



ISSUE FOURTEEN : SUMMER 2019
OPEN RIVERS :
RETHINKING WATER, PLACE & COMMUNITY



CLIMATE, CHANGE & PEOPLE

<http://openrivers.umn.edu>

An interdisciplinary online journal rethinking the Mississippi
from multiple perspectives within and beyond the academy.

ISSN 2471-190X

The cover image is a view of the Chixoy River, Guatemala. Image courtesy of Brent K. S. Woodfill.

Except where otherwise noted, this work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/). This means each author holds the copyright to her or his work, and grants all users the rights to: share (copy and/or redistribute the material in any medium or format) or adapt (remix, transform, and/or build upon the material) the article, as long as the original author and source is cited, and the use is for noncommercial purposes.

Open Rivers: Rethinking Water, Place & Community is produced by the [University of Minnesota Libraries Publishing](https://www.libraries.umn.edu/) and the [University of Minnesota Institute for Advanced Study](https://www.umn.edu/ia/).

Editors

Editor:
Patrick Nunnally, Institute for Advanced Study,
University of Minnesota

Administrative Editor:
Phyllis Mauch Messenger, Institute for Advanced
Study, University of Minnesota

Assistant Editor:
Laurie Moberg, Institute for Advanced Study,
University of Minnesota

Media and Production Manager:
Joanne Richardson, Institute for Advanced Study,
University of Minnesota

Contact Us

Open Rivers
Institute for Advanced Study
University of Minnesota
Northrop
84 Church Street SE
Minneapolis, MN 55455

Telephone: (612) 626-5054
Fax: (612) 625-8583
E-mail: openrvrs@umn.edu
Web Site: <http://openrivers.umn.edu>

ISSN 2471-190X

Editorial Board

Jay Bell, Soil, Water, and Climate, University of
Minnesota

Tom Fisher, Minnesota Design Center, University
of Minnesota

Lewis E. Gilbert, futurist

Mark Gorman, Policy Analyst, Washington, D.C.

Jennifer Gunn, History of Medicine, University of
Minnesota

Katherine Hayes, Anthropology, University of
Minnesota

Nenette Luarca-Shoaf, Art Institute of Chicago

Charlotte Melin, German, Scandinavian, and
Dutch, University of Minnesota

David Pellow, Environmental Studies, University
of California, Santa Barbara

Laura Salvesson, community member and artist

Mona Smith, Dakota transmedia artist; Allies:
media/art, Healing Place Collaborative

CONTENTS

Introductions

Introduction to Issue Fourteen By Patrick Nunnally, Editor	4
Guest Editor's Introduction to Issue Fourteen: Climate, Change & People By Lewis C. Messenger Jr. and Brent K. S. Woodfill	6

Features

Multiple Ways of Understanding Peru's Changing Climate By Rebecca Bria and Doris Walter	11
Uncovering Amazonia By Lewis C. Messenger Jr.	26
What's in My Backyard? Empowering Indigenous Voices on Firefly Creek at Blue's Bottom By Tianna M. Odegard	57
Ethnography and Archaeology of Water in the Maya Lowlands By Alexander E. Rivas and William G. B. Odum	93

Geographies

Libraries Burning By Phyllis Mauch Messenger	111
---	-----

In Review

Desert River Sea is a Vibrant, Compelling Tour of the Kimberley By Ted Snell	132
---	-----

Perspectives

An Archaeologist Writes against the Anthropocene By Brent K. S. Woodfill	139
---	-----

Primary Sources

Water and the Preclassic Maya at El Tintal, Petén, Guatemala By Mary Jane Acuña and Carlos R. Chiriboga	147
--	-----

Teaching And Practice

The Perils and Promise of Using Short-Term Media to Teach Long-Term Climate Patterns By Patrick Nunnally	167
---	-----

FEATURE

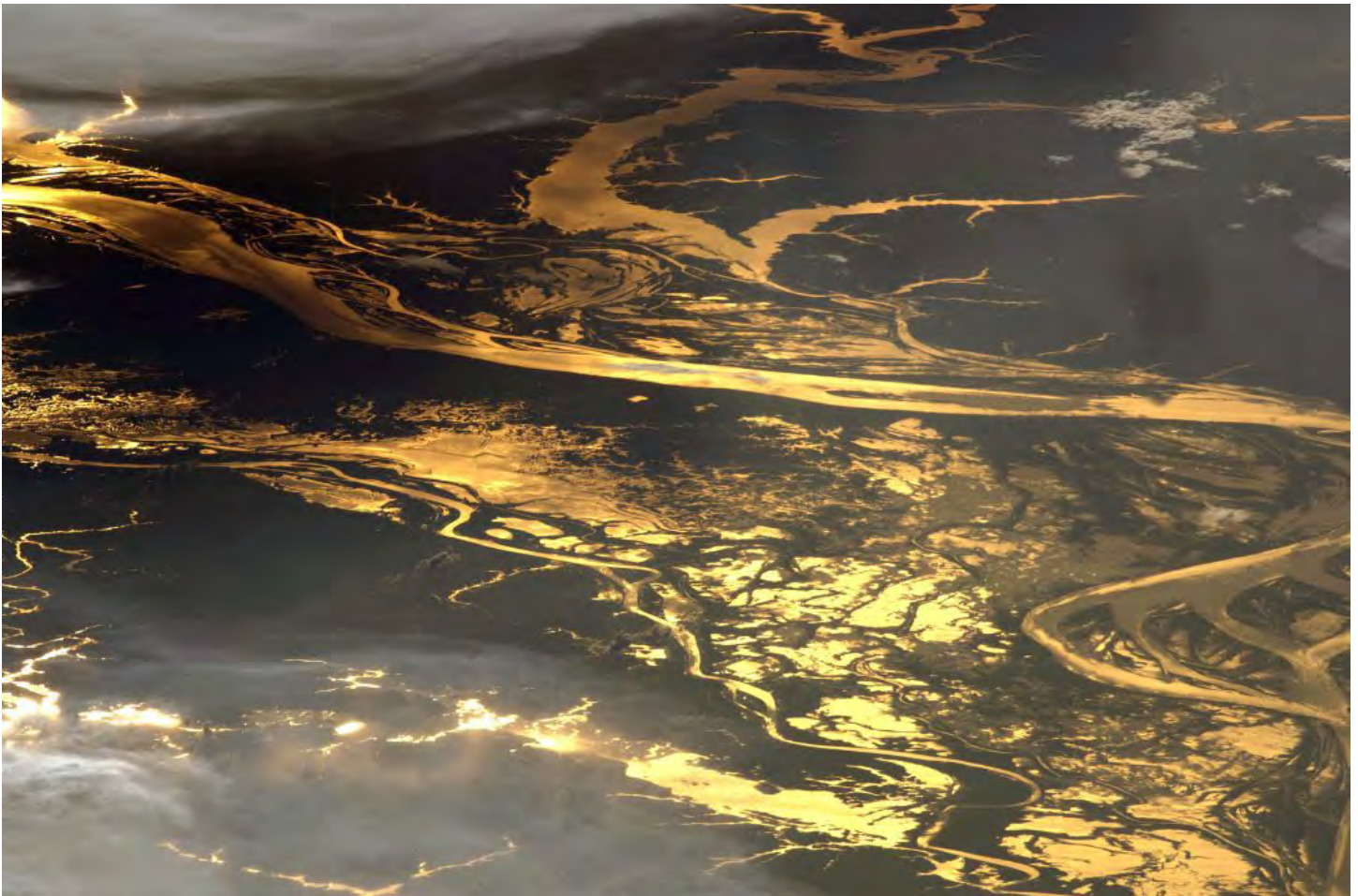
UNCOVERING AMAZONIA

By Lewis C. Messenger Jr.

“Amazonia”—the word alone can conjure up a lot of images, some accurate and some wildly not. In truth, it has many definitions, ranging from a specific drainage basin to a tropical ecological world. For most of my childhood, such kinds of tropical “jungles” were places of peril to be avoided. The very word “Amazon” conjured up Joseph Conrad’s images from *Heart of Darkness* ([1899] 2015), albeit that book was about the Congo in Africa. The tropical world itself was essentially a place to be avoided because of potential disease and predators large and

small, ranging from jaguars to leeches, to even some human groups who might try to attack you during the night while you slept.

As an anthropological archaeologist who has spent much of my life studying the tropical world and its cultures, I have come to realize that the environmental determinists who wrote off the tropics as inherently incapable of sustaining complex cultures were wrong. I have been drawn to a number of comparative questions about moist ecosystems around the globe. This began



Sun reflecting off the Amazon. Via NASA.

with my focus on the ancient Maya of Mexico and Central America, then the cultures of Southeast Asia, and in more recent years, Amazonia.

In this article we will explore the geographic and geological context of Amazonia, its role in the peopling of South America, and what we can learn from peoples of the region, both past and

present. We will look into tropical landscapes, both as they affected and reflected past cultural activities, but also as we are coming to realize, as they were increasingly the result of sophisticated human activities that left their indelible imprints ranging from soil chemistry to vast patterns of regular geometry. We will delve further into these questions in this piece.

What piqued my interest in Amazonia?

I was intrigued by the first account of a trip down the Amazon River, as written in *The Discovery Of The Amazon: According To The Account Of Friar Gaspar De Carvajal And Other Documents* (Medina 1939). My initial exposure to Carvajal occurred in a BBC video, *The Search for El Dorado* (Horizon 2002), which included a number of images as flashbacks to the original voyage under Captain Francisco de Orellana. It was quite an adventure and was clearly inspirational for Werner Herzog's film, *Aguirre: The Wrath of God* (Herzog 1972).

More recently, I acquired a reprint of the English version of the original account, written by the priest of the voyage, Gaspar de Carvajal, in 1541–1542 (Medina 1939). It presented descriptions of an Amazonian journey beginning along the Ecuadorian Napo River, a tributary, and then descending down to the main Amazon itself. Orellana's crew encounters both hostility and generosity from those peoples along the river. Luckily, Captain Orellana must have had considerable linguistic abilities because he was often able to communicate to the leaders of groups he found. This quote gives a sense of the kinds of landscapes the Spaniards were encountering.

