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The pre-Colombian roads of geoglyphs sites in the state of acre: the tequinho site road complex

Abstract

This article prioritized studying the roads and paths that are interconnected to geoglyph-type sites in the Western Brazilian Amazon, not only because of their originality, but also to understand some issues that permeate the universe of geoglyphs, such as how was gave the spatial distribution of these roads in the region, what meaning they had within the sociocultural context of that society. For a more detailed analysis, the Tequinho site was used as the main object of the research, its characteristics and location being what most contributed to its choice, given that it is in the center of the region where the geoglyphs occur, and several roads and paths are linked to the site, and are noticeable in the landscape. The Tequinho site is understood as a public center for cultural and religious events, and its roads and paths are seen as central props in ritualistic ceremonies, as well as markers and boundaries in the landscape. This article also addresses the importance of the Iquiri River, which works, was part of the context of a land-fluvial network in the region of geoglyphs, in the east of the State of Acre, Brazil. During this work, ethno-historical sources were used as a theoretical framework, as well as the perspective of landscape archeology.

Keywords: Amazonian archeology, roads, paths, geoglyphs

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Introduction

In recent decades, archaeological studies carried out in the Western Amazon, notably in the State of Acre, show that there is considerable anthropogenic evidence proving that ancient Amazonian terra firme societies were more complex than the current model indicates.[1–3] Since the implementation of PRONAPABA (National Program for Archeological Research in the Amazon Basin), which began in the mid-1970s, a specific type of archaeological site has been extensively researched where there are geometric earth structures, called geoglyphs. Acre's geoglyphs are composed of ditches and windrows in geometric shapes. Often, ancient linear roads interconnect different geoglyphs and link them to nearby streams. About 400 geoglyph-type sites have been identified in recently deforested areas in eastern Acre State, southern Amazonas, western Rondônia, and the lowlands of northeastern Bolivia (Figure 1).[3–6] However, little attention has been paid to the roads and paths, and the other communication routes used by the builders and users of these pre-Columbian monumental works.

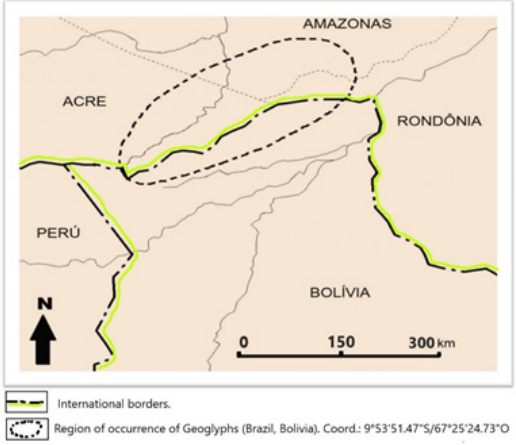

Figure 1 Map of the region of occurrence of Geoglyphs.

Source: Rubens Barros (2022).

Most types of Geoglyph sites have paths that connect one land structure to another, and to the region's streams, thus forming a possible terrestrial-river network. Some of the structures that are located above the headwaters of the rivers, generally, have sources of drinking water in their proximity, and are dispersed in the interfluves of the main rivers in the region. This leads us to think about the importance that this society gave to roads and paths as a facilitator of movement and communication in the region. In the tropical lowlands of Bolivia, where comparable archaeological sites have been documented,[7,4,8] the use of footpaths and canals for canoe traffic has established an efficient and sophisticated means of transport move in the region, possibly even serving as artificial markers within and between communities, also exercising important political and ritual functions.[9]

The study of these ancient means of communication is fundamental not only to understand social development, but also because it is evidence that allows the reconstruction of multiple aspects related to cultural, political, and economic interaction. Roads and paths are an expression of the way in which human groups organize social space based on the geography of the terrain, constituting authentic vehicles for exchange.[10] People traveled along these roads and paths, who in turn were carriers of objects and traditions, goods, and ideas. Undoubtedly, these roads and paths played an active role in the daily life of the society that built the geoglyphs by connecting different places, whose relevance was determined by the level of social development.

Based on these statements, this article intends to address this issue and contribute to future research in the region and, fundamentally, to draw attention to the importance of this pre-Columbian road network, synthesizing a range of information related to roads and paths. From this object of study, it is possible to reach an understanding of multiple aspects of the life of its builders and the geographical environment in which they circulated.

This article has as objectives to be achieved, firstly, (1) to carry out a spatial survey of the roads and paths that have some relation with the Tequinho geoglyph type archaeological site, determining its

location and direction; (2) investigate possible relationships that the Tequinho site had with other archaeological sites found in the region of analysis. And later, define the characteristics of the roads that interconnect the structures of the Tequinho site; identify if there is any pattern of construction of roads and paths and their relationship with the landscape.

To obtain quantitative knowledge, 289 geoglyphs were analyzed using satellite imagery, in order to know the occurrence rate of roads and paths in the region. And, as the main object of analysis, only the Tequinho geoglyph type site, which presents a good variability of roads that will help in the understanding and formulation of concepts, from which it will be possible to make a reflection and discussion about the theme proposed by this article. Allied to this, an approach of landscape archeology and ethno-historical sources was used, which were fundamental for the construction of a broader knowledge of the object of this article.

