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## Hidden Earthworks in the Forests of the Bolivian Amazon

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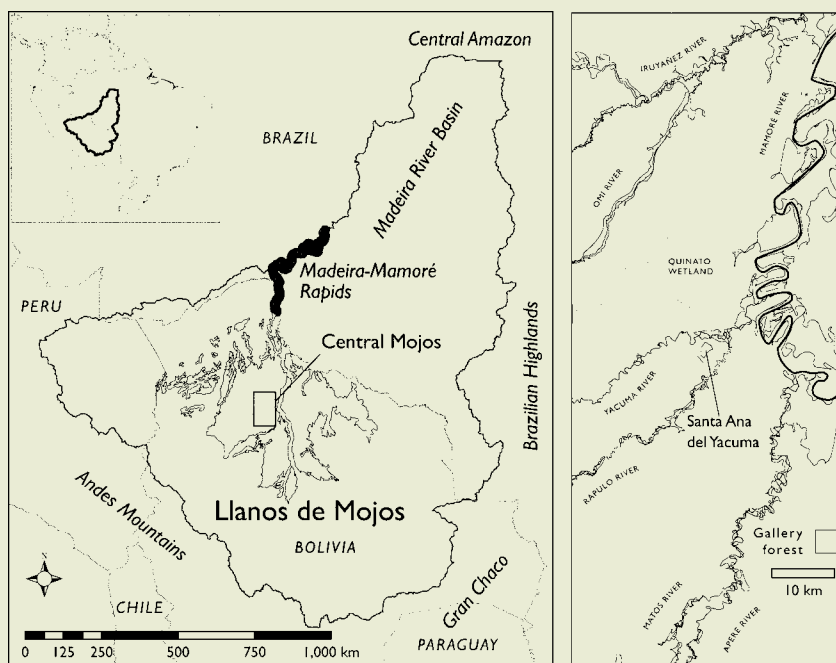
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# HIDDEN EARTHWORKS IN THE FORESTS OF THE BOLIVIAN AMAZON

BY JOHN H. WALKER

**T**HE ANDES AND THE COAST of Peru are famous for spectacular places and things: the mountaintop city of Machu Picchu, the mysterious Nazca lines, and elaborate Moche gold work. Archaeologists in the lowlands point to other phenomena: the first pottery in the Americas from the lower Amazon River, and archaeological sites stretching for kilometers beneath modern Brazilian cities. Today, most scholars are convinced that early Amazonian societies were populous and complex, and they work to understand how indigenous peoples wove their own histories from environments that they helped create and maintain.

These histories are coming to life in the Llanos de Mojos, or more simply, Mojos, (MO-hos), a tropical wetland larger than the state of New York, located in the eastern lowlands of Bolivia. Since the 1960s, geographers and archaeologists have come here to study abandoned canals, causeways, and raised fields to better understand how these man-made features changed the environment. In our imagination, “Amazon” stands for pure nature, untouched by bulldozers and chainsaws. But even if some parts of eastern Bolivia have never heard an internal combustion engine, for centuries they heard the muffled thumps of wooden digging sticks, the crackle of prairie fires, and the calls of fishermen harvesting



The Llanos de Mojos is part of the Madeira River drainage, an Amazonian tributary that moves twice as much water as the Mississippi River. The region borders the Andes, the Middle Amazon, the Gran Chaco, and both southeastern and western Amazonia.

their catch. Humans have lived in the Amazon Basin for thousands of years, planting and tending trees, burning grasslands, building and maintaining earthworks, and channeling water. No part of the Amazon is untouched, no area of ancient “virgin forest” can be contrasted with the logged forests of today. Like the rest of the world, the Amazon is made up of environments created by people.



Every year, the Mojos countryside changes from savanna to soggy wetland. Trickling streams that can be jumped in July turn into broad rivers that submerge entire forests in January. These photos show the same landscape in the dry season (top) and the wet season (bottom).





## LANDSCAPE HISTORY

By examining the landscape closely, we can better understand the history of pre-Columbian peoples. This particular historic episode comes from an area covered by three different kinds of earthworks that were built and used along three Amazonian rivers around AD 600. These landscapes are direct evidence of different kinds of farming, and represent solutions to specific political, environmental, and economic problems. When we interpret the landscapes as an accumulation of choices made by communities, Mojos and other parts of South America come into focus as multiethnic, multilingual societies, made up of farmers, fishermen, traders, chiefs, and shamans.

Mojos is a seasonally inundated savanna in the southwest Amazon. The dry season reaches its peak in July and August, when little rain falls, and dust and smoke color the sunsets. In January and February, it rains for days on end and rivers begin to rise. The same river we cross in February by paddling our canoe through the canopies of trees, we cross in August on foot, hardly getting our pants wet. The combination of savanna and forest supports a varied population of plants and animals, from giant anteaters to lungfish. Mojos is also the southern half of a larger region that linguists characterize as one of the world's most diverse, encompassing more than 50 languages from 8 different stocks, with 11 isolated languages.