From this village there went out many roads, and fine highways [they were], to the inland country: the Captain wished to find out where they led to, and for this purpose he took with him Cristobal Maldonado and the Lieutenant and some other companions, and

started to follow them [i.e. the roads], and he had not gone half a league when the roads became more like royal highways and wider; and, when the Captain had perceived this, he decided to turn back, because he saw that



Aguirre, the Wrath of God (1972).

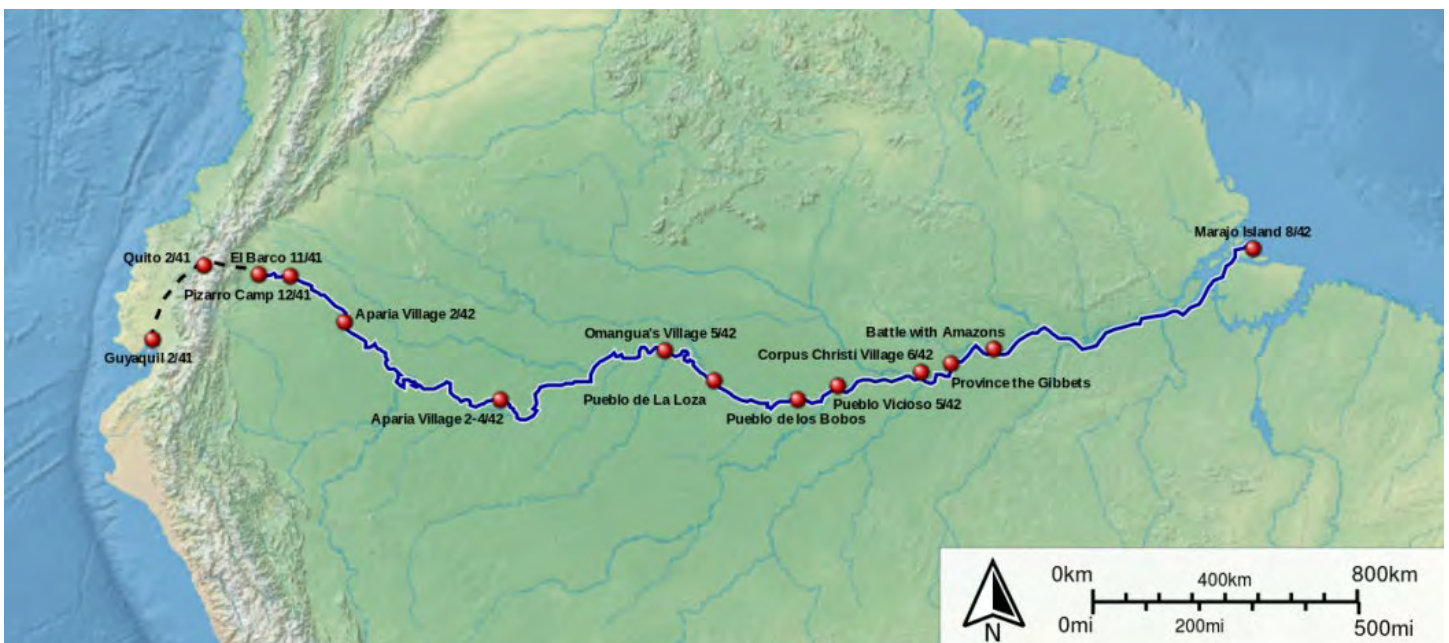
it was not prudent to go on any farther; and so he did return to where the brigantines were, and when he got back the sun was now going down, and the Captain said to the companions that it would be well to depart at once from there, because it was not wise to sleep at night in a land so thickly populated, and [he gave orders] that all embark at once; and thus it was that, with the food and all [the men] on board the brigantines, we began to move on when it was now night, and all that night we continued to pass by numerous and very large villages, until the day came, when we had journeyed more than twenty leagues, for in order to get away from the inhabited country our companions did nothing but row, and the farther we went, the more thickly populated and the better did we find the land. (Medina 1939:202; bracketed comments are as published in Medina)

Later, Carvajal talks about traveling down the river and encountering other countries with their own large villages and roads. One village was described as being two leagues long, some being continuous and less than a bow shot distance

between. One other was described as being gleaming white in the distance.

When the remainder of Orellana’s crew and Carvajal himself finally made it back to the Spanish Caribbean, they were not welcomed with open arms. On the contrary, they were treated as traitors, and Carvajal’s descriptions of the vast interior of Amazonia with its huge populations, extensive roads, powerful rulers, beautiful artwork, essentially a well-worked and productive landscape, were treated as falsehoods made up to try to cover their traitorous, mutinous activity.

It was almost a generation later that the next major Spanish explorations were undertaken down the tributaries leading to the Amazon, as well as leading up from the Portuguese territories along the Atlantic. In the sixteenth century, a German soldier and adventurer, Hans Staden, was captured by the Tupinamba, most likely somewhere along the coast of present-day Maranhão state of Brazil. He managed to avoid being killed and eaten, and later escaped and wrote an account of his experiences that became quite popular (Staden 1557, 2008). This was one



Francisco de Orellana’s Amazon River voyage (1541-1542) Based on Medelin, 1934, via ShareMap.org. (CC BY-SA 3.0).

of the initial bits of “evidence” that entered the popular media at that time and established a reputation of savagery for the Indians of tropical South America.

The issue of whether there was Indigenous American Indian savagery or not has existed for centuries, and Von Staden’s account is exemplary of the kind of approach taken to legitimize their subjugation. Beginning in the sixteenth century, accounts such as his were argued up to the Papal Courts against others, such as Bartolome de las Casas (las Casas 1566), who presented examples

of highly civilized faces of American Indian cultures. Eventually these cases resulted in Pope Paul III issuing the Papal Bull of 1537, *Sublimis Deus*, which legitimized the status of humanity for the Indians (Pope Paul III 1537).

Since the arrival of the Spaniards, there had been issues between the Church and the *encomenderos*, those *conquistadores* who had received land, and all that was on it, including resources above and below the ground, plants, animals, and the Indians, who, they argued, did not have souls and could be killed, tortured, and worked, to produce



Cannibalism in Brazil as described by Hans Staden (c. 1515–c. 1576). From “Americae Tertia Pars,” by Theodor de Bry (1592).

for the owner. *Encomienda* was a system of royal patronage granted throughout Spanish Latin America in the initial times of conquest. Along with this came the charge that Christianity had to be spread throughout those conquered lands. As hard as it is to believe today, the argument supported by the *encomendaros* was that the Indians had no souls, therefore the Church had no business trying to assert its influence or hold tracts of land.

By the time people returned to where Carvajal had made his great observations, all that was there along the banks of the great river was tropical forest and only a few beleaguered small villages. Why had this allegedly once populous landscape transformed so dramatically? Most likely smallpox and possibly other pathogens came along with the early Spanish group under Carvajal himself. Along with that, most likely came knowledge and fear of the ever-encroaching Spanish and Portuguese slavers. Whatever the causes, it seemed to be the case that by the latter sixteenth century, Amazonia lacked evidence of cultural complexity. This was in contrast to the high cultures of Mesoamerica and the Andes, for which individuals like Bartolome de las Casas could argue some degree of civilization in Papal courts. Many areas in the rest of the Americas, as well as other parts of the colonized world,

never received even this kind of advocacy until centuries later.

The apparent absence of evidence for the emergence of ancient cultural complexity has continued well into the twentieth century. American Indians throughout their homelands have been given a bum rap, and this is no less true in Greater Amazonia, where Indigenous peoples often were on the margins, but also generally marginalized from centralized national economies from the contact period onward.

Pronounced boom and bust cycles have occurred throughout Amazonia, perhaps most notably the Amazon Rubber Boom of 1879-1912. During this period, some of the cities along the central Amazon became extremely wealthy and were able to build opera houses, have electric trolleys, and become internationally “respectable.” While on the other end of the spectrum, Indian people were used to harvest the rubber on plantations, as shackled slaves in many instances. Foreign observers often wrote of their outrage at the conditions they saw and at how the Indians were treated (Hemming 2008: 212–217). Eventually all of this changed when Henry Wickham smuggled rubber tree seeds to England that eventually were sent to India, Ceylon, and finally, where they became most profitable, Southeast Asia (Hemming 2008: 195). Brazil no longer had the monopoly, and shortly thereafter, the bust ensued.

The geographic and geological context of Amazonia

When we stop to think about the activities of all of the players we have been talking about—the Spanish and Portuguese, let alone the French, Dutch, and English who also were involved at least peripherally in the northeastern corner of Greater Amazonia (the three Guianas)—the immensity of the area begins to become apparent. Greater Amazonia, or the Amazon drainage, is huge, comprising 2,722,020 sq. mi. (7,050,000 sq km), and includes parts of nine different

contemporary South American nations. Brazil alone is the fifth largest country in the world and is larger than the lower 48 of the United States. Virtually all of the countries that border on Brazil have extensive areas that are their own tropical lowland “Amazonas.” Close to one-third of Peru is tropical and Amazonian, both in its drainage and its biological makeup. Iquitos, the largest city in the Peruvian Amazonas province, is not linked by highway to the outside world; however, it receives

deep-water ships from the Atlantic. This attests to the depth and width of the Amazon that far into the continent from the ocean itself.

There is considerable topographical diversity within what we call “the Amazon.” Within this huge area there are indeed vast portions of tropical forest, but there also are areas of ranges of hills, variations in rainfall, and places where rivers make intrusions that are flanked by fingers of the Brazilian Highlands, such as the Xingu. The entire easternmost part of Brazil, referred to as their Northeast, is mostly desert, and

ecologically opposite to what one would expect of the Amazon. Therefore, one must be careful about overgeneralizing about things like weather throughout the entirety of Brazil, let alone all of the area the Amazon drainage comprises.

What was the region we now consider the Amazonian drainage like before the Andes Mountains emerged? Geologically, the Andes are similar to the Rockies in that they are being formed by the meeting of two continental plates, the Nazca Plate and the South American Plate, with the former subducting under the latter.



Map of Brazil overlaid on a map of North America, by The World Factbook.

