



4-1-2016

Amazonian Civilization?

David Wilkinson

Follow this and additional works at: <https://scholarsarchive.byu.edu/ccr>

Recommended Citation

Wilkinson, David (2016) "Amazonian Civilization?," *Comparative Civilizations Review*: Vol. 74 : No. 74 , Article 7.
Available at: <https://scholarsarchive.byu.edu/ccr/vol74/iss74/7>

This Article is brought to you for free and open access by the All Journals at BYU ScholarsArchive. It has been accepted for inclusion in *Comparative Civilizations Review* by an authorized editor of BYU ScholarsArchive. For more information, please contact scholarsarchive@byu.edu, ellen_amatangelo@byu.edu.

Amazonian Civilization?

David Wilkinson
dow@ucla.edu

ABSTRACT

Was there a pre-Columbian civilization, properly so called, in the Amazon River basin of South America? Civilizations imply cities. The earliest Spanish expedition reported the existence of Amazonian cities; later, however, no such cities were found. Mid-twentieth-century archaeologists considered that cities could not have been sustained in the Amazon basin. But toward the turn of the century, opinions began to shift. As of 2015, it appears that civilizationists have one more case to contemplate and compare.

Amazon Civilization

Before the arrival of Iberian explorers, conquerors and colonists, was there in the Amazon River basin of South America a civilization, properly so called, and separate from, not merely an outcropping of the Andean civilization? Opposing viewpoints, based on documentary and physical evidence and probabilistic reasoning have been vigorously asserted.

The period in question is the pre-Columbian (or for Brazilians pre-Cabralian) era before and up to 16th and 17th century contact with Amazonia by Spanish and Portuguese explorers, missionaries, conquistadors, colonists, and *bandeirantes* (gold-seekers and slave-raiders).

The space in question, the Amazon River basin, is an area of about 2 and ½ million square miles, nearly 7 million km², mostly having a humid semi-hot equatorial climate and covered by vegetation of a tropical wet evergreen forest or tropical rain forest type (FAO-UNESCO 1971, 15-17, 22-24).

The key question for civilizationists is: were there Amazonian cities before European contact? “Civilizations” require “cities,” and “cities” are the defining feature of “civilizations.” (Wilkinson, 1992, 1993, 2008) And by “cities,” we mean 4th magnitude settlements, i.e. settlements with a population of not less than the order of 10⁴ (~10,000; see Appendix A for detail). If there were “cities” in the Amazon basin when European explorers first examined it, there was “civilization” there, and perhaps a distinct and separate civilization—or more than one.

Did Amazonian cities exist? If we were to go only by the earliest reports of Spanish and Portuguese expeditions—the expeditions of Francisco do Orellana (1541-1542), Pedro de

Ursúa (aka Orsúa; 1560-1561), and Pedro Teixeira (1637-1639), the answer would certainly have been in the affirmative.

The first reports of Amazonia derive from the Orellana expedition of 1541-1542. Francisco de Orellana (1511-1546) became the leader of a Spanish detachment that followed the Coca River (now in eastern Ecuador) downstream to its confluence with the Napo, and the Napo to its own confluence with the Amazon. The Orellana expedition then navigated the Amazon to its estuary at Marajó Island, and then followed the Atlantic coast northward to Venezuela, terminating there after many observations and vicissitudes.

The “observations” noted settlements and peoples, among them “Amazons,” i.e. women warriors. The “vicissitudes” included gifting, trading and robbery by the expeditionaries and gifting, flight and resistance by the riverbank dwellers.

The next Amazon expedition downriver was that of Pedro de Ursúa (1526-1561), which departed Quito in 1560. Ursúa was assassinated by the infamous Lope de Aguirre (?-1561). Ursúa was succeeded by Fernando de Guzmán, likewise assassinated by Aguirre, who replaced him, rebelled against Spain, proclaimed himself a traitor and the “Wrath of God, Prince of Freedom, King of Tierra Firme,” and was at last put down and killed while attempting to conquer northern South America. There followed a long interval until the far more placid upriver-and-back Portuguese expedition (1637-1639) of Pedro Teixeira (d. 1641), which avoided drama and acquired knowledge.

The three expeditions differed from one another in significant ways. Orellana’s expedition was unprepared, impromptu and arguably mutinous. It had been detached from a larger expedition led by Gonzalo Pizarro, and tasked with foraging and resupply of food, but instead set off on its own. Ursúa’s was better prepared, but distracted by its high drama, murders, wanderings and rebellion. Teixeira’s was best prepared, with 47 canoes sent upriver filled with 1200 men, women and boys, plus arms, ammunition, food and trade goods (Acuña 1859, 55; Hemming, 230).

Each of the expeditions had its chronicler, and each chronicler had his own outlook, disposition and competence. The observations of the Orellana expedition were reported by its Dominican chaplain, Fray Gaspar de Carvajal (c. 1500-1584), with two published versions (both in Carvajal et al., 1934). Official reports of the Ursúa expedition do not exist, but survivors like Francisco Vázquez and one Capt. Altamirano told tales of its harrowing misadventure (Vázquez, 2007; Altamirano, as included in Vázquez de Espinosa, 1942). The downriver return leg of the Teixeira expedition was recounted by the Jesuit expeditionary Father Cristóbal Diatristán de Acuña (1597 – c. 1676) and published in Markham et al. in 1859. (See Appendix B for the various editions of the expeditionary accounts.)

Carvajal's narrative dwells upon the alternating experiences of starvation and glut. The narrative of Vázquez is preoccupied with what Clements R. Markham calls "the sanguinary career of the mad demon Lope de Aguirre" (Simón et al., 1971, liii). Altamirano focuses on observations of potential military relevance; Acuña records natural history, anthropology and fluvial geography, while burbling of the plenitude to be seen enroute, and on Amazonia's potential for profitable exploitation.

So what have the explorers to say of Amazonian cities?

Carvajal repeatedly notes riverbank settlements. For a civilizationist, one most intriguing observation by Carvajal is: "there was one settlement that stretched for five leagues [12.5-20 mi] without there intervening any space from house to house" (1934: 198). (By way of comparison, Manhattan Island is 13.4 miles long.)

Carvajal saw another settlement with many "fine highways" to the inland country, one highway so wide as to deter the Spaniards from following it for fear of what might be found at its terminus (1934: 200); and yet another settlement (202) "that must have been more than two leagues long" (5-8 mi) with "many roads leading into the interior" (203).

Myers et al. (2003:15) suggest "perhaps 10,000 inhabitants" for this last settlement, which would make it city-size, hence part of a civilization.