Within this region we are documenting distinct archaeological landscapes along three rivers, all within 100 km of one another: the Iruyañez, the Apere, and the Yacuma. To the north, large raised fields line the levees of the Iruyañez. To the south, long causeways and blocks of raised fields fill the savannas alongside the Apere. In the middle, along the Yacuma, an area I recently investigated, the landscape includes large raised fields as well as distinctive earthworks called ring ditches. Recent satellite imagery, now made public through the internet, makes it clear that ring ditches are associated with large raised fields, something we were not sure of as recently as one year ago.

In Mojos, a ring ditch is a complex of earthworks that includes a circular or polygonal ditch enclosing at least one half ha (hectare), but usually between one and three ha. These ditches range between one and four m in depth. Ring ditches can be found with other



Above, at the height of the wet season, Adalberto Rapu Lucu leads our canoe through the canopy of trees in the flooded forest. In the dry season, you can reach above your head and pick fishhooks out of the branches, where they were lost six months before. Below, raised fields near the Iruyañez River are evidence of how farmers improved soil conditions and coped with both drought and inundation. These fields average 20 m wide by 200 m long.





Above, the dike around Santa Ana del Yacuma protects the modern town from annual inundation, serves as a dock for large riverboats in the wet season, and is a “beltway” for motorcycles, trucks, cars, and scooters. Below, ranchers often light fires in the grassland, to open up the savanna and promote growth of new grass. Anthropogenic fire shapes the savanna today, and probably has done so for at least several thousand years.



earthworks, including an interior mound or mounds, canals, and interior pits. Ring ditches are usually associated with surface ceramics and artificial soils that have been changed through the addition of charcoal and other organic materials. They are found on islands of high ground covered with forest rather than open savannas, although the history of forest and savanna in Mojos is complex: forested locations may have been savanna in the past, and vice versa.

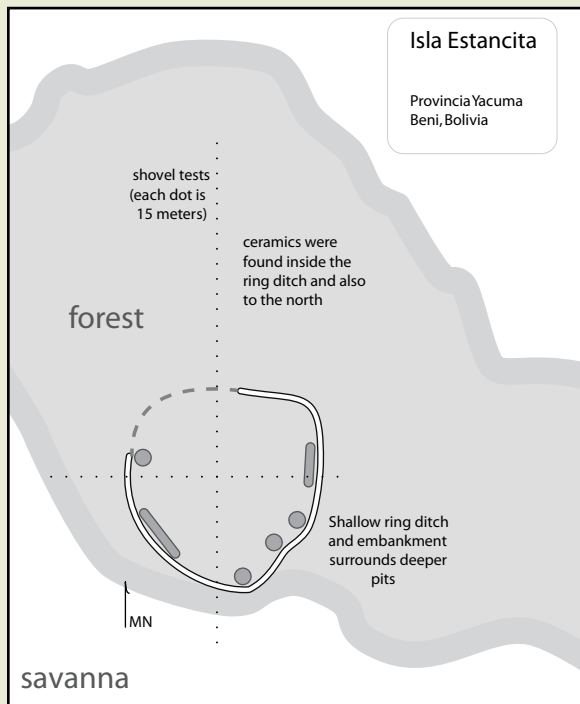
The lands alongside the three rivers—all with similar environments—were designed and altered to different specifications, for different purposes. How should one interpret these differences in such a small region? My approach makes three assumptions. First, agricultural infrastructure is linked to social life in complex but direct ways. For example, communities build shared resources such as irrigation ditches or orchards, and then create political structures to maintain those resources. However, not all communities build and maintain their earthworks in the same way. Second, agriculture has not evolved predictably over the centuries, with the use of “primitive,” then “advanced” methods. For example, slash-and-burn farming depends on metal tools (never found in the Amazon prior to their introduction by Europeans), and is therefore most likely a post-contact development, not a primitive form of farming. Third, climate, topography, and soils are not the only factors that determine what people plant or how they farm. To plant cassava or corn is a choice, and when a household or community makes that choice, they consider their political and economic situation, as well as cultural and environmental factors.

In *The Art of Not Being Governed*, James Scott suggests that communities organize in response to specific political circumstances, and some groups may choose not to join the modern world, preferring to live in a more “primitive” way. Scott connects these ideas to geography, as he discusses a remote region in highland Southeast Asia where communities such as the Hmong or the Montagnards avoided assimilation and entanglement with the state. For Scott, farmers are not defined by their use of paddy rice or slash-and-burn agriculture. Instead, people adjust their farming methods, move up into the mountains or out into the swamp, even define their ethnicity, choose their language, or change their politics in ways that specifically benefit them.