Theoretical reviews

Roads and paths in the archaeological context

Archeology shows us that certain pre-Columbian groups knew how to manage the environment, developing sophisticated transformations in the landscape, such as the rocks, elevated fields, sidewalks, and roads. And that these groups were not restricted to the banks of large rivers, but also occupied the mainland.[4,11–15] Land management, as in the case of roads, is a strong indicator, within Amazonian archeology, of sociocultural complexity.[9,16] In Brazil, at the end of the 19th century, researcher Joseph Steere reported the presence of landfills on Marajó Island.[17] Another example of earthworks is brought by José Vieira Couto de Magalhães, who gives news of an old construction, which consisted of a kind of circular "fort" of earth, which according to him existed on Ilha do Marajó, on Fazenda Cajueiros, in owned by Joaquim José de Assis, this monument, he claims, is contemporary or later than the landfills on the same island.[18]

According to Schaan *"the anthropogenic transformations of the landscape are recurrent features in complex societies"* As a result of this complexity, these hierarchically constituted groups built true *"cities"*. These large villages were integrated into vast areas of the Amazon, through networks of cultural and economic exchange.[14,19–21]

As evidence of this sociocultural interaction, Antonio Porro[22] states that, unlike the coast, the Amazon had a rich and diversified intertribal trade, before the arrival of Europeans in the region. This trade took place, mainly, through an exchange network that used both waterways and land routes, and that these land routes, the further away from the banks of the rivers, the better they were. The existence of an intertribal trade that used a terrestrial-river network is, undoubtedly, proof of the importance that pre-colonial societies gave to roads, fundamental within the context of integration and the system of exchanges over long distances.

Within this context, the roads and paths associated with the geoglyphs resemble a network of paths of the Apurinã Indians away from the banks of the Purus River in the municipality of Boca do Acre - AM (Brazil), used for communication and exchange (Virtanen, 2014) , as well as the wide and long well-defined roads in the landscape in the upper Xingu, which interconnected the old Xingu villages, thus creating a standard network of roads, which linked larger housing centers to small villages, on a regional scale.[14,16] In the same way, the complex networks of roads and channels dedicated to communication, and to the transport of consumer goods, in the regions of Baures and Llanos de Mojos, in the Bolivian Amazon, totally transformed the pre-Columbian landscape, thus demonstrating a society that invested in collective works, moving large amounts of earth.[4,9,23] The Apurinã roads, as well as the roads that cover the vast territory in the Upper Xingu, and the roads connected to the islands of habitation in the Bolivian Amazon, possibly have something in common with the geoglyph roads in Acre (Figure 2). In short, these spaces consisted of public places of social interaction, where people who lived dispersed throughout these regions integrated and interacted.

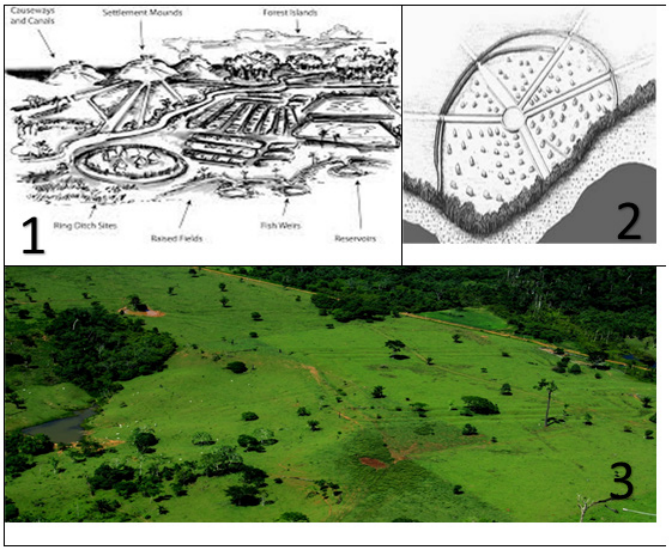

Figure 2 1: Llanos de Mojos (Bolivia) Source: Erickson;[9] 2: Xingu village (Xingu) Source: Heckenberger[14] and 3: Tequinho (Acre) Source: Saunaluoma.

Spencer and Redmond[11] analyzed a network of elevated paths in the Llanos region (wet area) in Barinas, Venezuela. The researchers came to the conclusion that these elevated paths or elevated walkways were much more than just an adaptation to seasonal flooding, these earthen structures were a fundamental part of the regional infrastructure that supported the political, military, and religious institutions of the late Gaván society (550-1000 A.D). Information like this reinforces the idea that roads and paths represent much more than just adaptations to the natural environment, given that the societies that used this mechanism, undertook a lot of energy in the construction of their road complexes.

A good example of this comes from Schaan & Silva who identified artificial lakes on Marajó Island, these worked as fish reservoirs and water reservoirs in the dry season, the researchers say that the sediments excavated from these lakes were used in the construction of dams, hills and paths, these paths united distinct structures.

Another good example is that of the German ethnologist Curt Nimuendajú[24] who found evidence of connecting paths between villages in the ancient Tapajós. These paths were almost straight and approximately five feet wide and a foot deep, denoting the great effort expended by their builders.