Massive tectonic forces began to raise the Andes Mountains that we are familiar with today during the Cretaceous, about 145–65 million years ago. Essentially, this collision of major plates is producing the massive and tectonically active Andes

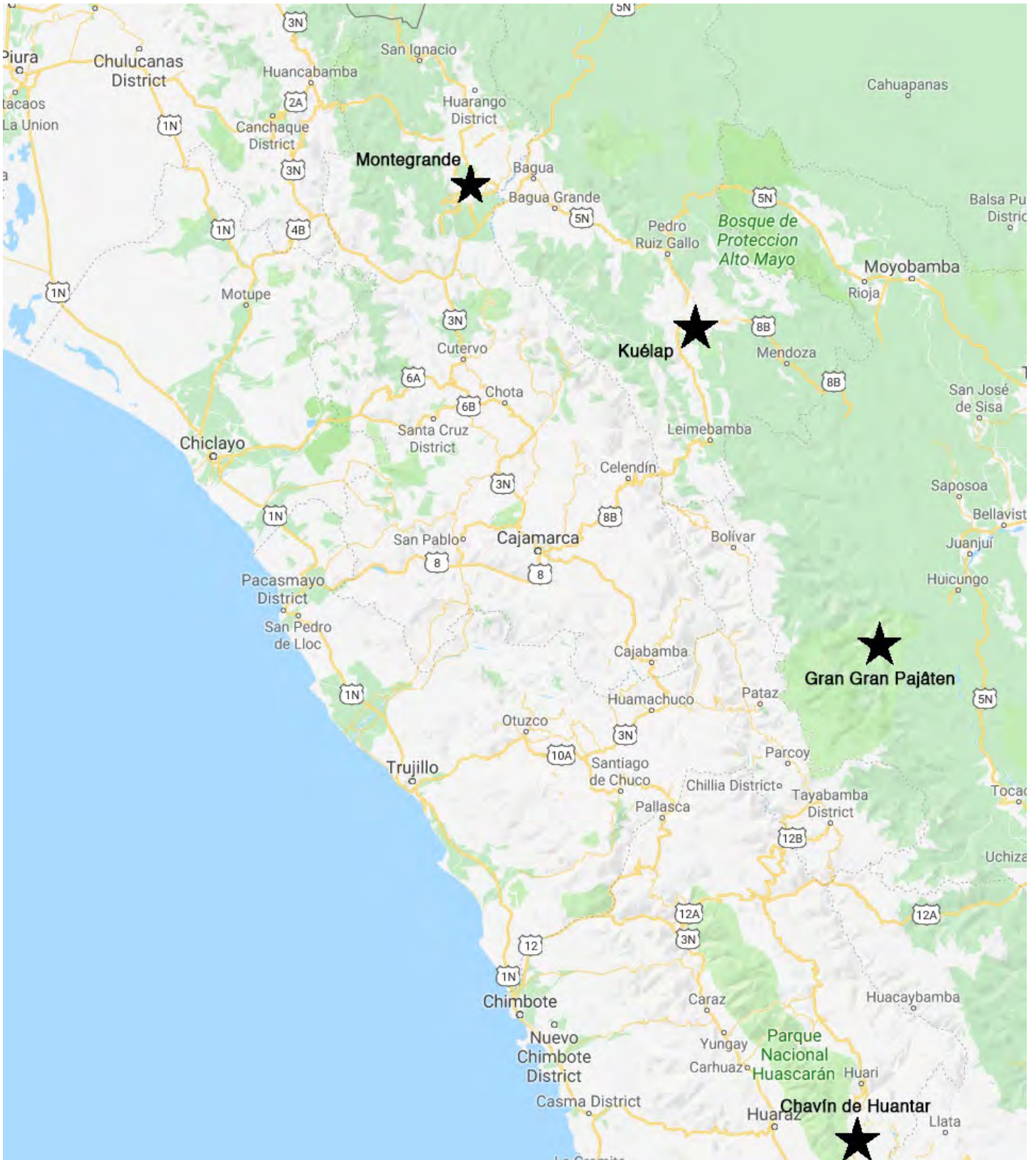
Mountains. The iconic fifteenth-century Inca site of Machu Picchu is typical of the mountainous part of the eastern Andes—the beginnings of the warm country leading toward the lowlands. The Urubamba River at the base of the hills flows



Amazon River drainage basin. By Kmusser via Wikimedia Commons, (CC BY-SA 3.0).



Note the Brazilian highlands on this topographic map of South America. Via NASA.



Relative locations of the sites in Peru. Map data © Google, 2019.

north and then east, becoming part of the Ucayali River. On a map, Machu Picchu, just northwest of Cuzco, is extremely close to the Amazonian lowlands.

Prior to these massive tectonic shifts, according to geologist Russell Mapes (2009) and others (Caputo and Soares 2019), there were hills where the current Amazon delta is today. By doing comparative studies of waterborne mid-Cretaceous zircon sand samples from eastern upland and western Pacific sites, Mapes deduced that the river flowed from the east toward the west, and

ostensibly, the Pacific Ocean, passing through an area where the Andes ranges had yet to form.

Why might it be important to know that once the Amazon flowed west, into the Pacific Ocean? Actually, if one looks at the Andean chain and where there are the lowest spots, there is a dip directly west of the westernmost part of the end of the Amazon and the modern city of Iquitos, Peru. From there, many of the Peruvian tributaries of the Amazon, such as the Ucayali and Marañon, make a hard turn to the south. Understanding topography is central to clarifying



*Spiral temple at Montegrande. Image by JOEL 20001
via Wikimedia Commons (CC BY-SA 4.0)*

the processes of development that took place, particularly in this peripheral area. It is no wonder, then, that archaeological sites, such as the upland site Chavín de Huantar, along one of these rivers should contain tropical imagery—felines, crocodilians, vegetation, and the like—when none of these things are found in the higher elevations.

Another of these upland, intermediary sites is Kuélap, perhaps the largest of the Chachapoya archaeological sites that exists. The Chachapoya people lived in the cloud forested, hilly region of what is now the Amazonas region of Peru.

Their main site of Kuélap can be reached by first going to Cajamarca on a bumpy twelve-hour bus ride from the coastal city of Chiclayo. This trip from the Pacific coast traces a trade route that would have been made often millennia and centuries ago. From the Chachapoya area, trade would have then gone on to and from Amazonia itself. Given such trading potential, the fact that the Chachapoya were a highly independent and powerful culture comes as no surprise. They were among the last sovereign groups to be incorporated into *Tahuantinsuyo*, the Land of the Four Quarters (or better known today as the Inca



Gran-Pajâten with feathered dancers. Image courtesy PromPeru, via Peru Telegraph.

Empire), in the fifteenth century during the reign of Topa Inca (Church and von Hagen 2018: 916).

With time, we are finding more and more sites in this peripheral zone linking Amazonia and the Andean world. The newly discovered site of Montegrande, near the present-day city of Jaen, further reinforces the concept that processes of cultural transformation were occurring between the Andean and Amazonian cultures in this transitional zone. Culturally, this site does not seem to fit with either the Peruvian highland cultures or the Amazonian lowland ones, yet there are suggestions that it may have been an

intermediary. What is striking is that the primary structure is a mound with a spiral stone structure.

Round structures have been noted at Chachapoya sites such as Kuêlap. At Gran Pajâten, another site further to the south, they often took the form of round wedding cake–style pyramids, most likely bases for other perishable structures. What was striking about these round structures was their embedded geometric designs; some were decorated with a frieze of plumed dancers all facing outward—all done in a stone-mosaic fashion.



Gran-Pajâten with feathered dancers. Image courtesy PromPeru, via Peru Telegraph.

Where does ancient Amazonia fit into the picture of the original peopling of South America?

Since this article focuses on relationships between human beings and Amazonia, to more fully contextualize how human beings first began living in this landscape, we will jump back in time to the Pleistocene. The Pleistocene is that period in the Earth's history marked by advances and recessions of polar and mountain ice fields creating ice ages interspersed by interglacial periods. It began a bit longer than two and a half million years ago and ended around 11,700 years ago. In other words, we currently live in an interglacial period that had its beginning around 11,700 years ago. What was it like during the ice ages in the vast lowlands of Amazonia, and then,

for those people who were experiencing it for the first time?

The story of the peopling of the Americas is being revised on an almost weekly basis. North American Archaeology class textbooks up until the 1990s presented the argument that the fluctuations of global climate during the Pleistocene made possible the arrival of the first Americans via the Bering Land Bridge. There were low global sea levels due to global moisture budgets "banking" their water in glaciers on continents and in mountain glaciers. These lowered sea levels exposed continental shelves, one of which



Pictograms from Serra da Capivara. By Vitor 1234 via Wikimedia Commons (CC BY-SA 3.0).

essentially made North America an extension of Asia via a broad tundra between Siberia and the Yukon. People and animals could cross, and the conventional wisdom was that this happened for humans only during the last major global cold period, bringing people here around twelve thousand years ago. They were great hunters, spreading quickly because the Pleistocene megafauna had no experience with humans as dangerous predators, so were easily slaughtered. This, essentially, is the Paul S. Martin Hypothesis (Martin 1973) of why the Pleistocene megafauna went extinct. The basic idea was that these Clovis hunters from about 12,000 years ago, armed with their chipped-stone fluted lance points, successfully spread out from the southern end of the ice-free corridor that formed east of the formerly glacier-bound Cordilleran Rockies, and west of the massive Laurentide ice sheet, much like a valve that had opened up from the north.