Acuña writes as an enthusiast and a promoter. He glorifies Amazonia, extolling the "famous river of Amazons, which traverses the richest, most fertile, and most densely populated regions of Peru," dispraising by comparison the Ganges, the Euphrates and the Nile: "the river of Amazons waters more extensive regions, fertilizes more plains, supports more people, and augments by its floods a mightier ocean" (1859: 61). He speaks of "an infinity of Indians" (81) and, in the domain of the Omaguas, which extended for 200 leagues (500-800 miles), settlements "so close together, that one is scarcely lost sight of when another comes in view" (95).

Regrettably, neither Carvajal nor Acuña offers estimates of the population size of the long, dense, narrow onshore settlements they observed, mostly while floating by. And Acuña, perhaps justifiably fearing skeptical denunciation as a hyperbolist, does add the caution that the breadth of that Omagua province "seems to be small, not more than that of the river" (95). Such riverside settlements might then have amounted to no more than strung-out villages or towns.

Here the more quantitative observations of Capt. Altamirano seem most helpful. Altamirano notes a settlement he—but nobody else--calls Los Paltas. (Amazonian travelers did not agree on the names of the settlements they passed; see Appendix C). Los Paltas had a population "over 2,000" (Vázquez de Espinosa, sec. 1201). In the province of Cararo, there was a settlement, "very extensive, of over 8,000 Indians" (sec. 1202). Later, Altamirano reports on Arimocoa, "another fine large settlement with more than 6,000

Indians,” including over 2,000 warriors (sec. 1204); and in the province of Machifaro, there were “more than 10,000 Indians” (sec. 1205). Unfortunately there is an ambiguity in Altamirano’s account of Cararo and Machifaro, for it is not clear whether in these cases “province” means “settlement” or “a district containing a settlement”; but for Arimocoa, the population estimate is clearly that for the settlement.

This would seem decisive: if we credit Altamirano, whom Carvajal and Acuña in no way contradict, there was in Amazonia at least one city—small, but within city-size bounds—and there may well have been several. If we believe the travelers, Amazonia contained a civilization.

How could such an Amazonian civilization subsist? Again, we must inspect the travelers’ reports. At Cararo, says Altamirano, Ursúa was given over 50 canoes loaded with “fish, corn, yams, and peanuts” (Sec 1202). “They had much delicious fruit in great abundance, like Zamora figs, aguacates [avocados], sapotes, jobos or plums, lugmas, mammees, and sweet potatoes in quantity, and peanuts, a sort of cereal which grow in Peru on a vine like chickpeas; they are like pine nuts, very sustaining and good to eat” (Sec. 1203).

There is also the enthusiastic eyewitness testimony of Acuña: “[O]f the river of Amazons it may be affirmed that its banks are a paradise of fertility, and if the natural riches of the soil were assisted by art, the whole would be one delightful garden.... [T]he river is full of fish, the forests of game, the air of birds, the trees are covered with fruit, the plains with corn, the earth is rich in mines...” (62).

Acuña rhapsodizes over the maize, yucca/manioc (as food and as base for a liquor), plantains, pineapples, guavas, chestnuts, coconuts, potatoes, fish, manatees, captive turtles, electric eels, tapirs, pigs, deer, guinea pigs, cotias (agoutis), “guanans,” “yagois,” partridges, “domestic fowls,” ducks, other water fowl, and wild honey (65-73).

Carvajal is more restrained, but still notes that, as the Spaniards proceeded downriver, they found food, whether gifted or looted, even if only intermittently between episodes of hunger and privation (cf. Carvajal et al., 1934: 200); in one place or another, abundant “meats, partridges, turkeys, and fish of many sorts” (175); “turtles and parrots in abundance” (180); “turtles... manatees and other fish, and roasted partridges and cats and monkeys” (182); “turtles in pens and pools of water, and a great deal of meat and fish and biscuit...in such great abundance that there was enough to feed an expeditionary force of one thousand men for one year” (192); “pineapples and [avocados] and plums and custard apples and many other kinds of fruit” (203); fish drying “to be transported into the interior to be sold” (207); “turtles...turkeys and parrots...bread and maize” (210); maize, oats “and very good wine resembling beer” (211); a tapir (230); snails and crabs (231); yams and maize (232).

The 18th century French geographer and scientist-traveler Charles-Marie de la Condamine traveled downstream in 1743-1744. Condamine’s report is consistent with its predecessors as to Amazonian fisheries: “the lakes and marshes which occur at every step along the

banks of the Amazons, and, occasionally, at considerable distance inland, are filled with fish of every kind at the time of the annual inundations; and when the waters fall, they remain in these, as in so many natural reservoirs, where they are caught with the utmost ease" (1813: 245).

These testimonials would seem sufficient. With eyewitnesses reporting the size of settlements and the wealth of surplus food available to support dense populations (and social complexity), there could be, and apparently there was indeed, pre-Columbian civilization in the Amazon basin.

But serious doubts later arose. Later reports spoke of smaller populations and weaker societies. The Jesuit Padre Samuel Fritz (1654-?), who preached to the Omaguas from 1686 to 1704 and founded 38 Amazonian missions from 1686 to 1715, noted on a map of 1707 that 39 Jesuit settlements contained only 26,000 people among them (1922:150). Fritz's work was mainly concerned with advising these small weak village communities on how to retreat and regroup upriver to evade continual Portuguese slave-raiding (1922, *passim*). Later visitors such as Condamine reported no cities, armies or navies in Amazonia, though Condamine left room for a different past, referring to the Omaguas as "a people formerly powerful" (1813: 225). "On the immediate banks of the Marañon there is [sic] now no warlike tribes inimical to Europeans, all such having either submitted or withdrawn themselves to the interior..." (229). Indeed, even as early as Acuña's travel the Amazonians showed no military mobilization nor demonstrations nor disposition to fight the Europeans, but fled their coming instead (1859: 80).

And critics focused on Carvajal's description of fighting "Amazons" to paint the expeditionaries as fabulists or dupes (Medina, 1934: 25-26). This seems unfair. Condamine (1813: 232-235) enquired regarding a tribe of women without men; he encountered no such tribe, but found abundant and persuasive word of a past or perhaps faraway female tribe who traded in greenstone jewels, while casually noting in passing that women of America "often accompanied their husbands to war" (234), while Samuel Fritz had noted that "In former days the Jurimaguas had been very warlike and masters of almost the whole River of the Amazon; and their women (as I have heard) fought with arrows, as valiantly as the Indians" (1922: 60). Carvajal's direct observation cannot be dismissed out of hand. He carefully distinguishes what he saw--women who fought (1934: 214-215, 434), from the reports he heard and passed along (220-222, 437-438).

More dangerous to the credibility of the explorers' accounts were the meticulously careful and systematic researches of 20th-century cultural-ecologist archaeologists who came to doubt that large-scale settlements and societies could ever have existed in Amazonia, which they pronounced a "wet desert" (Mann, 1491: 285-288). Differences of opinion on the maximum sizes of Amazonian settlements became most pointed in the late 20th century. Weighing heavily on the side of skepticism are, especially, the judgments of Betty Jane Meggers (1921-2012) and Clifford Evans (1920-1981).