## FOREST ISLANDS AND RING DITCHES ON THE YACUMA RIVER

In Mojos and across southern Amazonia, circular ring ditches are the predominant form of pre-Columbian earthworks. One of ten such ring ditches that we have investigated is located on an island of trees near the Yacuma River. Estancita Island is an irregularly shaped island of forest, seven ha in extent, located just north of Santa Ana del Yacuma, Bolivia. A complex of pre-Columbian earthworks marks the southwestern part of the island, including a group of large pits or hollows (about 20 m across), surrounded by a shallower ring ditch and embankment. The ring ditch traces about three quarters of a complete circle, roughly 145 m in diameter. The highest ground on the island lies within this circle. The ring ditch varies in height between 50 cm and 1 m between the top of the embankment and the bottom of the ditch. The hollows are about 2.5 m deep, and retain water deep into the dry season. Soil



Two lines of shovel tests and the corresponding results are shown in this diagram of excavations at Estancita Island. The ring ditch is about 145 m across, about the same size as similar earthworks that are found across 1500 km through Brazil and Bolivia.



Above, a Giant Anteater (*Myrmecophaga tridactyla*) strolls across the marsh, looking for an afternoon meal. Giant Anteaters are one of the few large mammals that can be seen on the savanna. Their hooked claws are used to break open rock-like termite mounds to reach the insects. Below, cattle frequent the high ground at Estancita Island, to escape the floodwaters and sometimes to give birth. Ranching is the most important activity shaping the environment in Mojos today.







cores from the center of the hollows yielded more than 80 cm of dark soil mixed with broken pottery. Ring ditches were probably built as parts of settlements, even if the dark organic soils were later used as agricultural land.

Small “shovel test” samplings provide evidence of settlement at Estancita Island. Dark soil containing ceramics and burned earth extends for 330 m along the east-west transect and 660 m along the north-south transect. Earthworks are associated with this artificial soil, but dark soil is also found to the north of the earthworks. The northern limit of the complex of earthworks is not well defined. The earthworks have two distinct cultural components, suggesting that they were built in stages, used and reused over several generations. The interior group of hollows may have been used to store water, but they do not form a complete circle, allowing access to the center. The outer ring ditch seems too shallow to have served as an effective defense, although it could have clearly defined the limits of, or a division within, a settlement. Spaces between the interior hollows may represent entrances into the village. These particular earthworks have no clear hydraulic function, although the removal of soil necessary for their construction causes water to accumulate, even if only over a small area. Understanding the movement of water will require both precise mapping and year-round observation.

The size of the ring is related to settlement population size. In a similar case to the north, test excavations were interpreted as evidence for towns of between 1,800 and 2,000 people, comparable to those

Top, to mark the ring ditch beneath thick tropical vegetation, Jaime Bocchietti, of the Santa Ana Museum, is facing outward on the top of the embankment, and the gray hat is in the bottom of the ditch. Middle, Trent McRae (far left) of the University of Central Florida stands on the inside edge of a large pit, just within the ring ditch at Estancita. The difference in elevation here, as shown by the rest of the crew, is about 2 m. Bottom, excavations under the forest at Estancita Island document the limits of a layer of artificial soil, which may come from domestic hearths.





A grove of motacú palms covers much of the northern part of the forest island. These trees have edible fruits, their leaves are used for thatched roofs and as fodder for horses, and they provide dense shade, making Estancita Island valuable land today.

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This white and pink stone “nutcracker” might have been used to open hard-shelled motacú fruits. Stone does not occur naturally in Mojos, so this mineral must represent trade with communities in the Andes or the Brazilian highlands.



Many potsherds are decorated with impressions of woven or stitched baskets. These basket impressions are likely to be the only archaeological evidence of baskets that will be found. In historic times, woven mats were used on the floors of houses.



Potters at Estancita Island and other locations to the north painted fine lines in repeating patterns on the outside surfaces of their pots, and also burned sponge to use as temper for their clay. This pottery has been dated to around AD 600.

described by Jesuit chronicles. At Estancita Island, the total area is smaller and a conservative population estimate would be about 500 people.

Two ground stone artifacts were recovered from shovel tests, including a white and pink quartzite stone, with a small circular pit; these stones likely served to crack seeds or nuts. Mojos has no source of stone, so this object or the raw material it was made from is an import from the Andes or possibly the



Stephanie Boothby and Trent McRae wash ceramics at the combination hotel, museum, pool hall, and family home in Santa Ana. The Museo Regional Arqueológico “Yacuma” occupies one room in this house, and contains the materials excavated by our projects, as well as donated materials.

highlands of the Brazilian Shield to the northeast. To date, the only stone tools we have found are finely made axes. Because the quartzite object is heavy and not well finished or polished, this raises new questions about trade in the region. Perhaps imported stone was also used to create objects of everyday life, such as seed- or nutcrackers.