Where does Amazonia fit in all of this? Actually, until relatively recently, it was rather peripheral to Pleistocene discussions. Textbooks dealing with the original peopling of the New World pretty much ignored South America and even the idea that people could have arrived earlier than the last glaciation. Eventually, research at the site of Monte Verde in the western foothills of the south-central Chilean Andes was accepted as proof that American Indians had comfortably established themselves that far south already by the time that the Paul S. Martin Hypothesis would have them just arriving in central North America (Dillehay 1989). This was the first of what we now recognize as a number of “Pre-Clovis” sites in South America, and its dates have been pushed back even further than the Clovis (Dillehay et al. 2015). People were crossing the Bering Land Bridge, but doing it earlier, and some going south along various routes, it seems, some along the

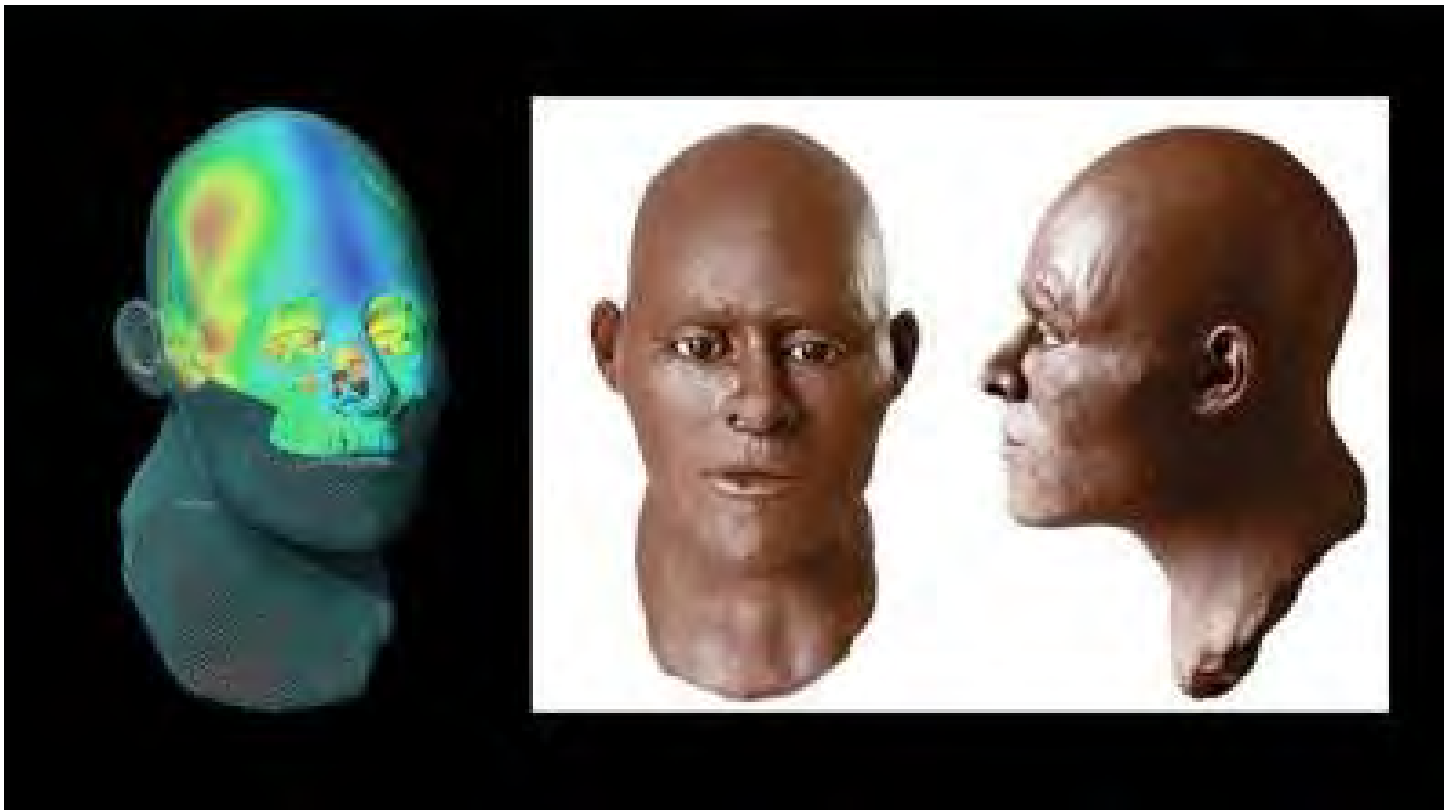
Pacific coast, while others broke off once they arrived south of Middle America.

It was only relatively recently that scientists realized that the ecosystems that characterize Amazonia today were not what they would have been like during the various Ice Ages. We now know that what we consider as the characteristic high tropical forest was in fact found only in small refugia, small areas with sufficient rainfall to maintain them, further toward the west in the foothills of the Andes. In fact, most of Amazonia during the peak of the Pleistocene glacial advances was grassland savanna with large areas of what we might prefer to call temperate grassland. Further south and along the Andes themselves, one would have encountered glaciers in abundance. For example, all of modern Patagonia would have been glaciated. Put another way, the Pleistocene landscapes of Amazonia—the “stages,” if you will, that were set for the arrival of

the first humans—were quite different than those that exist in those same diverse regions today.

So, imagine that an early human has made it as far south as what we now call Panama. Probably they cannot see gleaming white glaciers yet, but their choices are essentially to follow the Pacific coastline south, or to take an easterly route toward the Guyana Shield. Just before that, they might go directly south of it, toward what is now the Colombian lowlands, or up and over the Guyana Highlands and then to the east and to the mouth of the Amazon itself. From there, some of their relatives can head on down the river; others might continue further on down the coast.

Amazonia did indeed become a significant area of ancient migration movement during Pleistocene times, and it is shown both in osteological records and in cave art. The Serra da Capivera, in the Brazilian state of Piauí, is the largest rock-art site



See Luzia's original reconstruction via the article "Reconstructing the Deep Population History of Central and South America" (Posth et al.) [cell.com/cell/fulltext/S0092-8674\(18\)31380-1](http://cell.com/cell/fulltext/S0092-8674(18)31380-1) via FAPESP Agency (CC-BY-NC-ND)

in the world. Now designated a World Heritage Site, its abundant rock art shows people and Pleistocene animals. Nearby sites are dated back to as early as 20000 B.C. (Lahaye et al. 2013). The site of Santa Elina, situated in the center of South America, was recently dated to 21170 B.C. (23120±260 B.P.) for its earliest occupation, making it by far one of the earliest archaeological sites in the Western Hemisphere (Vialou et al. 2017).

Paleoanthropologists, those interested in understanding and learning about past human lifeways from what has survived from the remains of ancient individuals, have learned much about the ancestors of the contemporary Indigenous peoples of the region. There have been surprises in interpretation, with the discovery of one cranium, later named “Luzia,” in particular. She was found and painstakingly excavated, then underwent a forensic reconstruction by Richard Neave of Manchester University. According to that analysis, she seemed to have features incorporating characteristics of some western Oceanic peoples.

Then, in 2018, following the disastrous burning of the National Museum in Rio de Janeiro where the cranium of Luzia was housed, her burned remains were recovered and carefully removed. A new archaeogenetic technique allowed researchers to find out more about Luzia’s ancestral links. While Luzia was originally depicted as having facial characteristics that would have set her as remarkably distinct from the majority of Amerindian peoples, a different forensic expert now indicates her appearance to have been more Amerindian (as seen in the revised forensic reconstruction). A new type of DNA analysis strongly indicates that she was indeed closely linked to the main Amerindian group.



This is Luzia’s revised reconstruction. Image by Dornicke via Wikimedia Commons (CC BY-SA 4.0).



Marajoa Urn. Image by Wagner Souza e Silva, used with permission.

What is the nature of the evidence for or against the emergence of cultural complexity in ancient Amazonia?

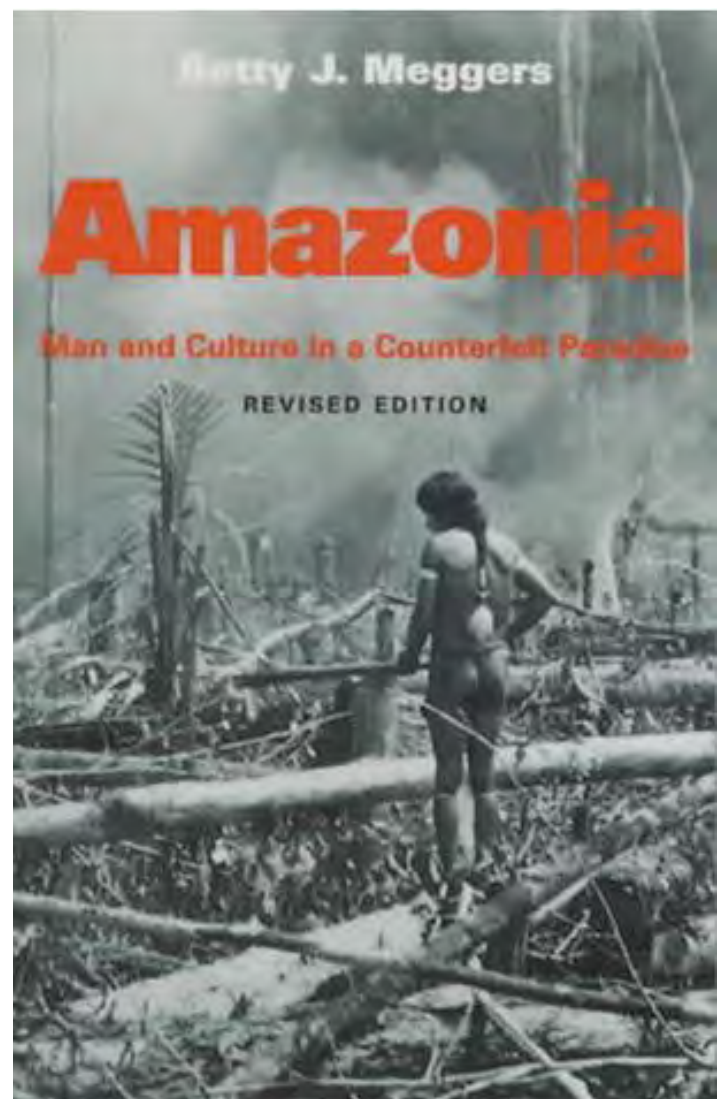
Now that we have established that the original migrants into the vast lowlands of the Amazonian drainage have settled, that they have been here for a much longer period than we had imagined, and that they became quite adept at mastering the various ecological subsets (and even recorded their impressions on rock walls), we can now look at how complex societies developed in Amazonia.

For many years it was conventional wisdom that the moist tropical world was somehow antithetical to the emergence of complex civilizations, or even hostile to ones coming from other areas. Even renowned researchers followed this line of reasoning. For example, the husband-wife team of Betty Meggers and Clifford Evans were major pioneers in South American, and in particular Amazonian, archaeology. Betty Meggers was one of the first to excavate on Marajo, the huge island at the mouth of the Amazon. There she found evidence of a culture that produced exquisitely decorated urns. She wrote the book *Amazonia: Man and Culture in a Counterfeit Paradise* (1996) wherein she argued that the tropical forest was inherently unable to support complex societies because of the poor quality of soils found under tropical forests.