Roads and paths also served as links, as William Denevan[25] attests, between the floodplain and the mainland, being, therefore, how pre-Columbian communities benefited both from the resources of the floodplains and from the land firm, strategically exploring both environments. Pärssinen and colleagues[1] infer that the floodplain of the region between the Juruá and Purus rivers were connected to the mainland nations, through good roads, and that they maintained a trade through them. Regarding the geoglyphs, they add that the *"obvious variability in the forms of settlements seems to reflect shared*

cultural patterns and a common cosmovision, as well as a peculiar social organization where the planning model (...) would reveal some social patterns".[1]

Recent research in Acre attests to the existence of pre-Columbian circular villages composed of small mounds evidencing permanent occupations.[26] These sites also have roads, positioned at a main entrance to the circle of mounds, and in some cases, they go towards the river network of the region.

Roads, paths, and waterways in the ethno-history context

The ethno-historical texts also give us information about groups that practiced earthmoving in the Amazon, showing that the Amazonian peoples for a long time transformed the landscape in their favor. The president of the province of Mato-Grosso José da Silva Guimarães, in the year 1815, on a trip to the land of the Apiacás indigenous group, narrates that they went to a river called "Peixe" or Itamiamy to look for stones to make their axes, and to fight three different enemy nations: Tapanhóna, Tapanhóa-nauhum and Timaóana. What stands out most in their narratives is the description of a populous village in the Tapanhóna nation: *"These Indians tend to lay steppes and make holes around their quarters"*.[27]

Furthermore, José Manoel Pando, describes a place where he camped together with his team, as being naturally defended, forming a kind of garden, surrounded by Ficus and wild cane, and isolated by a low ground near the Inambari River, on the border between Acre and Bolivia, at the time, Pando was unable to specify who had built such a structure.[28]

Karl Von den Steinen describes the Parecis group as being excellent builders of many ditches, in which they hunted many species native to the forest, such as deer, rheas and many others. *"These Indians use idols: these have a separate house with many figures of various shapes, in which only men are allowed to enter; these figures are very hideous, and each one has its gourd horn which the so-called Gentiles say belong to the figures"*.[29] Von den Steinen[29] adds that the Parecis were so clean and perfect in everything that even their roads were very straight and wide, and they were kept so clean that not a single leaf could be found.

Father Samuel Fritz narrates a surprising story that he would have witnessed in Jurimaguas indigenous lands, between 1689 and 1691. Fritz[30] describes a ritual that the Indians did when playing a flute, and when he asked what it was, he was told who called the "Guaricana" that way, which according to them was the devil, who since the time of their ancestors, visibly came and helped them in their villages, and they always made him a house apart from the village, inside the forest, and there they took him drink and the sick that they might be healed. This example illustrates one of the possible ways of using geometric earth structures found in Acre, given that Saunaluoma and Schaan[31] suggest a ceremonial character for such structures.

Of the countless reports of travelers and explorers who, since the beginning of the colonial occupation, affirmed the importance of roads, paths, berths and many other synonyms that land roads have in the Amazonian bibliography, the oldest that we have news comes from Friar Gaspar de Carvajal. In his chronicle about the discovery of the Amazon River, Carvajal[32] reports the existence of several indigenous groups that inhabited the banks of the great river, and that from there started many perfect and clean paths inland, and as these explorers entered the forest, these paths widened and multiplied, leaving the Spaniards very frightened by such a grandiose engineering work. Chronicles like this attest that in the Amazon, even before contact, there was a network of paths, as important as the waterways: they were *"more than simple trails, which left the riverside villages to the interior and served the intertribal trade"*.[22]

Prince Adalberto of Prussia (1847) in his travels through the interior of Brazil often describes the existence of what he calls "paths" used by the Indians as the only land way of communication with the upper Xingu, connecting two rivers and even villages. The Cayapós, according to Machado D'oliveira[33] were never a wandering group and were always linked to the territory of their ancestors, and for that reason they built wide avenues that left their villages towards other villages, as well as towards the rivers in the region.

The British researcher and naturalist Alfred Russel Wallace,[34] in his travels along the Amazon and Negro rivers in 1851, describes various indigenous trails and roads, as well as indigenous road-building groups. He accurately reports its measurements and characteristics: these vary between 20 and 30 feet in width and extend in some cases up to 50 miles in a straight line into the forest, linking supposedly distant communities. Wallace even compares it to "streets" because they are so clean, well-cared for and laid out. The explorer describes that beside these paths there were numerous species of palm trees from Irajá, Buriti and Piaçava, the latter used in making brooms for cleaning the roads. This took place in a harmonious and communal way, where everyone was involved in repairs and cleaning: *"all this is done willingly with greater joy and good humor"*.[34] Wallace draws attention to the "holes" that connect rivers and lakes. These paths, according to Wallace, stretched between lakes, through narrow inland channels through many miles of dense flooded forest, crossing the Madeira, Purus and other smaller rivers.