The mid-20th century work of Meggers and Evans focused on Marajó Island, in the Amazonian estuary. Marajó Island is about the size of Switzerland, and contains a number of noteworthy sites, especially in its northeastern area, where the complex pre-Columbian mound-building “Marajoara” culture or “phase” flourished for about a millennium.

The Marajoara researches of Meggers and Evans led them to the conclusion that Amazonian Tropical Forest ecology—resting upon soils of very limited fertility and productivity—could at best sustain slash-and-burn agriculture with long fallow years between croppings, and therefore could support only town-size settlements of ~1000 people. The “Marajoara phase” was seen as the intrusion of an advanced, non-Tropical-Forest culture, which overtaxed the environment and perforce declined to the locally sustainable level (Meggers and Evans, 1957: 21, 26-32, 605-606).

Further grounds for doubting the reports of the travelers were provided by bitter economic experience. Thinking like a developer or promoter, Acuña had waxed poetic over the value of Amazonian wood, over the prospects for profitable cultivation of timber, coconuts, tobacco, and sugar, among others (75-77); and over the prospects for gold and silver (78-79). Grand schemes of development such as Acuña had projected were in due course attempted, but provided only most educational and disappointing examples of unsustainable development, invariably issuing in degradation, abandonment or collapse. Bubble empires of rubber, of wood-pulp, of cattle-pasturage (Smith 1990: 326-330) rose and fell or absconded. Drawing from these sorry tales, Meggers challenged Acuña’s developmentalist optimism as a pipe-dream. Meggers made an eloquent case for the constraining character of Amazonian ecology:

Since this close correlation does exist between the increased productivity of agriculture and progressive cultural development, and agricultural productivity depends upon the potentiality of the natural environment, we can rephrase the statement that culture is dependent on agriculture to read that *the level to which a culture can develop is dependent upon the agricultural potentiality of the environment it occupies*. As this potentiality is improved, culture will advance. If it cannot be improved, the culture will become stabilized at a level compatible with the food resources (Meggers, 1954: 815).

The conclusion seems unavoidable that there is a force at work to which man through his culture must bow. The determinant operates uniformly regardless of time, place (within the forest), psychology or race. Its leveling effect appears to be inescapable. Even modern efforts to implant civilization in the South American tropical forest have met with defeat, or survive only with constant assistance from the outside. In short, the environmental potential of the tropical forest is sufficient to allow the evolution of culture to proceed only to the level represented by the Tropical Forest culture pattern; further indigenous evolution is impossible, and any more highly evolved culture attempting to settle and maintain itself in the tropical forest environment will inevitably decline to the Tropical Forest level (Meggers, 1954: 809).

This is powerful reasoning, hard to contravene. And Meggers' later and very influential book *Amazonia: Man and Culture in a Counterfeit Paradise* (1971) expanded her 1954 argument, carefully examined Amazonian subsistence potentials, and further buttressed the case for significant ecological limitations having severely constricted pre-Columbian population density and social complexity (Mann, 1491: 288-292). It is summed up in Meggers' bold and intellectually influential thesis: "Amazonia is a counterfeit paradise rather than a land of unrealized promise" (1971:120).

Considerations of Amazonian subsistence constraints provided the evidence and the reasoning that lay behind this declaration. Approximately 2% of Amazonia was "várzea" or floodplain of a silt-depositing "whitewater" river, while the rest was "terra firme," the interfluvial zone of land not subject to annual inundation, or in the drainage of sterile blackwater or clearwater rivers (1971: 14). The subsistence resources of the narrow "várzea" were only abundant between the annual inundations (4, 27-34), while those of the vast were always available but always scant (4, 14-27).

The soils of the terra firme were blamed for its low productivity. The predominant Amazonian soils of the terra firme are the so-called "ferralsols" (per the UN Food and Agriculture Organization, FAO), aka "oxisols" (per the US Department of Agriculture) or "laterites" (per their first taxonomist, Buchanan-Hamilton). Ferralsols, tropical and subtropical soils of humid areas, are noticeably prominent in the Amazon Basin (and the Congo Basin). These ferralsols are old, deep, long-weathered, and strongly leached, high in oxides of iron and aluminum, but with low nutrient content and quite infertile, since both organic material and soluble minerals have been sent far down or cooked off or washed out.

Ferralsols have served well when cut into bricks and used to build roads and temples; or when treated as ores for the recovery of nickel and aluminum. But ferralsols are rather unwelcoming for agriculture. As per FAO-UNESCO (1971), "In the Amazon only small areas of Xanthic [yellow] Ferralsols are in use for shifting cultivation....Yields are very low.... Under the present shifting cultivation system, various annual crops can be grown for a short period, but because of the low fertility yields they decrease rapidly [sic] and a long fallow period is necessary for restoration (1971:110).

In Meggers' view, the limitations of both environments placed narrow limits on population sizes. In particular, the more generous várzea was subject to sudden depletions of its otherwise paradisiacal food supply, which greatly restricted its carrying capacity: on the várzea, "six months of superabundance alternate with six months of relative privation" (146). Várzea settlements' populations would typically have been 500-700 on average, despite one report of a settlement as large as 2500 (34, 142-143). "The environmental imperatives ruled out the possibility of intensification of both [terra firme and várzea] patterns, and in so doing eliminated Amazonia as a potential cradle of higher civilization" (146).

So we encounter a deep contradiction. The explorers found dense settlements; but dense settlements could not have existed because they could not have subsisted. For the explorers, there was a civilization; for the ecologists, there could not have been a civilization!

But toward the end of the 20th century, the archaeological pendulum began to swing back toward crediting the early explorers' accounts. Even Meggers had passed on without comment a report by Mauricio de Heriarte (fl. 1662) that the capital of the Tapajós (at today's Santarem) could field 60,000 warriors (1971: 133). Any such number of militia would by Chandler's (1987: 8-9) comparative-civilizational standards have implied an urban population of 300,000 to 360,000! Perhaps we should suppose that the force was in fact recruited from the entire state, or protostate, rather than the city. Regardless of this remarkable outlier, but consistently with the Carvajal-Acuña vision of an "abundant Amazonia," late 20th century researchers, led by Anna Curtenius Roosevelt (1946-), rejected the settlement size-limits defended by Meggers and Evans (and later by Meggers alone). In the first major work along this line, Roosevelt avers that the multimound Marajó site Os Camutins "is likely to have had a population of more than 10,000 people" (Roosevelt, 1991: 38). And, using G.R. Willey's size-ranges, Roosevelt declares that the largest multimound Marajoara sites are "definitely in the range for cities, 5000 and upward" (1991:39). Roosevelt also applies comparative-civilizational criteria in contending that "some sources" (only Meggers is mentioned) describe as small temporary villages prehistoric Amazonian settlements whose tens of hectares of densely occupied area dwarf the approximately 10 to 20 hectare areas of early "cities" of Formative Mesoamerica and Mesopotamia (Roosevelt 1991: 16-17).