Personally, as one who has dedicated his life to studying complex civilizations in such settings (in particular the Maya), I found her idea that tropical ecosystems were somehow antithetical to complex societies—civilizations—to be fundamentally absurd. The very rise and florescence of Maya civilization itself was testimony to that, let alone the achievement of similarly complex societies in other parts of the world, such as ancient Southeast Asia and India.

I was fortunate to have studied under University of Minnesota Professor Dennis Puleston whose work at the Maya site of Tikal led us to think

about the Maya as having been extremely numerous there, western notions of urbanism notwithstanding. Mayanists tended to look to other areas of the world for cultural analogs that might help them interpret the archaeological patterns they were finding, and often they found them in tropical West Africa. I remember him showing me aerial photos of a large West African city (probably Ibadan, Nigeria) in the 1970s. It was a densely packed urban area with houses



Amazonia, Man and Culture in a Counterfeit Paradise, by Betty J. Meggers (1996).

surrounded by trees. I was really surprised when he told me that almost all of the homes in that photo represented primary food producers. Each house was surrounded by a kitchen garden and pretty much everything needed for the family's subsistence was directly accessible. This was the norm in this large, densely-packed, traditional community in West Africa. For Puleston, this was something to consider when trying to understand what archaeological indicators for densely-packed

settlements around Tikal and other Maya sites were beginning to show.

Puleston was providing good “thinking out of the box” archaeologically, something that is also helpful in rethinking the question of cultural complexity in Amazonia. Clearly, the description by Francisco de Carvajal, on the first trip by Europeans down the Amazon, suggested that the Indigenous peoples there had done much better than Betty Meggers ever would have imagined.



Santarem-style bottleneck-style vessel (Vaso de gargalo). Via [SciELO](#) (CC BY 4.0).

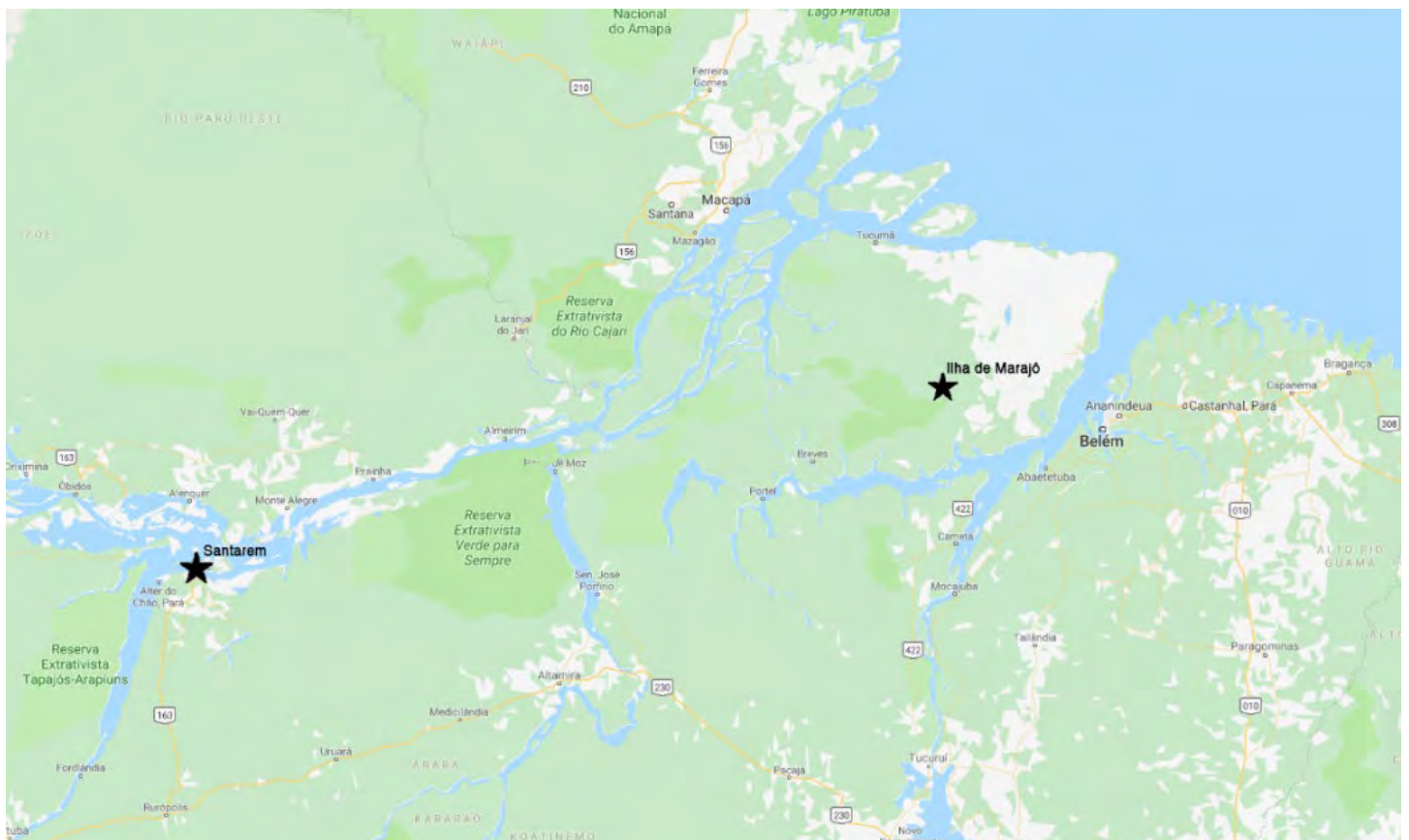
In fact, she would have denied his claims along with the Spanish courts. Yet archaeologically, we are beginning to gather evidence of great antiquity for human presence in South America and in the Amazonian area itself (Vialou 2017). A human presence over at least such a long time

period easily would have allowed for familiarization with, and adjustments and modifications made to, Amazonian species and landscapes, leading to domestication and increasing levels of complexity.

What new archaeological evidence has been emerging about ancient Amazonia?

Prior to the advent of sophisticated aerial and satellite remote-sensing technologies, much of the Amazonian landscape remained environmental and archaeological *terra incognita*. With extensive deforestation, especially in southwestern Amazonia in the Brazilian state of Acre, regular geometry began to become visible, and there they were named “geoglyphs.”

Geoglyphs generally take the form of ditch enclosures in the shape of circles or rectangles, and sometimes combinations of the two. As clearing progressed and as aerial reconnaissance then became more formal and sophisticated, the numbers of these landscape modifications increased to the multiples of hundreds. The area still under tropical forest is immense, and there are some



Map of the Amazon basin, showing the relative locations of Santarem and Ilha de Marajo. Map data © Google, 2019.

more sophisticated reconnaissance techniques being employed—among them lidar—right in the center of the area where Carvajal claimed there to have been extensive areas of settlement (Stenborg et al. 2018). This is the area famous archaeologically for its almost-baroque, elaborate, Santarem-style pottery vessels (Lopes-Alves 2018).

Parsons and Denevan did pioneering archaeological work there, noting regular geometry in a number of places in lowland South America (Parsons and Denevan 1967). Clark Erickson later worked in the Beni area of the Bolivian lowlands, furthering the observations that Parsons and Denevan had documented. Erickson elaborated upon what he viewed as the extensive nature of landscape modifications humans had made in this region, going beyond the geometry of the ridged fields to the series of forested “islands” that themselves turned out to be anthropogenic; their connected causeways with their adjacent canals provided for transport both during the dry seasons and flooded rainy seasons. Erickson’s scenario for pre-Columbian life in the region

would have been quite remarkable because he proposed having numerous people living on these artificial terraced “forest islands” and raising abundant crops (Erickson 2006). Archaeological research continues in the lowlands of Bolivia, adjacent southern Brazil, and Peru.

Farther to the east along the Xingu River, Michael Heckenberger, both an archaeologist and a cultural ethnographer, has been working with the Kuikuro people for decades. His research substantiates that the ancestors of the present-day people there had been much more numerous and had lived in much larger settlements than those found in the region today. As indicated by the archaeological record, people there had gardens, fields, and orchards, and lived in circular communities that were much larger than those lived in by the present-day Kuikuro. The communities were interconnected by extensive road systems. Today the Kuikuro live in an Indigenous reserve and their environment has been allowed to return more to a tropical forest (Heckenberger 2009).

What have we learned from the ancient, Indigenous peoples of Amazonia that has been powerfully transformative to the entire world?

When I was teaching and I had an opportunity to talk about the American culinary debt to the rest of the world, I usually began with manioc and asked how many of the students had ever eaten it. Unless I just happened to have someone from the region, it’s extremely rare that I got a “yes.” I then went on to say that most likely just about everyone in the room has had it at least once. Students usually showed doubtful curiosity. “How many of you have had tapioca? OK, now, how about cashews?” (from the Indigenous Tupi, *caxu*). I remember as a kid there were always nuts to crack at Christmas, and the hardest were always the toe-shaped Brazil nuts. It was Brazil wood

that first brought Europeans to that part of the world, and not just the Portuguese, but Dutch, English, French, and Spanish.

This is just the beginning, but manioc is quite significant as it is one of the main staples now around the world, not just for humans but also for livestock. It is also used extensively in various kinds of East and Southeast Asian dishes. There are also many fruits endemic to the Amazonian forest that are recognizable across the globe, such as passion fruit, avocado, and varieties of cacao, but increasingly the region is most famous for invasive species. Probably the most famous of

these invasive species is coffee, but there are also other commercial crops like soybeans.

