many other buildings, and it is still not exhausted" (Miller 2003, 234). Not only *sambaquis* but also the splendors of colonial architecture attest to the longstanding significance of mangrove shellfish to Amerindian subsistence strategies.

Figure 05. Distribution of the African mangrove oyster (*Crassostrea gasar*) in Brazil

Source: Lazoski et al. 2011.

Exploitation of mangrove food sources continued during the colonial period despite the decimation of native peoples. In the seventeenth century Jesuit Simão de Vasconcellos wrote of the "immense stocks of fish and shellfish" that were harvested from coastal mangroves, which provided the "sumptuous repast of the rich and a staple of the poor"' (Miller 2003, 226). One account from Bahia in 1583 is more explicit, mentioning crabs as "the sustenance of all this land, particularly of the Guinea slaves and Indians" (Miller 2003, 228). Besides crabs, oysters also became an important source of dietary protein. Sixteenth-century Bahian planter Gabriel Soares de Sousa wrote of these mollusks so thickly encrusted on mangrove tree roots that they "never deplete, because when removed, others are soon born in their places" (Sousa 1971, 291). Similar to the West African *Crassostrea gasar* oyster, the tropical New World species, *C. rhizophorae*, readily attaches to *Rhizophora* mangrove prop roots. But in some regions Brazil's *Rhizophora* mangroves also host *C. gasar* (Figure 05). Some geneticists argue the African species was likely established there as an accidental consequence of the transatlantic slave trade. They posit that *C. gasar* larvae hitchhiked on the hulls of slave ships or escaped from ship bilges, whereupon they found new homes on New World *Rhizophora* (Lapègue et al. 2002).

Along Neotropical coastlines mangrove shellfish provided African slaves crucial sources of dietary protein that supplemented meager plantation food regimens. Planters in New World slave societies notoriously stinted on food rations or free time for slaves to meet their subsistence needs (Conrad 1984). Such disregard for their welfare prompted royal edicts commanding more humane treatment, often at the urging of Catholic religious orders (Carney and Rosomoff 2009, 109-10). Jesuit André João Antonil voiced this concern in early eighteenth-century Bahia and "condemned planters who failed to feed their slaves adequately or to grant them a weekday to plant food crops, as this forced slaves to take what little time they had at the end of the day to go in search of a crab for supper, which, along with shellfish, was the slaves' favored food" (Miller 2003, 228).

But what were these shellfish? The *sambaquis* were principally formed of oyster, cockle, and clam shells, but many other mangrove mollusks and crustaceans were sources of dietary protein. Miller's (2003, 229, n.13) historical research on Bahia's colonial period elicited vernacular names of diverse *mariscos* that Amerindian and African slaves collected from coastal mangroves: *sernabis* (clam or cockle)*, ameijoas* (clam)*, tarcobas, sururus* (mussel)*, berbigões* (cockle), *búzio, languerões, perseves, carmajuos, pernambins, caramuhos* (conch)*, unhas de velha* (razor clam), *and periguaris*. However, not all are readily identified by modern usage or taxonomy.

The abolition of slavery in 1888 left many of the manumitted in Brazil without property or work, thereby deepening the reliance of Afrodescendant populations near the coast on mangrove resources for protein. Fishing and shrimping complemented shellfish collection in subsistence diets. These foodways remain important to their descendants to this day, especially in the ecologically complex mangrove forests along the Pará and Maranhão coastline. Even so, many collected species do not appear in research that examines human use of mangrove ecosystems, in part because anthropogenic usage is so frequently vitiated. In studies of the interactions between the local economy and the ecosystem, the focus is either on shellfish for which there is a commercial demand or on anthropogenic threats to its sustainability (Glaser 2003). There is far less information on the minor *marisco* species consumed by households and occasionally sold in local markets. Perhaps a contributing factor to the lack of attention to subsistence shellfish is that the primary collectors are women (*marisqueiras*). But occasionally this gendered shellfishery is exposed in media coverage, as recently occurred in Pernambuco when [female] *marisqueira* activists blamed development of the Suape port and petrochemical complex for mangrove decimation and the precipitous drop in their shellfish catch (Sullivan 2014).

EDIBLE SHELLFISH ALONG BRAZIL'S MANGROVE COAST

The association of vernacular mangrove fauna with their Latin binomials has advanced considerably since the Rio Earth Summit. Two major reports by the *Intergovernmental Panel on Climate Change* (2009, 2013) spurred scientific research on mangrove ecosystem status and vulnerability across the world (Spalding 2010; Giri et al. 2011; Friess and Webb 2014; Hogarth 2015). In Brazil, this has resulted in a number of critical studies that include remote sensing analysis of forest coverage (Herz 1991; Magris and Barreto 2010), mangrove biodiversity (Beasley et al. 2005; Filho et al. 2008; Cunha-Ligon et al. 2011), ecosystem productivity (Wolff et al. 2000; Marques-Silva et al. 2006), mangroves and climate change (Godoy and de Lacerda 2015), regional patterns of forest disturbance (Schaeffer-Novelli et al. 1990, 2000; Beys-da-Silva et al. 2014), shellfish commercialization and sustainability (Pedroza-Júnior et al. 2002; Glaser 2003; Diele et al. 2005), and human use of 19 mollusks in medicinal and candomblé practices of which some are also consumed as food (Neto 2006; Léo Neto et al. 2012).