What's more, Ten. Colonel of the Brazilian Army, Engineer Ricardo Franco de Almeida Serra, in the year 1800, was in the region of Moxos and narrates the ease with which indigenous groups moved between rivers and over long distances, including by land, in search of cocoa to make chocolate on the banks of the Madeira River.[35]

When the Brazilian Army Colonel, Candido Rondon, on his expedition to build the communication line between Mato Grosso and the region currently known as the State of Rondônia, in 1907, at the time an inhospitable region inhabited by indigenous people from various nations. Rondon identified and used several roads of the Parecis Indians that greatly facilitated the advance of the expeditioners, and later, the construction of lines of communication.[36] The same trails were used by Edgar Roquette-Pinto, when he was studying the natives of the region.[37]

In relation to waterways, these have always been seen as facilitators in the displacements of natives in the Amazon, with land routes being a complement within this context. The main rivers were considered important, but the streams could also have the same function of serving as movement corridors. The igarapé, which means "paths of canoes" in the general Amazonian language,[34,17] played a fundamental role in the process of occupation and exchange in the Amazon. The Acre region, as described by Castello Branco,[38] is watered by several watercourses, "true walking paths" occasionally crossed by indigenous trails that linked one basin to another.

The Colonel Ernesto La Combe[39] comments that the natives of the upper Amazon preferred to travel along the rivers and their tributaries, and only used land routes when the waterways offered difficulties and dangers, and he adds that The river network that crosses the vast Amazon plain is so wide that in many places the rivers, tributaries or sub-tributaries, close to each other in such a way that only a narrow

strip of land separates them. These strips when separating rivers belonging to distinct basins are called isthmuses.

In 1880, Liberato Barrozo explored the entire length of the Paraná-Pixuna River, starting from Vila de Humaitá, on the Madeira River, in canoes manned by Bolivian Indians and reached the Purus, thus proving that the said channel, or Paraná, as it was called, joined the Madeira to the Purus.[38]

Roads and paths in the acrean region: ethno-historical information

When it comes to the region that comprises the current state of Acre, what draws attention is the narratives of the trailblazers. One of the first, Manoel Urbano, reports that the Muras Indians, who lived at the mouth of the Paraná-Pixuna, passed from the Madeira River to the Purus River by a path, and from there, crossing to the Tarauacá River, they walked one day by land, arriving on the right bank of the Juruá River.[40] Manuel Urbano, in 1864, entered the Mucuim River, going up until it found the Madeira River, from where he returned by the same route thirty days later. He navigated the Mucuim River for 15 days, passing from there by land in two days to the Madeira River near the Teotônio Falls. The Conibos of Juruá and Maneteneris of Purus used two paths to go from one valley to the other. In the past, they used to make these trips via the Taraucá River and the Envira River, but due to the attacks of the Nauás Indians, at the mouth of the Taraucá, they started to go up the Juruá River only to the mouth of the Ira-açu lake.[38] Likewise, Euclides da Cunha (2000) also narrates similar experiences and the same paths/varadouros that connected the Juruá River to the Purus River.

João da Cunha Corrêa, in 1857, also attested to these same connecting routes between the Purus and Juruá valleys, and reports two indigenous trails that depart from the Juruá River to the Purus: the first departing from its lower section and leaving far below the mouth of the Chandless River, and the second starting near the sources of the Jurupari River and reaching those of the Pequeno Tarauacá River, whose outlet fell on the left bank of the Purus River.[38]

The English geographer William Chandless narrates an encounter he had with Indians who had come from the vicinity of the Purus, the route they had used consisted of going down the Cuniná River to the Tapuá River, after going up the Tapuá they passed over land dragging their canoes through a pier to the Chiruã river, leaving in the Juruá river.

Another account is that of the Brazilian engineer João Martins da Silva Coutinho, in charge of exploring the Purus River in 1862. He describes in his report that the Maneteneris Indians of the Purus traveled to the headwaters of the tributaries of the Beni River to buy beads from the tribes that lived there.[41] Reports like this attest that this region was more integrated than previously thought.

In 1904, the Peruvian naval officer Germano Stiglich,[38] met several Brazilians in the Javari River, who told him about a crossing they were used to making. He recorded it in one of his reports:

"sertanistas enter through Javari, going up the Itacoai to the headwaters; from there, by land, looking for the slopes of the Ipixuna; reach them; transmute it; descend the small tributary; they arrive at Juruá; they sail to São Felipe, where they inflect, penetrating the Tarauacá, the Envira and the Jurupari as far as their light canoes go up; leave them; they break again by land to find the Purús in the outskirts of Sobral; descend, embarked 760 km from the great river to the mouth of the Ituxi; and, taking the latter path, after another crossing over land, reaching the Abunã, which descend, finally embroidering the left bank of the Madeira".[42]

According to Father Nicolas Armentia, there is communication by land between the Orton River, which flows into the Beni River, 42 miles below the mouth of the Madre de Dios River, with the Acre basin, through berths, some starting from its banks and others cutting it in that direction that is further south.[38] Paths and roads such as these, also described by José Manoel Pando, in his exploration of the Acre region, attest to the significance of such links between rivers and indigenous communities spread throughout the Western Amazon region.[28]

Peter Gow[43] reports the achievements of Carlos Fermin, who "discovered" the crossing point between the Mishahua and Manú rivers, and the "discovery" of Delfin Fitzcarrald, between the Sepahua and Cujar rivers. In fact, these two just used standard routes used by the Piros Indians to communicate between the Ucayali valleys – Urubamba, Manú, Piedras, Juruá and Purus, which had been involved in a complex system of long-distance exchange since time immemorial.