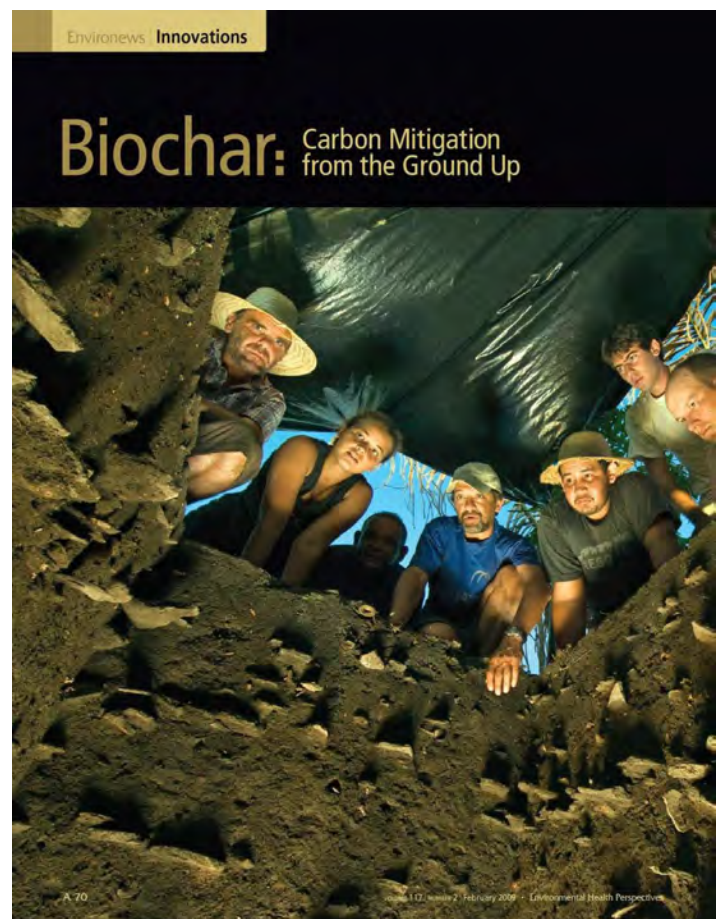
One of the initial recognitions of there having been dense human occupation in the very center of Amazonia was found in areas where even today one finds the best soil to grow gardens, the *terra preta do indio*—the “black earth of the Indians.” When I first was made aware of it years ago, the thing that I was most amazed about was that it veritably bristled with ceramics.

Until recently the implications of this *terra preta* have been largely unrecognized. Now it is tied to an interest in biochar as an augmentation to horticulture not only in the tropical world but the temperate one as well. Betty Meggers, the former Smithsonian Institution archaeologist, contended that the Amazon forest tropical soils were unable to support complex societies, but that argument now appears to be in disfavor. I hope some of what has been presented above has helped shed some light on work related to that.

Clearly, many people had lived in what had been once viewed as “unsustainable,” poor tropical-soil lands. They produced vast amounts of pottery and left it in soil that was definitely quite different from what was “normal” for that found beneath tropical forests. These new soils were rich and black and could sustain crops.

Today, soil scientists in other areas of the world have begun to look at biochar, a charcoal made from a biomass being smoldered or from an incomplete burning process. For example, in Minnesota people now employ things like organic permaculture teas produced from biochar processes as fertilizer, and the University of Minnesota is carrying out research on the applications of biochar (Nooker 2014). Perhaps it is best put by saying that new research is just “discovering” old patterns after all.

Muito obrigado. Many thanks to the ancient Indigenous people of Amazonia!



Biochar: Carbon Mitigation from the Ground Up.

What of the future of Amazonia?

The Amazon has always been ecologically dynamic, having changed over time with glacial and interglacial periods, now followed by our own period of increasing global warming. In the Amazon region this has led to a number of years of drought during the rainy season. It also has led to interesting uncertainties during their winter. For example, in August 2010 there was one time when there were seventeen cities with snow falling on the ground, sometimes interrupting traffic. Normally, there are two to three cities that might get a trace of snow in a year. These snowfalls occurred in cities in various locations in the Brazilian Highlands, a significant portion of southern and eastern Brazil. While not the hot, moist, tropical forest, these areas affect them and are also impacted by them.

Amazonia has had its share of wet and dry years and more drought years recently. Large swaths of it have been transformed to farmland. In portions of Brazil, rivers have been aggressively dammed. Traditional, scheduled, fallow-based systems of slash-and-burn agriculture have often been replaced by more destructive ones introduced by poor settlers from large cities—people encouraged to come into the region in search of livelihoods (much like our own Homestead Acts in

the U.S. in the past). Brazil alone has the fourth largest economy in the world and most likely will continue and grow, but at what cost?

There are other models that we can begin to discern that have been employed to adapt to the same ecosystems without the kinds of destructive outcomes that we are seeing in the end of the twentieth and beginning of the twenty-first century.

We are continuing to learn how interesting Amazonia's prehistory is. The same is true if we look at the region geologically, biologically, and historically. We all are deeply invested in the success of the region whether we like it or not because every breath we take contains some oxygen produced by the abundant forests that still remain there. It is worthwhile to try to understand how Indigenous peoples of Amazonia managed to coexist with their environmental conditions in the past, and do so in ways that allowed them to develop different kinds of complexities, different kinds of tropical urbanisms. The vastness of Amazonia encourages the broadest enquiring minds! Below are some suggestions for using some of the portals and spreadsheets often not used by English speakers, but that nonetheless will have sources useful for all.

Finding archaeological information about ancient Amazonia

Archaeological work in Amazonia has been going on for a number of years with much of it published in Portuguese, Spanish, and French. There are a number of international search engines that can be used specifically for South America. *SciELO* (Scientific Electronic Library Online) began in Brazil in 1997 and now includes 19 other countries. It is one of the best. Also, there is *Redalyc* (Red de Revistas Científicas de América Latina y el Caribe), a database of

scientific journals and other publications for Latin America and the Caribbean. *Latindex* is a regional cooperative online information system for scholarly journals from Latin America, the Caribbean, Spain, and Portugal. There are 30 countries represented and 17,000 journals. In addition, there is *Persée*. This is a French database that includes journals related to archaeology of Latin America, often including Amazonia. A quick search there using words like "archeologie,

Amazon” quickly pulled up a few thousand titles, including one by Anna Roosevelt on her work on Marajo Island. The complete *Proceedings of the Société des Américanistes* (Society of Americanists) are found there.

Currently, one of the foremost institutions doing this is the Universidade de São Paulo, Museu de Arqueologia e Etnologia and close to the mouth of the Amazon itself, the Museu Paraense Emílio Goeldi, now celebrating 150 years.[1]

They publish a *Boletim do Museu Paraense Emílio Goeldi Ciências Humanas*, a quarterly journal that often includes articles in English on, or related to, archaeology.[2] In addition, the Museu also has its own set of digital book-length publications.[3] Also, there is an active Brazilian Archaeological Society (Sociedade de Arqueologia Brasileira)[4] with its own scholarly journal, *Revista de Arqueologia*, that comes out once, and sometimes twice, a year.

Further Reading

Heckenberger, Michael J. 2005. *The Ecology of Power: Culture, Place, and Personhood in the Southern Amazon, A.D. 1000-2000*. New York: Routledge.

Hemming, John. 2008. *Tree of Rivers: The Story of the Amazon*. New York: Thames & Hudson.

Mann, Charles C. 2011. *1491: New Revelations of the Americas Before Columbus*. New York: Vintage.

McEwan, Colin, Cristiana Barreto, and Eduardo Neves, Eds. 2001. *Unknown Amazon: Culture in Nature in Ancient Brazil*. London: The British Museum Press.

Medina, Jose Toribio. 1939. *The Discovery Of The Amazon: According To The Account Of Friar Gaspar De Carvajal And Other Documents*. Edited by H. C. Heaton. Translated by Bertram T. Lee. First published in 1894. American Geographical Society Special Publications, No. 17. Edited by W. L. G. Joerg. New York: American Geographical Society. Reprinted Whitefish, MT: Kessinger Publishing’s Rare Reprints, 2010.

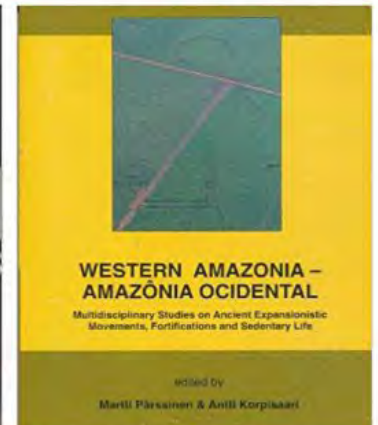
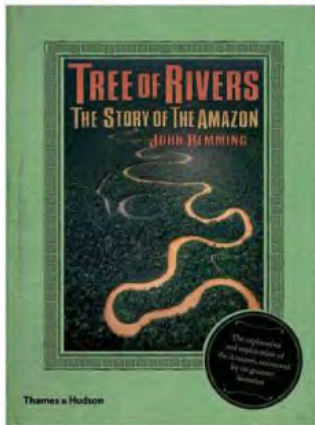
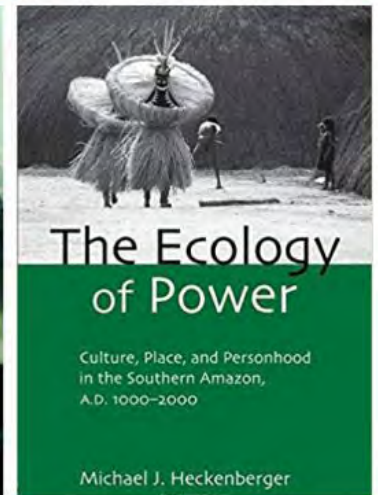
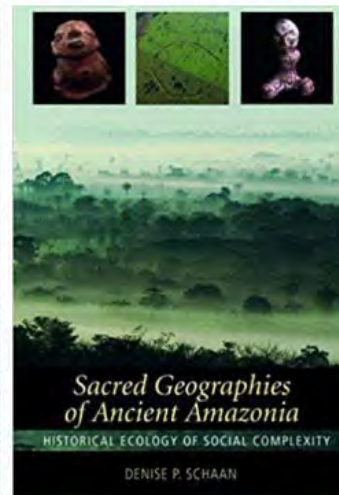
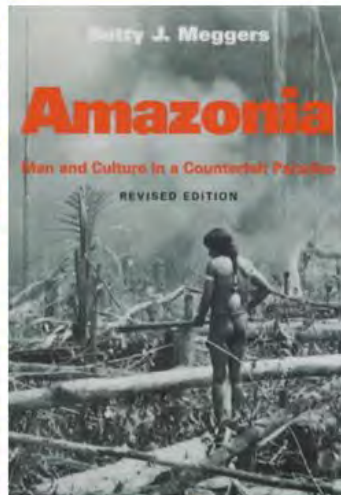
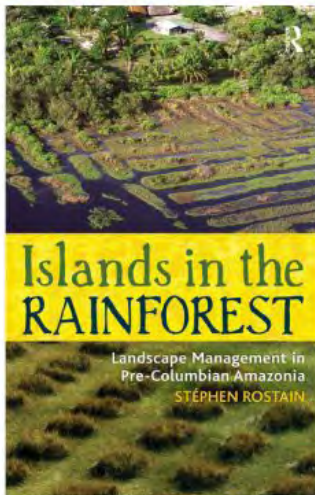
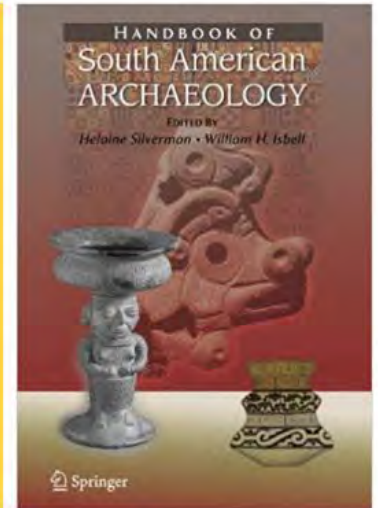
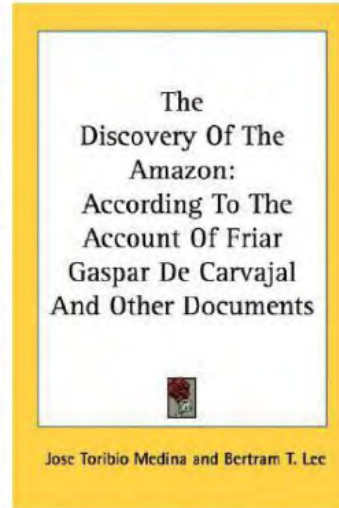
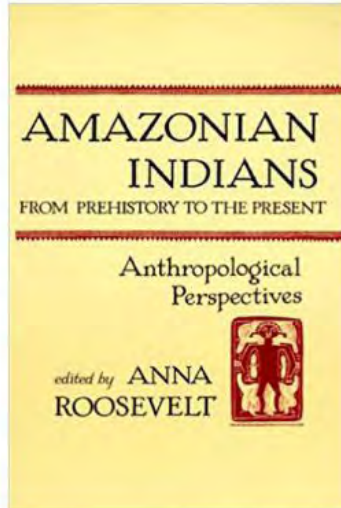
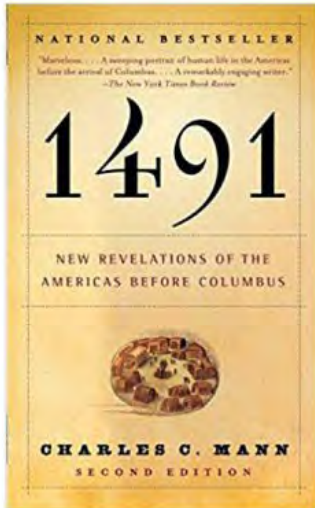
Meggors, Betty. 1996. *Amazonia: Man and Culture in a Counterfeit Paradise*. Washington, D.C.: Smithsonian Institution.