While none of these scientific studies from Brazil offer a comprehensive list of the shellfish species collected for food in mangrove swamplands, they are useful in establishing Latin binomials for some and in mentioning vernacular names for others, even if scientific interest in mangrove fauna often does not indicate which of the shellfish are consumed (Rios 1994). Nonetheless, these studies do enable the compilation of a preliminary list of 22 edible species that are collected along Brazil's mangrove coastline (Table 01). The list includes mollusks and gastropods, but also crustaceans because crabs are mentioned so often in colonial records as a primary source of slave dietary protein. Table 01 lists these edible mollusks and crustaceans by their scientific and vernacular names (in Portuguese and English).

Crabs are found in every mangrove habitat influenced by daily tides. Four species are collected. *Siri* (*Callinectes sapidus*), the swimming crab, which spends its entire existence in water, is caught just offshore in traps set from canoes. Land crabs are indispensable to the biological functioning of the mangrove ecosystem. They digest the *Rhizophora* leaves that fall onto the mudflat substrate. Through litter fall, mangroves inject this primary food source into the environment. Mangrove crabs are either specialized in consuming the leaf fall directly or once it has been metabolized by bacteria. These crustacean herbivores are in turn consumed by other species, most notably human beings (Aveline 1980; Wolff et al. 2000).

Table 01. List of edible mollusk and crustacean species collected in Brazilian mangroves

Order	Family	Species	Vernacular Name	
			Português	English
Bivalves				
Mytiloida	Mytilidae	*Mytella charruana* (d'Orbigny 1842)	*sururu*	mussels
		Mytella guyanensis (Lamarck 1819)	*sururu*	mussels
Ostreoida	Ostreoidae	*Crassostrea gasar* (Deshayes 1830)	*ostra, leri-mirim*	oysters
		Crassostrea rhizophorae (Guilding 1828)	*ostra, leri-mirim*	oysters
Pholadina	Teredinidae	*Bankia fiimbriatula* (Moll & Roch 1931)	*turus*	mangrove boreworm, shipworm
		Lyrodus pedicellatus (Quatrefages 1849)	*turus, teredo, anomia*	mangrove boreworm, shipworm
		Neoteredo reynei (Bartsch 1920)	*turus*	mangrove boreworm, shipworm
		Teredo sp. (Linnaeus 1758)	*turus*	mangrove boreworm, shipworm
Veneroida	Donacidae	*Iphigenia brasiliana* (Lamarck 1818)	*taioba*	cockle, saltwater clam
	Lucinidae	*Lucina pectinata* (Gmelin 1791)	*sernambi, lambreta*	cockle, saltwater clam
	Solecurtidae	*Tagelus plebeius* (Lightfoot 1786)	*unha de velha*	razor clam
	Tellinidae	*Macoma constricta* (Brugière 1792)	*sernambi, lambreta*	cockle, saltwater clam
	Veneridae	*Anomalocardia brasiliana* (Gmelin 1791)	*maçunin, berbigão, sernambitinga*	cockle
Gastropods				
Cycloneritimorpha	Naticidae	*Natica marochiensis* (Gmelin 1791)	*marisco pedra*	rock shell, dog winkle
Littorinimorpha	Strombidae	*Strombus pugilis* (Linnaeus 1758)	*taguaria*	conch
Neogastropoda	Melongenidae	*Pugilina morio* (Linnaeus 1758)	*rochelo*	whelk
	Thaididae	*Thais coronata* (Lamarck 1816)	*marisco pedra, sapequara*	rock shell, dog winkle
		Thais haemastoma (Linnaeus 1767)	*saguaritá, marisco pedra*	rock shell, dog winkle
Crustaceans				
Decapoda	Gecarcinidae	*Cardisoma guanhumi* (Latreille in Latreille, Le Peletier, Serville & Guérin 1828)	*guaiamum*	blue land crab
	Grapsinae	*Goniopsis cruentata* (Latreille 1802)	*aratu*	mangrove root crab
	Portunidae	*Callinectes sapidus* (Rathbun 1896)	*siri*	blue crab
	Ucididae	*Ucides cordatus* (Linnaeus 1763)	*uçá, canaguejo-verdadeiro*	fiddler crab, swamp ghost crab

Source: Aveline 1980; Glaser 2003; Beasley et al. 2005; Magris and Barreto 2010.