This ethno-historical information confirms the importance of land routes associated with waterways, corroborating the existence of a vast road network for displacement and communication, which not only included paths on the mainland, but also included the main rivers and their tributaries throughout the region. Amazon region.

The geoglyphs of acre

Archaeological investigations in Acre only began in 1977, with researchers Ondemar Dias and Franklin Levy, both from the IAB (Instituto de Arqueologia Brasileira), who at the time were members of PRONAPABA, coordinated by Betty Meggers and Clifford Evans from the Smithsonian. Institution, and carried out between the years 1977-1980. The project aimed to establish the patterns of settlement, the diffusion routes of past societies, as well as to describe the cultural characteristics in the Amazon region.[44–47] In general, the methodology used by the researchers in their fieldwork consisted of collecting surface artifacts, performing preliminary topographic mapping, and, finally, documenting the sites found by means of photographs. In some cases, stratigraphic surveys were carried out in order to collect a greater amount of archaeological evidence.

Since the seventies of the last century, to the beginning of this century, little has been produced in terms of Archeology in the Acre region, except for the cases of geometric earth structures and the sites of circular mounds. Geometric earthen structures with trenches were only discovered during the first archaeological investigations in Acre, and they remained unknown to the public until the mid-eighties of the last century, thanks to the efforts of Paleontologist Alceu Ranzi, who in 1986 understood to be facing of something monumental. It was only from there that the scientific community had its interest aroused in relation to archaeological sites in Acre. On that occasion Ranzi baptized the earth structures of Acre as geoglyphs.[46] As for the circular mound sites, despite having been discovered at the same time as the geoglyphs, they are only now receiving greater attention. These sites are composed of a few mounds of earth in a circular or oval shape, varying between 10 m and 25 m in circumference, and 0.5 m and 1.5 m in height, and together they form, in some cases, a circle of approximately 100 m,[6] these sites also have a main road, which in some cases leads to the region's streams (Figure 3).

Figure 3 Campo Esperança circular mound site.

Source: Saunaluoma.

It is only in recent years that archaeological and anthropological research in the Acre region has intensified, thanks to the partnership of Brazilian and foreign researchers, with emphasis on the relevant work done by researchers: Denise Schaan, Martti Pärssinen, Sanna Saunaluoma and Pirjo Virtanen, who has contributed to his research on geoglyph-type sites.

The geoglyphs of Acre are enclosures surrounded by ditches, mainly circular and/or square, whose size varies in most cases, between 100 and 300 meters in diameter or width. These sites are located on the interfluvial plateaus of the Acre, Iquiri and Abunã rivers, preferably at an altitude of 180-280 m.[5] Most of them are located close to the region's streams, and to these they are connected by roads, which are usually straight and bordered by walls, almost imperceptible in the landscape.

The tequinho site

The Tequinho archaeological site was discovered in an overflight carried out in August 2007 by researchers from the "Geoglyphs of Acre" project.[47] The archaeological site is 55 km away from the capital of Acre, Rio Branco. Access is via BR-364 (for 22.5 km) towards Porto Velho – RO, until reaching the place called 4 bocas; from there, turn left onto BR-317 (where it continues for 30.5 km) towards Boca do Acre - AM, until reaching Vila Pia; turn right on the Pelé branch (2.0 km) until the junction with branch 49, where the residence of the owners of Colônia Santo Antônio, Mr. Raimundo (Tequinho) and Mrs. Fátima da Silva, who have lived in the area for about 30 years.

The site is on the edge of a relative geological depression, caused by soil erosion, which is caused by the washing done by the surface runoff sheet. According to Guerra[48] this happens when the clay breaks or collapses into the soil, due to deforestation. The vegetation that surrounds the site is basically composed of a secondary forest, resulting from several sessions of deforestation for cattle grazing (Figure 4).

Figure 4 The Tequinho site, highlighting its roads and paths.

Source: Google Earth on 9/5/2013.

The site was built on an elevated area, 180 m above sea level, in a privileged position in relation to the Iquiri River valley. The Tequinho site is located in a central region, in relation to the area of occurrence of the geoglyph-like structures identified so far.

The site is composed of two earthen structures with a square geometric shape, the main structure (A) measuring 206 m x 206 m, consisting of three ditches, arranged in parallel (Figure 5). Inside there is a rectangular structure formed only by walls. It is interesting to observe that this structure (A) has four roads (Entrance/Exit), which initially start from its external walls until they are lost in the horizon. They are located, respectively, in their sectors NO (E1) (the main), SE (E2), NE (E3) and SW (E4).

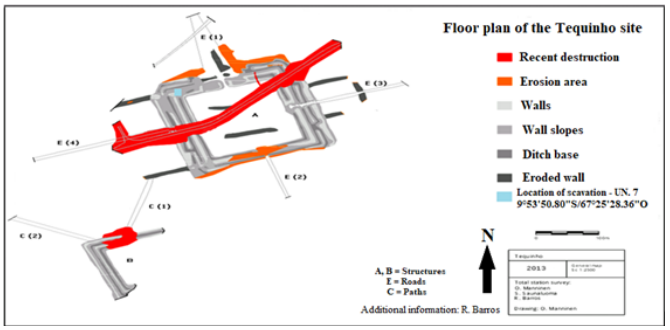

Figure 5 Floor plan of the Tequinho site.