Pärssinen, Martti, and Antti Korpijarvi, Eds. 2003. *Western Amazonia—Amazônia Ocidental: Multidisciplinary Studies on Ancient Expansionistic Movements, Fortifications and Sedentary Life*. Helsinki: Renvall Institute Publications, University of Helsinki.

Roosevelt, Anna C., Ed. 1994. *Amazonian Indians: From Prehistory to the Present, Anthropological Perspectives*. Tucson: University of Arizona Press.

Rostain, Stéphen. 2013. *Islands in the Rainforest: Landscape Management in Pre-Columbian Amazonia*. Walnut Creek, CA: Left Coast Press.

Schaan, Denise. 2013. *Sacred Geographies of Ancient Amazonia: Historical Ecology of Social Complexity*. Walnut Creek, CA: Left Coast Press.



A selection of book covers of further reading titles.

References Cited

- Aimola, G., C. Andrade, L. Mota, and F. Parenti. 2014. Final Pleistocene and Early Holocene at Sitio do Meio, Piauí—Brazil: stratigraphy and comparison with Pedra Furada. *Journal of Lithic Studies* 1 (2): 5-24. doi: 10.2218/JLS.V1I2.1125.
- Barreto, Cristiana. 2013. Beyond Pots and Pans: Ceramic Record and Context in Pre-Colonial Amazonia. Paper presented at the 78th Annual Meeting of the Society for American Archaeology, April 4, 2013, Honolulu, HI.
- Bush, Mark B., Crystal H. McMichael, Dolores R. Piperno, Miles R. Silman, Jos Barlow, Carlos A. Peres, Mitchell Power, and Michael W. Palace. 2015. Anthropogenic influence on Amazonian forests in pre-history: An ecological perspective. *Journal of Biogeography* 42 (12): 2277-2288. doi: 10.1111/jbi.12638.
- Caputo, Mario Vicente, and Emilio Alberto Amaral Soares. 2016. Eustatic and tectonic change effects in the reversion of the transcontinental Amazon River drainage system / Efeitos de mudanças eustáticas e tectônicas na reversão do sistema de drenagem do Rio Amazonas transcontinental. *Brazilian Journal of Geology* 46 (2): 301-328. doi: 10.1590/2317-4889201620160066.
- Church, Warren B., and Adroamma Von Hagen. 2008. Chachapoyas: Cultural Development at an Andean Cloud Forest Crossroads. In *Handbook of South American Archaeology*, edited by Helaine Silverman and William H. Isbell, 903-926. New York: Springer.
- Conrad, Joseph. (1899) 2015. *Heart of Darkness*. New York: CreateSpace Independent Publishing Platform.
- Derewicz, Mark. 2007. A River Runs Backward. *Endeavors: Research and creative activity at UNC-Chapel Hill*. Chapel Hill, NC: UNC Research. Monday, January 1.
- Dillehay, Tom D. 1989. *Monte Verde: A late Pleistocene settlement in Chile*. Washington, D.C.: Smithsonian Institution Press.
- Dillehay, Tom D., Carlos Ocampo, José Saavedra, Andre Oliveira Sawakuchi, Rodrigo M. Vega, Mario Pino, Michael B. Collins, Linda Scott Cummings, et al. 2015. New Archaeological Evidence for an Early Human Presence at Monte Verde, Chile. *PLoS ONE* 10 (11): e0141923. doi: 10.1371/journal.pone.0141923.
- Erickson, Clark L. 2006. The Domesticated Landscapes of the Bolivian Amazon. In *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands*, edited by William Balée and Clark Erickson, 235-278. New York: Columbia University Press.
- . 2010. The Transformation of Environment into Landscape: The Historical Ecology of Monumental Earthwork Construction in the Bolivian Amazon. *Diversity* 2: 618-652.

Glaser, Bruno, and Jonathan Birk. 2012. State of the scientific knowledge on properties and genesis of Anthropogenic Dark Earths in Central Amazonia (terra preta de Índio). *Geochimica et Cosmochimica Acta* 82 (April): 39-51. doi: 10.1016/j.gca. 2010.11.029.

Gregorio de Souza, Jonas, Denise Pahl Schaan, Mark Robinson, Antonia Damasceno Barbosa, Luiz E. O. C. Aragão, Ben Hur Marimon Jr., Beatriz Schwantes Marimon, et al. 2018. Pre-Columbian earth-builders settled along the entire southern rim of the Amazon. *Nature Communications* 9 (1 March). doi: 10.1038/s41467-018-03510-7.

Heckenberger, Michael J. 2009. Lost Cities of the Amazon: The Amazon tropical forest is not as wild as it looks. *Scientific American* 301 (4, October): 64-71. Stable URL: [stable/26001557](https://www.sciencedirect.com/science/article/pii/S0037001709001557).

Hemming, John. 2008. *Tree of Rivers: The Story of the Amazon*. New York: Thames & Hudson.

Herzog, Werner, dir. 1972. *Aguirre: The Wrath of God*. Written, directed, and produced by Werner Herzog, featuring Klaus Kinski, Helena Rojo, Ruy Guerra. Starz / Anchor Bay Studio. Production company Werner Herzog Filmproduktion, Hessischer Rundfunk. Distributed by Filmverlag der Autoren. <https://www.youtube.com/watch?v=RIOCyVeRmjo>.

Ippolito J. A., A. Donnelly, and J. Grob. 2015. Anatomy of a Field Trial: Wood-based Biochar and Compost Influences a Pacific Northwest Soil. *The Biochar Journal*. 15 June. Arbaz, Switzerland. ISSN 2297-1114. <http://www.biochar-journal.org/en/ct/62>. Accessed, January 1, 2019.

Jaimés Betancourt, Carla. 2017. Diferencias Cronológicas, Funcionales y Culturales en la Cerámica de los Llanos de Mojos, Beni-Bolivia. In *Arqueología de la vertiente oriental Surandina. Interacción macro-regional, materialidades, economía y ritualidad*, edited by Beatriz N. Ventura, Gabriela Ortiz and María Beatriz Cremonte, 25-50. Buenos Aires, Argentina: Sociedad Argentina de Antropología.

Khan, S., L. Aragão, and J. Iriarte. 2017. A UAV–lidar System to Map Amazonian Rainforest and its Ancient Landscape Transformations. *International Journal of Remote Sensing* 38 (8-10): 2313-2330. doi: 10.1080/01431161.2017.1295486.

Lahaye, Christelle, Marion Hernandez, Eric Boëda, Gisele D.Felice, Niède Guidon, Sirlei Hoeltz, Antoine Lourdeau, et al. 2013. Human occupation in South America by 20,000 BC: the Toca da Tira Peia site, Piauí, Brazil. *Journal of Archaeological Science* 40 (6): 2840-2847. doi: 10.1016/j.jas.2013.02.019.

las Casas, Fray Bartolomé de. 1566. *Apologética historia sumaria*. La Fundacion El Libro Total. Online Spanish <https://www.llibrototal.com/llibrototal/?t=1&d=4072>.

Levis, Carolina, Bernardo M. Flores, Priscila A. Moreira, Bruno G. Luize, Rubana P. Alves, Juliano Franco-Moraes, Juliana Lins, et al. 2018. How People Domesticated Amazonian Forests. *Frontiers in Ecology and Evolution* 5 (171). doi: 10.3389/fevo.2017.00171.