Crabs are found in every mangrove habitat influenced by daily tides. Four species are collected. *Siri* (*Callinectes sapidus*), the swimming crab, which spends its entire existence in water, is caught just offshore in traps set from canoes. Land crabs are indispensable to the biological functioning of the mangrove ecosystem. They digest the *Rhizophora* leaves that fall onto the mudflat substrate. Through litter fall, mangroves inject this primary food source into the environment. Mangrove crabs are either specialized in consuming the leaf fall directly or once it has been metabolized by bacteria. These crustacean herbivores are in turn consumed by other species, most notably human beings (Aveline 1980; Wolff et al. 2000).

Bivalves are the most important mangrove mollusks in regional diets, especially mussels (*Mytella* spp), oysters (*Crassostrea rhizophora*, *C. gasar*), and diverse clams and cockles (see Table 01). The most commonly consumed gastropods include the *marisco pedra* or dog winkle (*Stramonita haemastoma*) and sea snails of the *Thais* genera.

Many of the shellfish species collected in Brazil are also important in West African diets. This is of scholarly interest for several reasons. Table 02 presents a list of 33 edible species that are gathered in just three countries for which there is extensive documentation: Senegal, The Gambia, and Guinea-Bissau. Several genera span the tropical South Atlantic with representatives in both Brazilian and West African mangrove areas, including some identical species that are harvested. Only the conch (*Strombus pugilis*) is without a representative genus in the African Atlantic. The gastropod species, *Pugilina morio*, is consumed in some mangrove areas of Brazil's northern coast but ignored elsewhere (Beasley et al. 2005). This sea snail is esteemed by populations along the Senegambian mangrove coast, where it is actively harvested as a subsistence staple (Niang 2008; Carney 2016). *P. morio* thrives in the mudflats supporting oyster-bearing *Rhizophora* trees, as is shown in Figure 06.

Table 02. List of edible mollusk and crustacean species collected in West African mangroves

Order	Family	Species	Common Name
Bivalves			
Adapedonta	Pharidae	*Ensis goreensis* (Linnaeus 1758)	razor clam
Arcida	Arcidae	*Arca noae* (Linnaeus 1758)	ark clam
	Arcidae	*Donax* (Linnaeus 1758)	ark clam
	Arcidae	*Senilia senilis* (Linnaeus 1758)	clam, blood ark, cockle
	Glycymeridae	*Glycymeris vovan* (Lamy 1912)	ark clam
	Noetiidae	*Noetia* spp	saltwater clam
Cardiida	Cardiidae	*Cardium costatum* (Linnaeus 1758)	cockle
	Psammobiidae	*Gari* spp	clam
	Solecurtidae	*Tagelus adansonii* (Bosc 1801)	razor clam
Mytiloida	Mytilidae	*Modiolus* spp	rhomboid mussel
Ostreoida	Ostreoidae	*Crassostrea gasar* (Deshayes 1830)	oyster
Pinnida	Pinnidae	*Pinna (Pinna) rudis* (Linnaeus 1758)	fan mussel

Gastropods			
Caenogastropoda	Potamidae	*Tympanotomus fuscatus* (Linnaeus 1758)	periwinkle
Littorinimorpha	Cassidae	Cassis tessellata (Gmelin 1791)	sea snail
	Naticidae	*Natica collaria* (Lamarck 1822)	sea snail
		Natica senegalensis (Récluz 1850)	sea snail
		Natica tigrina (Röding 1798)	sea snail
		Natica turtoni (E. A. Smith 1890)	sea snail
Neogastropoda	Melongenidae	*Pugilina morio* (Linnaeus 1758)	whelk
	Muricidae	*Hexaplex (Truncalariopsis) duplex* (Röding 1798)	murex sea snail, rock snail
		Murex angularis (Lamarck 1822)	murex sea snail, rock snail
		Murex (Bolinus) cornutus (Linnaeus 1758)	murex sea snail, rock snail
		Stramonita haemastoma (Linnaeus 1767)	murex sea snail, rock snail
		Thais (Thaisella) coronata (Lamarck 1816)	murex sea snail, rock snail
	Nassariidae	*Bullia miran* (Bruguière 1789)	sea snail, mud snail, dog whelk
	Volutidae	*Cymbium cymbium* (Linnaeus 1758)	sea snail, volute
		Cymbium glans (Gmelin 1791)	sea snail, volute
		Cymbium marmoratum (Link 1807)	sea snail, volute
		Cymbium pepo (Lightfoot 1786)	sea snail, volute
		Cymbium senegalensis (Marche-Marchad 1978)	sea snail, volute
Crustaceans			
Decapoda	Grapsinae	*Goniopsis cruentata* (Latreille 1802)	mangrove root crab
	Portunidae	*Callinectes sapidus* (Rathbun 1896)	blue crab
	Ucididae	*Ucides cordatus* (Linnaeus 1763)	fiddler crab

Source: Ba et al. 2006; Regalla and Baldé 2008; Carney 2016.