If Roosevelt is correct, there had existed a civilization with a city at Marajó. If Meggers is correct, there should not have been such a city, at least not a sustainable one.

Meggers did not accept Roosevelt's conclusions. Reviewing *Moundbuilders*, Meggers declared "This book is remarkable both for its thesis that prehistoric urban civilizations developed in the Amazon and for the polemical tone in which the argument is made.... If Marajó and other parts of Amazonia once supported dense urban populations, they can do so again. ... [T]his conclusion contravenes both the voluminous environmental data collected during the past two decades and the consequences of varying efforts at 'development'..." (Meggers, 1992: 399-400).

But Roosevelt persevered in the propagation of her alternative explanation. In late Amazonian prehistory "some settlements held many thousands of people.....from several thousands to tens of thousands of individuals or more" (Roosevelt, 1993:259-260). "In Amazonia, non-state societies appear to have organized large, dense populations, intensive subsistence adaptations, large systems of earthworks, production of elaborate artworks and architecture for considerable periods of time. The more centralized and hierarchical of these societies had developed more ritual and material culture related to conflict, and had a heavier impact on their environments" (Roosevelt, 1999). All these features are so notoriously associated with civilizations that they have sometimes been treated as defining

features for “civilization” itself; though this goes too far, certainly each such feature discovered in Amazonia suggests or favors the existence of a concentrated population, and adds to the plausibility of the case for a pre-Columbian Amazonian civilization.

Others have come to concur with Roosevelt. Whitehead concludes that “we are dealing with civilizations of considerable complexity, perhaps even protostates” (1994:48). And Heckenberger et al. affirmed the likelihood of “lost civilizations” somewhere in pre-Columbian Amazonia (2001:332).

Evidently, to address the contradictions in the sources and among the authorities, one must ask, if there were Amazonian cities, where did they go? And, if there were Amazonian cities, how could they have subsisted, given the bad soils of the terra firme and the annual drowning of the floodplain?

The first objection is addressed by the growing scholarly consensus (e.g. Porro, 1994:81) that, during, after and as a consequence of Spanish and Portuguese penetration of the Amazon, established populations dispersed and crashed over a period of several centuries.

Thomas P. Myers (1988) has examined the reports of chroniclers and travelers to document more than 30 epidemics—smallpox, measles, and other outbreaks--some “on a massive scale”—in 16th-18th century South America. From his sources, Myers has derived estimates of two-century depopulations as high as 99%. As he suggests, “This may have been the reason why the missionaries later transmitted the idea of a relatively uninhabited Amazon region. The people they found were the survivors of the diseases and epidemics.” So, concludes Myers, the societies they encountered were reduced in size and simplified in character, as compared to those observed by Orellana. A small city of 10,000 that loses 99% of its inhabitants becomes a village of 100, that can do far less—and live on far less. (Others see disaster too, but less—e.g. Schaan, 2012: 188 estimates an 80% decline.) And we may note that while Carvajal (1934: 198) saw an Amazonian settlement 5 leagues long, Acuña a century later said that “the largest village that we met with on the whole river” was only somewhat longer than a league and a half (1859: 106). And Myers finds evidence of very substantial depopulation between the Orellana and the Teixeira expeditions (1988: 76-77).

Furthermore, riverine concentrations of population were likely selectively reduced both by *bandeirante* slave-raiding, and by fear of slave-raiding, as survivors of the raids fled inland to less accessible but also less welcoming territories, whose ecological poverty forced the refugees to disperse in order to survive free. (Samuel Fritz was constantly concerned to manage refugees and relocate and merge victimized communities.)

But if settlement sizes were certainly very much reduced post-contact, their pre-contact sizes can only be discussed within the limits of the available evidence—which must include the earliest accounts. What then of the alleged unsustainability of civilizational economic development? How could even a small Amazonian city manage to subsist?

It is unquestioned that the floodplains were abundant between annual floodings. Acuña mentions cultivated uninhabited Amazon islands: “These islands are flooded by the river every year, and are so fertilized by the mud which it leaves behind, that they can never be called sterile” (65). Meggers speaks of “six months of superabundance” (1971: 146). But what of the “six months of relative privation” (ibid.), the flood “winter”? Could adequate food reserves have been stored seasonally? Or could the terra firme have supported communities during the seasonal floodings? Meggers thought not.

Given the seasonality of Amazonian plenty and shortage, and the difficulty of preserving seasonal surpluses in tropical heat and humidity, Meggers suggested that to sustain “a population of 100,000 or more for nearly a millennium” on seeds-and-fish diet (these being the predominant Marajoara plant and animal residues reported by Roosevelt) “would seem to require perennially repeating the miracle of the loaves and the fishes” (Meggers, 1992:402). “[N]either fish nor game can be kept more than a week, and then only if continuously exposed to smoke” (1996: 195).

The problem of food storage in a hot, humid environment which promotes food spoilage, while seasonal floods stop daily harvesting, is a real one. It should be noticed that Orellana’s expedition was overtaken by the annual Amazonian inundation in May, after its visit to Aparia and before its arrival at Machiparo; before that point they had received generous gifts of food, while afterward they had to fight and loot to eat (Carvajal et al. 1934: 192, 421). If the fighting is evidence of food shortage, however, the successful looting must be treated as evidence of successful food storage!

Where might food be stored for consumption during the inundations? The floods often produced flood basins banked by higher levees, which could serve as dwelling sites. Denevan (1996) argues that most Amazonian settlement was not in the floodplain but rather on the valley-side bluff tops adjacent to active river channels; these would provide a location for winter food storage, if technology allowed. Did it?

Apparently it did. The travelers’ reports provide us with some information on food storage methods. During the inundation season, Orellana’s men found in one village “a great quantity of maize in hampers...buried in ashes that it might keep” (432). Acuña notes that yuca/manioc roots were collected and buried, to be recovered after the inundations had subsided, while baked yucca cakes would last for many months (66). And modern researchers (Heckenberger et al, 2001: 330) have noted that in the Upper Xingu (an Amazon River tributary), manioc was stored in silos holding hundreds or thousands of kilos.

As regards caloric food storage, we might usefully reflect on the transformation of bread to beer and grapes to wine from the 5th millennium BC in Egypt, Mesopotamia, and Armenia, and of millet and rice to alcoholic beverages in Neolithic China, as a vehicle not only for festive occasions but for food preservation. The Amazon basin had its own alcoholic beverage: *chicha*. *Chicha* was derived from manioc and maize (Carvajal et al., 1934: 205,

398, 427). One wonders whether the hundred-gallon jars found by Carvajal in “Porcelainville” (1934; 201, 425) were not meant to be storage containers for *chicha*; certainly Acuña (66-67) mentions large earthen jars, hollowed tree limbs, and bitumen-smearred woven vases as the liquor-storage vehicles.