Levis, C. F., R. C. Costa, F. Bongers, M. Peña-Claros, C. R. Clement, A. B. Junqueira, E. G. Neves, et al. 2017. Persistent effects of pre-Columbian plant domestication on Amazonian forest composition. *Science* 355 (6328): 925-931. doi: 10.1126/science.aal0157.

Lima, Helena Pinto, Eduardo Goes Neves, and James B. Peterson. 2008. A fase Açutuba: um novo complexo cerâmica na Amazônia Central. *Arqueología Suramericana/Arqueologia Sul-americana* 2: 26-52.

Lombardo, Umberto, Sebastian Deniera, Jan-Hendrik May, Leonor Rodrigues, and Heinz Veita. 2013. Human-environment interactions in pre-Columbian Amazonia: The case of the Llanos de Moxos, Bolivia. *Quaternary International* 312 (October): 109-119. doi: 10.1016/j.quaint.2013.01.007.

Lopes-Alves, Marcony. 2018. Para além de Santarém: os vasos de gargalo na bacia do rio Trombetas (Beyond Santarém: 'necked vessels' in the Trombetas River basin). *Boletim do Museu Paraense Emílio Goeldi. Ciências Humanas* 13 (1, jan.-abr.): 11-36. doi: 10.1590/1981.81222018000100002.

Mann, Charles C. 2011. *1491: New Revelations of the Americas Before Columbus*. New York: Vintage.

Mapes, Russell W. 2009. Past and Present Provenance of the Amazon River. Ph.D. dissertation, Department of Geological Sciences, University of North Carolina at Chapel Hill.

Martin, Paul S. 1973. The Discovery of America. *Science, New Series* 179 (4077): 469-974.

McMichael, C. H., M. W. Palace, M. B. Bush, B. Braswell, S. Hagen, E. G. Neves, M. R. Silman, E. K. Tamanaha, and C. Czarnecki. 2014. Predicting pre-Columbian anthropogenic soils in Amazonia. *Proceedings of the Royal Society B: Biological Sciences* 281 (1777). doi: 10.1098/rspb.2013.2475.

Medina, Jose Toribio. 1939. *The Discovery Of The Amazon: According To The Account Of Friar Gaspar De Carvajal And Other Documents*. Edited by H. C. Heaton. Translated by Bertram T. Lee. First published in 1894. American Geographical Society Special Publications, No. 17. Edited by W. L. G. Joerg. New York: American Geographical Society. Reprinted Whitefish, MT: Kessinger Publishing's Rare Reprints, 2010.

Meggers, Betty. 1996. *Amazonia: Man and Culture in a Counterfeit Paradise*. Washington, D.C.: Smithsonian Institution.

Nooker, Eric Paul. 2014. Impact of management practices on Minnesota's specialty crop production: From biochar to tillage practices. M.A. thesis, University of Minnesota.

Novotny, Etelvino H., Michael H. B. Hayes, Beáta E. Madari, Tito J. Bonagamba, Eduardo R. de Azevedo, André A. de Souza, Guixue Song, Christine M. Nogueira, and Antonio S. Mangrich. 2009. Lessons from the Terra Preta de Índios of the Amazon region for the utilisation of charcoal for soil amendment. *Journal of the Brazilian Chemical Society* 20 (6): 1003-1010. doi: 10.1590/S0103-50532009000600002.

Parsons, James and William M. Denevan. 1967. Pre-Columbian Ridged Fields. *Scientific American* 217 (1, July): 92-100. doi:10.1038/scientificamerican0767-92.

Phys.org. 2017. Ancient peoples shaped the Amazon rainforest. *Phys.Org*, March 2, Naturalis Biodiversity Center. <https://phys.org/news/2017-03-ancient-peoples-amazon-rainforest.html>. Accessed December 14, 2018.

Phys.Org. 2015. Amazonian natives had little impact on land, new research finds. *Phys.Org*, October 28, Florida Institute of Technology. <https://phys.org/news/2015-10-amazonian-natives-impact.html#nRly>. Accessed December 14, 2018.

Pope Paul III. 1537. *Sublimus Dei*, On the Enslavement and Evangelization of Indians. Papal Encyclicals Online. [Dated: May 29, 1537]. Online English translation, <https://www.papalencyclicals.net/paul03/p3subli.htm>.

Posth, C., Nathan Nakatsuka, Iosif Lazaridis, Pontus Skoglund, Swapan Mallick, Thiseas C. Lamnidis, Nadin Rohland, et al. 2018. Reconstructing the Deep Population History of Central and South America. *Cell* 175 (November 15): 1185-1197, e22. doi: 10.1016/j.cell.2018.10.027.

Rostain, Stéphen. 2013. *Islands in the Rainforest: Landscape Management in Pre-Columbian Amazonia*. Walnut Creek, CA: Left Coast Press.

Rozas-Davila, Angela A., Bryan G. Valencia, and Mark B. Bush. 2016. The functional extinction of Andean megafauna. *Ecology* 97 (10): 2533-2539. doi: 10.1002/ecy.1531.

Saunaluoma, Sanna. 2012. Geometric Earthworks in the State of Acre, Brazil: Excavations at the Fazenda Atlântica and Quinauá Sites. *Latin American Antiquity* 23 (4). doi: 10.7183/1045-6635.23.4.565.

Schaan, Denise. 2013. *Sacred Geographies of Ancient Amazonia: Historical Ecology of Social Complexity*. Walnut Creek, CA: Left Coast Press.

Staden, Hans. 1557. *Warhaftige Historia und beschreibung eyner Landtschafft der Wilden Nacketen, Grimmigen Menschfresser-Leuthen in der Newenwelt America gelegen*. Kolb: Marpurg. (Original German edition, 1557 available at: <https://archive.org/details/staden/page/n1>.)

Staden, Hans. 2008. *Hans Staden's True History: An Account of Cannibal Captivity in Brazil*. Edited and translated by Neil L Whitehead and Michael Herbsmeier. Durham, NC: Duke University Press. doi: 10.1215/9780822389293-002.

Stenborg, Per, Denise P. Schaan, and Camila G. Figueiredo. 2018. Contours of the Past: LiDAR Data Expands the Limits of Late Pre-Columbian Human Settlement in the Santarém Region, Lower Amazon. *Journal of Field Archaeology* 43 (1): 44-57.

Strauss, André, Rodrigo Elias Oliveira, Marina Gratão, Amelie da Costa, Emílio Fogaça, and Eric Boëda. 2018. Chapter 7. Human skeletal remains from Serra da Capivara, Brazil: Review of the available evidence and report on new findings. In *New Perspectives on the Peopling of the Americas*, edited by Katerina Harvati, Gerhard Jäger, and Hugo Reyes-Centeno, 153-171. Words, Bones, Genes, Tools: DFG Center for Advanced Studies Series. Tübingen: Kerns Verlag. ISBN: 978-3-935751.

UNESCO. ND. Serra da Capivara National Park. UNESCO World Heritage Centre. <http://whc.unesco.org/en/list/606>. Accessed January 2, 2019.

Vialou, D., M. Benabdelhadi, J. Feathers, M. Fontugne, and A. Vialou. 2017. Peopling South America's centre: The late Pleistocene site of Santa Elina. *Antiquity* 91 (358): 865-884. doi:10.15184/aqy.2017.101.

Watling, Jennifer, José Iriarte, Francis E. Mayle, Denise Schaan, Luiz C. R. Pessenda, Neil J. Loader, F. Alayne Street-Perrott, Ruth E. Dickau, Antonia Damasceno, and Alceu Ranzi. 2017. Impact of geoglyph builders on Amazonian forests. *Proceedings of the National Academy of Sciences*. 114 (8): 1868-1873. doi: 10.1073/pnas.1614359114.

Watling, Jennifer, Myrtle P. Shock, Guilherme Z. Mongeló, Fernando O. Almeida, Thiago Kater, Paulo E. De Oliveira, and Eduardo G. Neves. 2018. Direct archaeological evidence for Southwestern Amazonia as an early plant domestication and food production centre. *PLoS ONE* 13 (7): e0199868. doi: 10.1371/journal.pone.0199868.

Wikipedia contributors. 2019. Amazon River. In *Wikipedia, The Free Encyclopedia*. https://en.wikipedia.org/w/index.php?title=Amazon_River&oldid=877516439. Accessed 22:19, January 9, 2019.

Wikipedia contributors. 2018. SciELO. In *Wikipedia, The Free Encyclopedia*. <https://en.wikipedia.org/w/index.php?title=SciELO&oldid=874618690>. Accessed 00:00, January 10, 2019.

Footnotes

[1] This was taken from the current Home page for the Museu Paraense Emílio Goldi at <https://www.museu-goeldi.br/>, accessed January 8, 2019.

[2] Homepage for their Human Sciences bulletin at <http://editora.museu-goeldi.br/humanas/>.

[3] Digital books with some in English (Livros digitais) at <https://www.museu-goeldi.br/assuntos/publicacao/livros-digitais>.

[4] The Brazilian Archaeological Society home page (Portuguese) is at <https://www.sabnet.com.br/>.

Recommended Citation

Messenger, Lewis C., Jr. 2019. "Uncovering Amazonia." *Open Rivers: Rethinking Water, Place & Community*, no. 14. <http://editions.lib.umn.edu/openrivers/article/uncovering-amazonia>.

About the Author

Lewis C. "Skip" Messenger Jr. is a Professor Emeritus from Hamline University in Saint Paul, Minnesota. His passion is teaching and introducing students to other cultures through his numerous study abroad courses in Latin America and Southeast Asia. His practice was anthropological archaeology with regional interests in Mesoamerica, primarily the ancient Maya, but also in the origins and developments of complex societies in moist ecosystems in other parts of the world. These interests were influential in his early recognition of the role climate changes may have played as sources of stress on the development of ancient civilizations. This expanded his regional focus to include Southeast Asia, the Andes and Amazonia, and elsewhere. He began research on climate change and human affairs in

the late 1970s and published in the journal *Ancient Mesoamerica* (Ancient Winds of Change—Climatic setting and prehistoric complexity in ancient Mesoamerica [1990]; Los Mayas y El Niño—Paleoclimatic correlations, environmental dynamics and cultural implications for the ancient Maya [2002]). Later he began introducing his students to these concepts and included them in his research. He is proud of his record of having integrated climate change with anthropological archaeology for more than three decades with his Hamline students.