The association between earthworks and fine line painting on pottery from the ring ditch at Estancita suggests a link to pottery found along the Iruyañez River to the north. These ceramics are securely dated to the 5th and 6th centuries AD. The earthworks were probably used at that time, placing them 800 years earlier than ring ditches studied and excavated in the eastern and northeastern parts of Mojos. This indicates that the Yacuma ring ditches are part of a long tradition of ring ditch architecture throughout the region.

## A RING DITCH TRADITION

Recent studies of similar earthworks in northeastern Mojos present a complex picture. There, the circles are well defined, with deep ditches and associated embankments. Ring ditches to the west of the Mamoré River enclose comparable areas, although they are generally shallower. Archaeologists agree that current evidence places these ring ditches in late prehistory, between AD 1300 and 1400. They are often found in





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Girls and boys line up as part of a celebration of Movima culture, hosted by the municipal government of Santa Ana. The colorful dresses are called *tipoy*, and are a tradition that extends back to the Jesuit period in the 17th and 18th centuries.



groups, linked by connecting ditches. Some ring ditches may have had a hydraulic function, draining or even moving water during the wet and dry seasons. Ring villages with tall, stout palisades are described in the ethnohistorical record, and some pre-Columbian ring ditches could have had this form as well.

Scholars do not agree on a single interpretation or function for all of these earthworks, as the archaeological evidence varies. The ring ditch tradition is identified with several groups that speak Arawak, a language that is found in Cuba and throughout the Amazon as far south as Mojos. Ethnohistorical documents from Mojos record that the Canichana, a group that did not speak Arawak, also lived in palisaded ring ditches at the time of contact. Ring ditches along the Yacuma River should not be directly associated with a single language or ethnic group; they are better interpreted as being linked to particular forms of political organization or particular survival strategies. Geographically, ring ditches are on the frontier between two well-established, distinctive agricultural landscapes. If agriculture is a political choice as well as an environmental adaptation, then ring ditches may have been used both by farmers, and by people who chose not to farm. The investment of labor in agricultural fields may have made communities vulnerable to organized violence from other groups, and ring ditches were places of refuge. Ring ditches may have also functioned as seasonal installations, reused every wet season to harvest forest or wetland resources. Alternatively, perhaps ring ditches represented a culturally defined safe place where different groups met on neutral ground for trade and negotiation.

Agricultural regimes in Mojos cannot yet be linked to particular systems of political organization. With further investigation, we may be able to see differences in social organization, ethnicity, material culture, and language. Ring ditches like the one on Estancita Island represent one of three distinctive patterns of settlement and economy within a range of only 100 km. Various uses for ring ditches represent choices made by communities, with even neighboring communities differing in the decisions they made. Mojos was a cultural mix of many different languages, types of material culture, and ways of life. The more we explore, the more we find that the same is true throughout the Amazon. 🏠

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He works as an archaeologist in the Bolivian Amazon, studying the link between social organization and spatial patterns.



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#### For Further Reading

- Balée, William, and Clark L. Erickson, eds. *Time and Complexity in Historical Ecology: Studies in the Neotropical Lowlands*. New York: Columbia University Press, 2006.
- Crevels, Mily, and Hein Van der Voort. "The Guaporé-Mamoré Region as a Linguistic Area." In *From Linguistic Areas to Areal Linguistics*, edited by Peter Muysken, pp. 151-179. Amsterdam: John Benjamins B.V., 2008.
- Denevan, William M. *Cultivated Landscapes of Native Amazonia and the Andes*. Oxford: Oxford University Press, 2001.
- Erickson, Clark L. "The Transformation of Environment into Landscape: The Historical Ecology of Monumental Earthwork Construction in the Bolivian Amazon." *Diversity* 2 (2010): 618-652.
- Prümers, Heiko. "Hügel umgeben von 'schönen Monstern': Ausgrabungen in der Loma Mendoza (Bolivien), Expeditionen in Vergessene Welten." *25 Jahre archäologische Forschungen in Amerika, Afrika und Asien, Forschungen zur Allgemeinen und Vergleichenden Archäologie* 10 (2004): 47-78.
- Scott, James C. *The Art of Not Being Governed*. New Haven: Yale University Press, 2009.
- Walker, John H. "Pre-Columbian Ring Ditches along the Yacuma and Rapulo Rivers, Beni, Bolivia, A Preliminary Review." *Journal of Field Archaeology* 33(4) (2008): 413-427.