Protein storage was also reported, notably in the form of captive turtles. During the inundation, Orellana’s expedition found (and looted) turtle pens and pools (Carvajal et al., 192, 421). Altamirano tells us of Arimocoa: “there were a number of enclosures with over 4,000 turtles in them; they catch them in summer in the river and put them in these enclosures to eat during the winter.... (Sec. 1204). (As Acuña points out, Amazonian “winter” is not a cold season but the time of the rising of the waters that impedes the harvesting of seeds and fruits: 73.) Acuña also describes the capture, penning in ponds, feeding and winter-eating of turtles (69-70). And Condamine noted river-turtles and land-tortoises, the river-turtles so abundant that they alone with their eggs would yield ample nourishment to the inhabitants of the [Amazon’s] banks, while both types could live “for months together out of the water, and without any visible nourishment” (1813: 245), thus presumably forming a living food-storage bank, just as they must have been doing when the Spanish expeditionaries committed their food-bank-robberies! As additional protein stores, Acuña mentions that toasted manatee meat would last a month, while ashes would preserve such meat throughout the year (69). And more recently, Schaan has proposed dried fish and fish-flour as well as corralled turtles as vehicles for Amazonian protein storage (2011:18, 66).

Further, the infertility of the interfluvial areas seems to have been overstated. Recent studies contend that the prevalence of lateritic soils in Amazonia has been overestimated (Quesada et al., 2011). Denevan (1996) proposes that bluffedge gardens, agroforestry, and hunting as interfluvial food sources to supplement what the floodplains provided. The expeditionaries do offer evidence of bluffedge development. At Cararo, says Altamirano, “for up and down the river banks for over 4 leagues [10-16 mi] there were fields of corn and sweet yucca and the country had an excellent climate *and was never flooded*” (sec. 1203; emphasis added). At Arimocoa, a bluff settlement 100 steps up staircases from the river, “[t]here were many savannas or prairies...i.e., meadows, and on them great numbers of deer” (sec. 1204) And Schaan argues that anthropogenic forest management, in the form of pre-agricultural gatherer selection favoring human-useful palms and fruit trees, has altered well over 10% of Amazonia over more than 11,000 years in the direction of sustainable development (2011:180-181); and given that only 2% of Amazonia is floodplain, this implies a very large area of sustainable improvement in the terra firme.

It has become increasingly well known that there were in prehistoric Amazonia soil management techniques that could build local pockets of durable high fertility by creating “anthropogenic” soils. Among the 30 soil groups in the soil classification system of the FAO (Food and Agriculture Organization) are the Anthrosols, soils that have been modified profoundly by human activities. Anthrosols cover a small but growing earth area (Spaargaren, n.d.: 2-3).

The anthrosol relevant to the issue of a past Amazonian civilization is called “Terra Preta do Indio,” or “Indians’ black earth,” a “ferralsol-hortic anthrosol.” Hortic anthrosols are those created by centuries-long monomanagement by intensive cultivation of an upper soil horizon 50 cm or more thick (hence “hortic”) atop an underlying soil (Spaargaren, n.d.: 5). In the Amazonian case the underlying soil is of the characteristic Amazonian “ferralsol” type, hence “ferralsol-hortic.” The hortic ferralsols, with gardening management, allow ferralsols to be overlain and exploited without slash-and-burn-and-fallow constraints.

As Spaargaren (n.d.: 29) and Glaser et al. (2001: 38) show, the Amazonians’ did not rest content to accept the annual fluvisol gift of the rivers. The “terra preta do indio” was the Amazonian answer to the laterite/ferralsol challenge of the interfluvial areas.

Terra preta is hortically modified by the addition of fish and animal bones, animal feces, plant residues, and, notably, high concentrations of low-temperature wood charcoal, produced by “slash-and-char” techniques, and “charged” by soaking with plant tea or urine. Some combination of accident (convenient “midden” disposal of organic wastes near the habitation of human wastemakers) and deliberate soil engineering (learned from serendipitous discovery that terra preta middens were unusually fertile) seems likely to be behind the spread of Amazonian dark earths.

Terra preta was created and maintained through intensive gardening, not extensive plantation-farming. Many sites of terra preta have been found scattered along the Amazon and its tributaries, as well as in interfluvial areas, usually well above the floodplains (Bechthold, n.d.; Glaser, 2007). So rich is terra preta agriculturally that, for good or ill, terra preta site-mining has become a local industry.

The discovery and creation of terra preta was in fact a major civilizational advance. Today this advanced and sustained soil management is currently recommended to the more soil-destructive modern global civilization (Glaser, 2007). A commercial version of its charcoal element is offered as “biochar,” and “Amazonian dark earth” has become an important research topic in itself (e.g. Lehmann et al, 2003).

It seems that the objections to taking the explorers’ claims seriously have been adequately addressed.

The answer to the (very proper) question, “if there were Amazonian cities, what became of them” would be, in two words, “recurrent catastrophes.” And the answer to the (equally proper) question “if there were Amazonian cities, how could they possibly have been sustained” will again take but two words: “exemplary agronomy.”

Given the well-supported explanations for the long sustenance and the sudden destruction of Amazonian civilization, I would conclude that we should accept the original testimonies of the expeditionaries and the later researches of Roosevelt despite the understandable skepticism of Meggers.

A reasonable concession to the Meggers critique would lead us to accept that interfluvial Amazonian populations would be sparse and any interfluvial cultivation shifting, unless and until terra preta sites evolved over time. Interfluvial population limitations before and between localized hortic soil development would be quite consistent with Capt. Altamirano's observation that when Sancho Pizarro's detachment traveled inland between rivers by road, instead of the dense riverine settlement pattern, there were very long intervals punctuated by rest stops supported by local (and perhaps shifting) cultivation of maize and yucca (Vázquez de Espinosa, 1942: sec. 1205).

Another concession to Meggers' theory seems necessary in the case of Marajó, for which the plague-collapse explanation does not work; its floreat is AD 300-1300, ending well before the European arrival (Young-Sánchez and Schaan, 2011). In Marajó, Meggers' size-limit-hypothesis still seems to resonate.

Those concessions made, we must nevertheless reasonably conclude that the existence of Amazonian civilization (duration uncertain, ending in collapse to village level c. 16th-17th century AD), supported by soil-changing activity perhaps dating to 5000 BC, should properly be accepted by civilizationists.