Source: Rubens Barros.

The secondary structure (B), located southwest of the main structure, with dimensions of 120 m x 120 m, has basically the same characteristics as the first structure, except for the fact that it has only two parallel ditches. The structures are connected through a path (C1), NE/SW, almost imperceptible in loco, measuring 146 m. The structure (B) also shows traces of another path (C2) with 332 m in length, arranged in a SE/NW direction, and going towards the road (E4). Both structures (A and B) are impacted, mainly due to a natural depression, or lowering of the ground, which occurred in the southern sector of the site after its construction, and by the construction of a recent branch, which cuts the site from east/west., and pasture for dairy cattle, the colony's main economic activity.

The most recent archaeological research, which was carried out by the projects "Musealization of the Tequinho site" by UFPA, coordinated by Dr. Denise Schaan, and "United in Diversity: Monumental Landscapes, Regionality, and Cultural Dynamism in the Pre-Columbian Western Amazon", financed by Academy of Finland and coordinated by Doctor Martti Pärssinen from the University of Helsinki. Mapping and excavations were carried out at the site in 2012 and 2013. Preliminary results indicate that the archaeological material is mainly concentrated in the elevations, especially in the mounds near the main entrance on the northwest side of the site. The central flat part and the roads are without remarkable archaeological deposits.

The roads and ways of sítio tequinho

For a better understanding of the site and its surroundings, it was necessary to build a descriptive table of the roads and paths, allowing not only a systematic record of such structures, but also to try to understand the meaning they have within the context of study of the geoglyphs, after all, these structures are also part of the archaeological site (Table 1). A structural analysis of the formal organization of the roads and paths that are arranged in the region of the geoglyphs will enable a better understanding of past social interaction, the spatial occupation of the region, and who knows, the practice of daily life of the builders and road users.

Table 1 The roads and paths of the Tequinho site

Structures	Location on site	Typology	Extension	Initial width	Geographical Coordinates
A	North Sector	Road (E1)	1,15 km	63 m	9°53'49.28"S 67°25'26.03"O
A	South Sector	Road (E2)	167 m	7.5 m	9°53'53.87"S 67°25'22.57"O
A	East Sector	Road (E3)	1,46 km	5 m	9°53'49.83"S 67°25'21.58"O
A	West Sector	Road (E4)	2,21 km	5 m	9°53'53.45"S 67°25'27.04"O
B	North Sector	Path (C1)	196 m	8 m	9°54'02.02"S 67°25'27.71"O
B	Northwest Sector	Path (C2)	332 m	8 m	9°54'02.85"S 67°25'28.93"O

Roads and paths contain powerful cultural, social, symbolic and cosmological functions, and these are evidence of physical changes in the environment of great importance, as they represent in the landscape a registered mark of a certain culture that no longer exists, but which at the same time, assume the ability to reinvent themselves, to successively absorb new meanings over time.[9] Earle[49] developed typological concepts and classifications to investigate and classify this type of archaeological find.

This article proposes a standardization of roads and paths based on observations made by researcher Timothy Earle, within the universe of researched sites. Thus, a structure is identified as a "road" when its length is used as being local, regional, and long-distance, its daily, seasonal, and periodic use, its high traffic volume, its high physical and structural standard, and its ceremonial function and/or military. The paths have a local extension, are for daily use only, their traffic volume is low, their construction standard is moderate, and their function is mainly logistic. There are also trails, classified as being of an intermediate level between the other two mentioned.

Within this perspective, the parameters of differentiation between the roads and paths for the geoglyphs of Acre were established. For a better understanding of this proposal, we will use the Tequinho site as an example. The main structure roads (A), namely: roads (E) - 1, 2, 3 and 4, were so named mainly for their length, durability, and sense of origin/direction, that is, where they leave and where depart. Paths, unlike roads, were classified for being the links between two or more earth structures in a short space, that is, every stretch that connects two or more geoglyph-like structures in small distances is a path (Table 2).

Table 2 Symbolic characteristics. (Based on Earle's scheme, 2009)

Routes	Spatial extent	Utilization	Volume	Construction	Primary functions
Paths	Local	Daily	Low	Low	Logistics
Roads	Local, regioal, long distance	Daily, seasonal and recurrent	High	High	Ceremonial and military

Until now we know that the roads start from the geometric ditches and get lost in the landscape. The prospections made to know effectively where these will arrive, did not show satisfactory results, because due to the fragility of these structures, many have already been lost over time, mainly due to human action in the region. Much of the information is due to satellite images, showing that many of these roads lead towards the small rivers and their tributaries, spread throughout the region, and some of these even cross small streams, such as the road (E) 1 of the site Tequinho (Figure 6). It starts from the wall in the north sector and crosses the "Rio de Janeiro" stream and after following for 1.15 km in the S - N direction, crossing farm pastures, it disappears into the terrain.

Figure 6 Partial view of the main road of the Tequinho site (E1).

Source: Rubens Barros (15/06/2014).

The roads and paths of the Tequinho geoglyph have, in their physical-structural genesis, the same characteristics, that is, wavy shapes, varying only in height and width (Figure 7).