Africans from western Africa's mangrove coast would have recognized many of the shellfish they encountered in Brazil, especially those of pantropical genera. It does not appear possible to assess knowledge transfers of edible species between Amerindians and deracinated Africans during Brazil's colonial period. However, coastal Africans from West Africa held as firm an understanding of mangrove shellfish resources as Brazil's native peoples. Dean has written that many *sambaquis* had been abandoned in the centuries prior to the arrival of the Portuguese (Dean 1995, 24). This suggests that African knowledge systems of consumable shellfish in Brazilian mangrove areas may be more pronounced than previously thought. A more comprehensive comparison of the species collected on each side of the tropical Atlantic and the ways they are used in foodways might yield compelling insights. Today, the collection of shellfish for food is a gendered activity across the African diaspora, not only in Brazil and West Africa but also in the African-descended communities of Colombia's Pacific mangrove coast (Carney 2016).

Figure 06. *Pugila morio* in mangrove oyster mudflats, The Gambia

Photo credit: Richard Rosomoff, November 2015.

Conclusion

This discussion of the edible shellfish that have supported human occupation of Brazil's mangrove coastline aims to encourage a research perspective of these tropical wetlands as a quintessentially coupled human-environmental ecosystem, one whose history cannot be separated from the tropical peoples who have lived in and managed these habitats for millennia. It is a perspective that contrasts with the view Europeans initially formed of mangroves in West Africa during the transatlantic slave trade, a view that continues to influence contemporary global policy initiatives. Although mangroves are no longer portrayed in the global North as forbidding and inimical, they are still conceived as places where human beings do not belong. Anthropogenic presence is now equated with environmental degradation and habitat loss. This perspective ignores how successive tropical peoples have managed Brazil's mangrove coast – deriving from it both sustenance and shelter – from pre-Columbian times to our own. Investigation of edible shellfish draws attention to the faunal resources – mollusks, bivalves, and crustaceans – that underpinned the survival of Brazil's indigenous peoples, and those who replaced them from tropical Africa, while illuminating the economic development projects that imperil the mangrove shellfishery upon which their mixed-race descendants continue to depend.

This preliminary identification of subsistence shellfish in Brazil is a necessary first step for examining historical questions such as possible tropical knowledge transfers during the colonial period, especially with regards to collecting and food preparation. There is now ample acknowledgement of the African influence in Brazilian cooking and the incorporation of shellfish in many dishes (Cascudo 1983; Carney and Rosomoff 2009). The problem is that many consumed species are not identified or only known by their colloquial names. Once a list of edible mollusks with Latin binomials is completed from historical and contemporary sources for Brazil, the information can be productively engaged with research currently underway in western Africa on the mollusks and gastropods that form a principal dietary component of coastal Africans. With comparative research, scholars will be better placed to ascertain African contributions to the syncretic Brazilian seafood palate, whether through specific species harvested or through their influence on regional foodways.

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Entre a Terra e o Mar: Manguezais e Moluscos ao longo dos Mangais da Costa Brasileira

Resumo

Os ocidentais há muito consideram os manguezais como paisagens proibitivas e pestilentas. Enquanto a medicina moderna transformou sua reputação mortal, a percepção permaneceu como de um ambiente que era pouco mais do que um deserto tropical. A Cúpula da Terra de 1992 no Rio de Janeiro mudou profundamente este ponto de vista, chamando a atenção para o ecossistema como um habitat crucial para os ciclos de vida de muitas espécies e fauna ameaçada, mas cada vez mais em risco de desmatamento. As iniciativas de conservação nos anos que se seguiram à Cúpula do Rio, entretanto, raramente reconhecem os manguezais como um habitat que há muito dá suporte à vida humana. Isto é evidente nos sambaquis encontrados ao longo dos Manguezais da costa e no registro histórico dos moluscos colhidos para a dieta proteica. Com foco no Brasil, este artigo examina os mariscos que sustentaram ameríndios, africanos escravizados, e seus descendentes ao longo dos Mangais da costa desde os tempos pré-Colombianos. A discussão alega que as florestas de manguezais do Brasil não podem ser separadas da história dos povos tropicais que viveram e manejaram esse ecossistema desde os tempos antigos até o presente. Finalmente, o artigo conclui que um foco de pesquisa sobre moluscos sugere laços mais amplos com a história do Atlântico Sul.

Palavras-Chave: Manguezais; Habitat Humano; Moluscos Comestíveis; Litoral do Brasil; Diáspora Africana; História do Atlântico Sul.

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