But was Amazonian no more than a local extension of the Andean civilization? The distance and time traveled, the food shortages and travel difficulties encountered, and the unpeopled areas traversed by the Orellana expedition as it first worked its way downstream militate against any settlements found further downstream being mere outcrops of, and thus within the political-military-diplomatic network of, the Andean civilization. It is noteworthy that most of the Amazon basin was eventually annexed by the Portuguese, traveling a long, easy distance up a broad stream whose easterly mouth they held, rather than by the Spanish, who had conquered the Pacific coast a century earlier, but to penetrate Amazonia thence had to struggle down unwelcoming canyons from their westerly position atop the Andes. Samuel Fritz (1922) objected strenuously but ineffectually to persistent Portuguese encroachment into Amazonia, territory Spanish by treaty but not by effective occupation. Despite Fritz's representations and good reception by the Spanish authorities in Peru (1922: 12), "the burning question of the disputed boundary was quietly shelved;" i.e. the Spanish Viceroy in Lima declined to fight for the Amazon basin. The decision was logistically defensible. Condamine later noted that the snow-capped Cordilleras of the Andes were "passable for but a few months in the year" (1813: 214), rendering communication from the west to the Amazon so little practicable that the inhabitants of the western Amazon were "effectually as much divided [from Quito] by the Cordilleras as by a sea a thousand leagues in breadth" (230). Clearly, Amazonian civilization was not a mere extension of Andean.

And a further conclusion is then, of course, that it is necessary to add "Amazonian civilization" to our rosters of civilizations.

Consequently, comparative-civilizational research into the Amazon may properly be added to its archaeological research agenda. And civilizational research has its own problematique.

For instance: civilizations commonly display cores and peripheries, which show uneven and unbalanced development (Quigley, 1961: 81-87; Wilkinson, 1991). Can we distinguish such in Amazonian civilization? Where, and how differentiated? Carvajal's centrally located Machiparo-Omagua-Paguana-Amazon states with their militaries (and militarism), frontier posts, and rural as well as urban population concentrations (Smith 1990: 65-72), suggest a multipolar core, while the quieter, more isolated and less compacted polities of Aparia the Less and Aparia the Great on the upstream west, and the less imposing though militant polities toward the estuary on the east (Smith, 54-64, 73-77), have a semi-peripheral or peripheral aspect.

Of course, civilizational cores have moved and do move over time (Wilkinson, 1991). Schaan sees the first "regional polity" as having emerged on Marajó, with Marajoara polity preceding that of central Amazonia both in coalescence and collapse (2011: 19-20, 22), a characteristic feature of the uneven development of civilizations (Quigley, 1961: 81-87).

Again: civilizations are polycultures, characterized by cultural diversity (Iberall and Wilkinson, 1993). There was plentiful diversity in Amazonian cultures, e.g. Carvajal's "Stupidville" vs. "Viciousville" (1934: 426). But what were the axes of Amazonian diversity, how sited, how explained? Mainstream river/tributaries? "Várzea" vs. "terra firme"? Upstream/downstream?

Civilizations normally contain interdependent specialists (Maxwell, 2000). Did Amazonia have such? Carvajal's "Porcelainville" suggests a specialist factory town (1934: 201-202) and Altamirano's notice of specialist trading posts and the use of Machifaro's excellent dried fish as barter currency (Vázquez de Espinosa, sec. 1205) imply that "Machifaro" was a trade-specialist province.

From Machifaro, Altamirano, under Cpt. Sancho Pizarro, journeyed inland for along a well-traveled road with tambos or taverns every 3 leagues [7.5-12 mi], with "fields of corn and yucca, and other root and field crops for the meals and provisioning of the traders and travelers who came and went from the inland provinces to trade with the natives of the Machifaro provinces and others adjoining; the barter medium was pottery and fish, which was excellent in Machifaro Province, in exchange for gold leaf and spirals and other native valuables, according to what the Indian women gave us to understand." (Sec. 1205; cf. Simón, 41, 47)

A significant problem, perhaps irresolvable on account of Amazonia's ecology: civilizations normally have systems of record-keeping and transmission through time and space, most notably writing. Had Amazonia such? Here we lack information.

A frequent attribute of civilizations is the building of public monuments, which can serve the function of historical memorialization and religious interchange. Meggers and Roosevelt drew due attention to the built mounds of Marajó (“truly monumental in scale” representing “hundreds of thousands of cubic meters of earthen construction”) Roosevelt (1991: 30). Schaan (2011: 26-27, ch. 5) has collected reports of “geoglyphs,” ring-ditch earthworks, “large-scale, spectacular enclosures” likely combining “defensive, ceremonial and agricultural” uses. And as a perhaps more familiar form of monumental architecture, we may note the solar temple and monument found by Orellana’s expedition two days downriver from the Amazon-Rio Negro junction (1934: 205, 427).

Again: civilizations are networks of trade, diplomacy, war and command-control (Wilkinson, 2002). In Amazonia, who fought whom, who dominated whom, who bordered whom? Carvajal notes a garrison village fortifications (1934: 199, 227), wars and war alliances (Machiparo and Omagua combined for defense against an inland enemy: Carvajal et al. 1934, 190; Carari sent 200 warriors downriver to attack Machiparo, which Ursúa’s Spaniards defended: Simón, 32-34), vassal-suzerain relations (e.g. Carvajal et al., 1934:205, 220). Roosevelt (1993) alleges “large-scale organized warfare” (1993:260). Schaan (2011:19) notes large polities that could maintain frontiers as far as 75 km from their power centers.

And the permanent civilizational question: what, when, where and how large were the sizes and locations and networks (economic, political, military) of the largest cities of the Amazonian civilization? (Cf. Chandler, 1987).

Attention has especially been drawn to Santarem at the Amazon-Tapajós confluence with its “relatively large, dense population” (Roosevelt, 2014:1195). Mann cites a 3 mile long by ½ mile wide terra preta concentration there, which a geographer suggests could have supported 200,000 to 400,000 people (2005: 310)--consistent with Heriarte’s report of the size of the fighting force it could muster (Meggers, 1971: 133).

The explorers’ reports contain tantalizing suggestions on all these questions, but civilizational archaeology will be needed to go beyond those suggestions in order to examine the specific research program that will distinguish the idiosyncratic and the generic features of the Amazonian civilization.

Researchers always hope to raise more questions than they answer. One may hope that this paper is conformable to that project.

Appendix A

“4th magnitude”: 4th magnitude, for base 10, centers at $10^4=10,000$, and ranges from $10^{3.5}$ to 10^4 , approximately 3,000 to 30,000, or, for the true precisionist, 3162.2776602... to 31622.776602...

“Towns” are 3rd magnitude settlements, with populations around 1000, “villages” 2nd magnitude settlements ~100.)

“League”: The “league,” a term used to represent distance, was not a fully agreed-upon or stabilized physical distance, but was probably not less than 2.5 English statute miles nor more than 4. Both extreme possibilities will accordingly be suggested side by side in this paper where a source cites “leagues.”