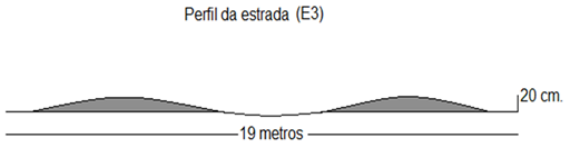

Figure 7 Profile of the road at the Tequinho site (E3).

Another physical factor observed is that the main road of the site (E1) has the shape of a funnel, drawing (A), while the others follow a normal pattern of parallel lines, drawing (B); It is worth mentioning that these two physical types are valid for all geoglyph-type structures researched so far in the region (Figure 8).

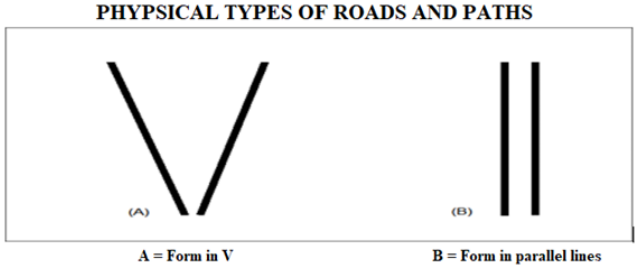

Figure 8 Physical pattern presented on the roads of the Tequinho site.

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Discussion

Today, for Amazonian Archeology, there is no longer any doubt that the banks of the great rivers and their numerous tributaries, as well as on the mainland, since long before the arrival of the first explorers, naturalists, and researchers, existed and remained very different indigenous societies of the small horticulturists and hunter's groups that are known today in the Amazon. Both archaeological information and ethnohistorical sources attest to the existence of complex societies, at least from an economic and demographic point of view, distributed throughout different places in the Amazon.[1,4,3,7,9,11–16,19,46,47,50,52,58] The same data present very suggestive indications regarding social hierarchy, forms of government, religiosity, and inter-ethnic and regional relations.

It is absurd to think of the Amazon as a universe divided into only two large, homogeneous, and distinct areas: floodplain and mainland. The pre-colonial indigenous universe has always been multiple and extremely diversified,[19] since a long time ago they formed complex, hierarchical societies, with extremely sophisticated forms of power and organizations in all environments of the Amazon, with profound interventions in the landscape, thereby reversing supposed environmental limitations for the establishment and long-term permanence of large populations in the region, as well as regional integration and exploitation of resources in various areas.[7,19,20]

There are several examples in the archaeological literature of the Amazon that we could list: the formation of Terra Preta Arqueológica (TPA), an indication of a sedentary lifestyle and an increase in population density;[51] the large circular villages and the construction of defensive ditches and roads in the Upper Xingu;[14,16] artificial mounds or mounds on Marajó Island; roads, canals and raised fields for planting in Llanos de Mojos;[9,4] elevated paths in the Venezuelan Llanos[11] and monumental centers of geometric shapes with roads and paths in the Western Amazon.[31] All these examples suggest a social organization with a high degree of mobilization and organization of labor, and a policy to carry out such enterprises of artificialization of the natural environment.

The geoglyphs are the material evidence of this multiplicity and diversification when we talk about their varied shapes and measures. Interestingly, although the area covered by the geoglyphs is very extensive, about 113,900 km², they are presented in a more complex form (the term "complex" applies here, since there are sites composed of more than one structure, the example of Tequinho, while most sites are composed of only one isolated structure) and with more precise measurements, only in the east of the State of Acre. Looking more closely at the map of the layout of the geoglyphs, one can clearly see that there is a division in relation to the shapes, starting from the center towards the northern region of the geoglyphs, to a predominance of square shapes, antagonistically, when we turn to the south, there is a predominantly incidence of circles. (Figure 9)

Figure 9 Map of the arrangement of geoglyphs in the east of the state of Acre - Brazil (Source: Denise Schaan).

Although roads and paths are found throughout the region where the geoglyphs occur, they are more common in the north than the south of the region. It should be noted that both circular and quadrangular structures present traces of roads and paths, but within the researched universe, that is, of the 289 analyzed structures, this phenomenon is more related to square shapes, concentrating more on the center and north of the region of geoglyphs.

Of the 289 structures that were analyzed, it was possible to observe that 206 structures have roads and paths, which start from their walls towards the other structure, or towards the springs and streams of the region, a very significant number. Of the total observed, only 57 structures did not show any traces of roads and paths, and 26 structures did not allow a more detailed observation.

Of the 206 researched structures that present roads and paths, 125 are square-shaped structures, composed of one or more ditches and with different measures; 74 have circular shapes, also varying in their diameters, and 7 structures are mound-shaped, arranged in circles or oval. As for the structures that did not have roads and paths, out of a total of 57 structures, 44 are circles and only 13 structures have a quadrangular shape.

Based on this information, it would be reasonable to think that the road phenomenon first took place in the center of the region where the geoglyphs occur, and from there it spread throughout the region, further north, it is true. Within this context, the Tequinho site, due to its geographical position, would have been one of several public centers for cultural and religious events, with its roads and paths being central props in large-scale ceremonies,[53] which legitimized the social order of this region. geoglyph building society. As in the Yaokwa ritual of the Enawene Nawê people, an Aruak-speaking group that inhabits northwest Mato Grosso. The Enawenê Nawê are divided between the Harikare and the Yaokwa for this ritual, the Harikare are the hosts responsible for organizing the ritual, with the task of preparing the food for the party, cleaning the village patio and, mainly, preparing the paths where the Yaokwas entered (Source: IPHAN).