Appendix B

Carvajal’s narrative was partly collected in 1542 by Gonzalez de Oviedo (whose work also included statements from Orellana and other expeditionaries, but was published only in 1855). Carvajal was more fully published in 1894 by Toribio Medina, and re-edited in 1934 by H.C. Heaton, who also included Oviedo’s version of Carvajal. (Carvajal and Medina, 1894; Fernández de Oviedo y Valdés, and Pérez de Tudela Bueso, 1959; Carvajal et al., 1934)

Capt. Altamirano’s account is quoted in Vázquez de Espinosa, *Compendium and Description of the West Indies*, c. 1620 (1942). The Ursúa expedition was also chronicled by Francisco Vazquez (2007) and its history written by Fray Pedro Simón and Lucas Fernández de Piedrahita, (1624-1688) Bishop of Santa Marta and then of Panama (Southey 1821). Simón’s history mostly focuses upon the expedition’s high drama, but mentions, consistently with other sources, an Indian settlement on a narrow island: “its length was nearly two leagues” (5 – 8 mi) and it was lined with habitations” (Simón et al., 1971: 77). Altamirano has more to say on the settlements.

Acuña’s 1641 narrative (*Nuevo descubrimiento del gran Rio de las Amazonas*) is collected in Markham et al., 1859.

Appendix C

Moving downriver, Carvajal speaks of Aparia the Less, Aparia the Great, Machiparo, Omagua, Paguana, the Amazons, Couynco, Arripuna and Ichipayo (1934, *passim*). Simón speaks of Carari (25), Caricuri and Manicuri (28), and Machifaro (32). Altamirano names Los Paltas, Cararo, Arimocoa and Machifaro (Vázquez de Espinosa, secs. 1201-1205). Acuña saw Encabellados, Omagua, Curuzirari, and Yoriman, as well as many others (93-

111). (Porro 1994: 81-86) has attempted to collate these labels: Aparia=Carari=Manicuri=Acuña's Omagua; Machiparo=Machifaro=Curuzirari; Carvajal's Omagua=Yoriman.

References

- Acuña, Cristóbal de. "A New Discovery of the Great River of the Amazons." In Markham et al., 1859, 41-142.
- Aprile, Fabio, and Assad José Darwich. "Nutrients and Water-forest Interactions in an Amazon Floodplain Lake: An Ecological Approach." *Acta Limnologica Brasiliensia* 25.2 (2013): 169-82. (Web. 31 May 2015).
- Bechtold, Gerhard. Terra Preta, <http://www.gerhardbechtold.com/TP/gbtp.php> (web; retrieved 5/27/2015).
- Carvajal, Gaspar de, and José Toribio Medina. *Descubrimiento del Río de las Amazonas Según la Relación Hasta Ahora Inédita de Fr. Gaspar de Carvajal, con Otros Documentos Referentes á Francisco de Orellana y Sus Compañeros; Publicados á Expensas del Excmo. Sr. Duque de T'Serclaes de Tilly*. Sevilla: Impr. de E. Rasco, 1894.
- Carvajal, Gaspar de, José Toribio Medina, Gonzalo Fernández de Oviedo y Valdés, Bertram T. Lee, and H. C. Heaton. *The Discovery of the Amazon According to the Account of Friar Gaspar De Carvajal and Other Documents*. New York: American Geographical Society, 1934.
- Chandler, Tertius. *Four Thousand Years of Urban Growth: An Historical Census*. Lewiston, NY, U.S.A.: St. David's UP, 1987.
- Condamine, Charles-Marie de la. "Abridged Narrative of Travels through the Interior of South America." In Pinkerton, 1813, *infra*, 211-269.
- Costa, Angyone. *Introdução à Arqueologia Brasileira (Etnografia e História)*. 3rd ed. São Paulo: Companhia Editora Nacional, 1959.
- Denevan, William M. "A Bluff Model of Riverine Settlement in Prehistoric Amazonia." *Annals of the Association of American Geographers* 86.4 (1996): 654-81.
- Drennan, Robert D., and Carlos A. Uribe. *Chiefdoms in the Americas*. Lanham, MD: University of America, 1987.
- FAO-UNESCO. *Soil Map of the World: 1:5,000,000*. Vol. IV, South America. Paris: UNESCO, 1971.
- Fernández de Oviedo y Valdés, Gonzalo, and Juan Pérez de Tudela Bueso. *Historia General Y Natural De Las Indias*. Madrid: Ediciones Atlas, 1959.
- Fritz, Samuel, and George Edmundson. *Journal of the Travels and Labours of Father Samuel Fritz in the River of the Amazons between 1686 and 1723*. London: Printed for the Hakluyt Society, 1922.
- Glaser, Bruno. "Prehistorically modified soils of central Amazonia: a model for sustainable agriculture in the twenty-first century." *Phil. Trans. R. Soc. B* 2007 vol. 362 pp. 187-196. <http://rstb.royalsocietypublishing.org/content/362/1478/187> (retrieved 05/27/2015)

- Glaser, Bruno, Ludwig Haumaier, Georg Guggenberger, and Wolfgang Zech. "The 'Terra Preta' Phenomenon: A Model for Sustainable Agriculture in the Humid Tropics." *Naturwissenschaften* 88.1 (2001): 37-41 (retrieved 5/31/15).
- Heckenberger, Michael J., James B. Petersen, Eduardo Góes Neves, and Eduardo Goes Neves. "Of Lost Civilizations and Primitive Tribes, Amazonia: Reply to Meggers." *Latin American Antiquity* 12.3 (2001): 328-333.
- Hemming, John. *Red Gold: The Conquest of the Brazilian Indians*. Cambridge, Mass.: Harvard University Press, 1978.
- Iberall, Arthur, and David Wilkinson. 'Polycultures' and 'Culture-Civilizations.'" 28 *Comparative Civilizations Review*, Spring 1993: 73-79.
- Lehmann, Johannes, Dirse C. Kern, Bruno Glaser and William I. Woods, eds. *Amazonian Dark Earths: Origin Properties Management*. Dordrecht: Kluwer Academic Publishers, 2003.
- Mann, Charles C. *1491: New Revelations of the Americas before Columbus*. New York: Knopf, 2005.
- Markham, Clements R., Garcilaso de la Vega, Antonio de Herrera y Tordesillas, and Christóbel de Acuña. *Expeditions into the Valley of the Amazons, 1539, 1540, 1639*. London: Printed for the Hakluyt Society, 1859.
- Maxwell, Ross R. "Civilization and Interdependent Specialists: Cooperative Systems, Symbioses, Moral Syndromes, and a Sense of Wholeness." 43 *Comparative Civilizations Review* (Fall 2000): 33-62.
- McConnell, Anita. "La Condamine's Scientific Journey down the River Amazon, 1743-44." 48 *Annals of Science* no. 1 (1991): 1-19.
- Medina, José Toribio. "Introduction." In Carvajal et al (1934): 7-163.
- Meggers, Betty J. "Environmental Limitation on the Development of Culture." *American Anthropologist* 56.5 (1954): 801-24.
- Meggers, Betty J. "Review of Anna Curtenius Roosevelt, Moundbuilders of the Amazon: Geophysical Archaeology on Marajo Island, Brazil." *Journal of Field Archaeology*, vol. 19, no. 3 (Autumn, 1992): 399-404.
- Meggers, Betty J. "Review of Anna Roosevelt, ed. *Amazonian Indians from Prehistory to the Present: Anthropological Perspectives*." *The Journal of the Royal Anthropological Institute* 2.12 (1996): 194-196.
- Meggers, Betty Jane. *Amazonia: Man and Culture in a Counterfeit Paradise*. Chicago: Aldine/Atherton, 1971.
- Meggers, Betty Jane, and Clifford Evans. *Archeological Investigations at the Mouth of the Amazon*. Washington DC: U.S. G.P.O., 1957.
- Myers, Thomas P. "El efecto de las pestes sobre las poblaciones de la Amazonía Alta." *Amazonía Peruana* 8:15 (1988). [Volume spine says vol. IX]
- Myers, Thomas P., William M. Denevan, Antoinette Winklerprins, and Antonio Porro. "Historical Perspectives on Amazonian Dark Earths." Ch. 2 in Lehmann et al, 2003, *supra*.
- "Orellana and the Amazons." *Athena Review* vol. 1 no. 3.
<http://www.athenapub.com/orellan1.htm>

- Peters, Charles M., Michael J. Balick, Francis Kahn, and Anthony B. Anderson. "Oligarchic Forests of Economic Plants in Amazonia: Utilization and Conservation of an Important Tropical Resource." *Conservation Biology* 3.4 (1989): 341-49.
- Pinkerton, John. *A General Collection of the Best and Most Interesting Voyages and Travels in All Parts of the World*. Vol. 14. London: Longmans, 1813.
- Porro, Antonio. "Social Organization and Political Power in the Amazon Floodplain: The Ethnohistorical Sources." In Roosevelt, ed. (1994): 79-94.
- Quesada, C. A., J. Lloyd, L. O. Anderson, N. M. Fyllas, M. Schwartz, and C. I. Czimczik. "Soils of Amazonia with Particular Reference to the RAINFOR Sites." *Biogeosciences* 8 (2011): 1415-1440.
- Quigley, Carroll. *The Evolution of Civilizations; an Introduction to Historical Analysis*. New York: Macmillan, 1961.
- Roosevelt, Anna Curtenius. "Chiefdoms in the Amazon and Orinoco." In Drennan and Uribe, (1987), *supra*, 153-185.
- Roosevelt, Anna Curtenius. *Moundbuilders of the Amazon: Geophysical Archaeology on Marajo Island, Brazil*. San Diego: Academic, 1991.
- Roosevelt, Anna Curtenius. "The Rise and Fall of the Amazon Chiefdoms." *L'Homme* 33.126 (1993): 255-83.
- Roosevelt, Anna C. "The Development of Prehistoric Complex Societies: Amazonia, A Tropical Forest." *Archeological Papers of the American Anthropological Association* 9.1 (1999): 13-33
- Roosevelt, Anna, ed. *Amazonian Indians from Prehistory to the Present: Anthropological Perspectives*. University of Arizona Press, 1994.
- Roosevelt, Anna C. "Prehistory of Amazonia." In Renfrew, Colin, and Paul G. Bahn. *The Cambridge World Prehistory*. Cambridge: Cambridge UP (2014): 1175-1199.
- Schaan, Denise Pahl. *Sacred Geographies of Ancient Amazonia: Historical Ecology of Social Complexity*. Walnut Creek, CA: Left Coast, 2011.
- Simón, Pedro, William Bollaert, and Clements R. Markham. *The Expedition of Pedro de Ursua & Lope de Aguirre in Search of El Dorado and Omagua in 1560-1*. Works issued by the Hakluyt Society, 1st ser., 28. New York: B. Franklin, 1971.
- Smith, Anthony. *Explorers of the Amazon*. London, England: Viking, 1990.
- Spaargaren, Otto. *Anthrosols (and Technosols)*. ISRIC –World Soil Information. Wageningen, The Netherlands.
http://eussoils.jrc.ec.europa.eu/events/summerschool_2005/cd_rom/SS2005_Files/2DAY/AnthroTechnosols_OSpaargaren_U.pdf (retrieved 5/27/2015).
- Southey, Robert. *The Expedition of Orsua: And the Crimes of Aguirre*. London: Longman, Hurst, Rees, Orme, and Brown, 1821.
- Teixeira, Pedro, William F. Sinclair, Donald William Ferguson, and John Stevens. *The Travels of Pedro Teixeira: With His "Kings of Harmuz" and Extracts from His "Kings of Persia."* London: Printed for the Hakluyt Society, 1902.
- Vázquez, Francisco. *El Dorado. Crónica de la expedición de Pedro de Ursúa y Lope de Aguirre*, Madrid, 2007, Alianza Editorial.

- Vázquez de Espinosa, Antonio. *Compendium and Description of the West Indies*, by Antonio Vázquez de Espinosa, Translated by Charles Upson Clark. Smithsonian Miscellaneous Collections, Vol. 102. Washington: Smithsonian Institution, 1942.
- Whitehead, Neil Lancelot. "The Ancient Amerindian Polities of the lower Orinoco, Amazon and Guayana coast: a preliminary analysis of their passage from antiquity to extinction." In: Roosevelt, ed., 1994, *supra*, 33-54.
- Wilkinson, David "Civilizations as Networks: Trade, War, Diplomacy, and Command-Control." 8 *Complexity* no. 1 (September-October 2002): 82-86.
- Wilkinson, David "Science and Civilizational Study: A Sand-Clearing procedure." 58 *Comparative Civilizations Review* (Spring 2008): 90-98.
- Wilkinson, David "Cities, Civilizations and Oikumenes II," 28 *Comparative Civilizations Review* (Spring 1993): 41-72.
- Wilkinson, David "Cities, Civilizations and Oikumenes." 27 *Comparative Civilizations Review* (Fall 1992): 51-87.
- Wilkinson, David "Cores, Peripheries and Civilizations." Christopher Chase-Dunn and Thomas D. Hall, eds., *Core/Periphery Relations in Precapitalist Worlds*. (Boulder, CO: Westview, 1991): 113-166.
- Young-Sánchez, Margaret, and Denise P. Schaan. *Marajó: Ancient Ceramics from the Mouth of the Amazon*. Denver, CO: Mayer Center for Pre-Columbian & Spanish Colonial Art at the Denver Art Museum, 2011.