To understand the dynamics of social formations in the pre-Columbian Amazon, it is essential to have material evidence of these societies, although we know that this becomes more difficult when it comes to Amazonia, where the climate makes it difficult to preserve material culture. Archeology must be based on analysis of specific remains, in this case physical, such as roads and paths.

Although we have a well-defined research object, the lack of permanent concepts, and more objective ones, referring to roads and paths, makes the task of researchers who intend to understand the dynamics and meanings of these pre-Columbian structures in the Amazon difficult. These are mentioned in various ways in the ethno -historical and archaeological bibliography, that is, road, path, route, beach, footpath or trail. In addition, each of the authors specializing in the subject uses different connotations, in certain cases within the same text, and in general these words are used as synonyms, whose use is merely evaluative and not descriptive, lacking a more explicit definition of these ways. Pre-Columbian.

When dealing with roads and paths, I am referring, in most cases, only to traces in the landscape, perceptible only to the most attentive observers and those specialists who know the subject, leaving in the imagination the idea of solid and paved structures, like the roads that became known throughout the world, and which even today arouse curiosity and fascination, to the Roman and Inca ways. Certainly the roads and paths of Acre, because their structures are composed only of earth excavated from the ground, this soil being removed and used to make the side walls, varying in some cases between 20 and 50 cm

in height, which in the past delimited and marked the landscape, are no less important than the roads mentioned above. The presence of roads and paths in the region of the geoglyphs of Acre makes it clear that there was a fundamental and important pre-established order in the social context of these builders.

Returning to the problems of working with roads and paths in the Amazon, it is the fact of the difficulty of establishing precise and absolute chronologies associated with them. Up to the present moment, we do not know exactly if the roads and paths connected to the geoglyphs were built during or after the construction of the earth structures, given the few dates that exist, and these refer exclusively to the geoglyphs, as in the case on screen. , the Tequinho site dated between 200 cal. B.C. at 327 cal. AD.[54]

However, the evidence leads us to believe that the paths were built after the geometric structures, as not all geoglyphs have such features, as attested by the previously analyzed data. Another important factor that corroborates such inferences to be observed is the simple fact that these structures took as much work to build as the geoglyphs. But that simply doesn't explain why, that some geoglyphs show traces of roads and others don't. It can be inferred that the structures that do not contain roads and paths are the most recent, structures built in the period of decay of this culture, and therefore the absence of such traces.

The roads of the geoglyphs are always arranged in straight lines. It is curious, as both ethno -historical texts and archaeological sources in the Amazon always describe straight paths, and may only vary in direction in relation to the cardinal points. In the case of geoglyph roads Tequinho, these are perfectly aligned in a Northwest (E1) - Southeast (E2) and Northeast (E3) - Southwest (E4) direction. Another detail that draws attention is due to the fact that at a certain time of year, during the solstice of June, around the 21st, the sun rises in the center of the Nordeste road (E3) and sets in the center of the road. Southwest (E4), perfectly aligned. This was observed several times *in loco* in the last days of June 2012.

Regarding the size and length of these structures, it is very relative, as we do not know for sure how much of the roads were destroyed during their useful life. We can only glimpse what might have been; what is its importance in the daily context of the people who used it, without forgetting its practical functions. Obviously, more than individuals with practical goals, but also symbolic ones, passed through these roads.

Although archaeological research in the region has advanced a lot in recent years, the question still persists: where did these builders live? Certainly, we can infer that local and regional interaction could have been organized through mechanisms, such as networks of roads and paths, and natural waterways, as in the Llanos de Mojos region.[9] And that the Tequinho site served as a convergence center, where groups interacted in ritual ceremonies, exchange of objects and seasonal parties.[6]

It can also be inferred that, despite the existence of ceremonial activities in other secondary sites, or of smaller proportions, Tequinho, due to its location, size and complexity, served as a center where ceremonies of a more special nature took place, where communities at a given time of the year they moved to their ritualistic activities. It also served as a crossing point, a place where roads crossed, indicating it's cosmological and/or ritual importance, and why not political and economic.

This vision in relation to Tequinho suggests a type of hierarchy of sites, where the most complex, like Tequinho, would be at the top, at the highest level of this hierarchical chain of public spaces and the focus of a regional road network, given that, as well as Tequinho, there are other geoglyph -type sites as complex as this one; a good example of this is the Chico Barroso site, which has various geometric structures and roads.

Conclusion

Due to the vertiginous urban and agricultural growth that we currently observe throughout the State of Acre, with enterprises that require ever larger areas, the need to preserve the historical and cultural heritage, such as the geoglyphs and their roads, is on the agenda and paths, under penalty of losing important records of societies that were part of the past of this region.The lack of a chronology for the roads and paths linked to the geoglyphs may be a priority to be studied in the future, since no road has been duly dated so far, and could be part of a broader project.

The researchers Pärssinen and Ranzi[55] infer that the main entrance to the Tequinho site is between 63 cal. B.C. -175 cal. AD, however this sample was collected in a mound near the road. As for the percentage of 25% that the authors claim to be the rate of roads and paths in a sample of (+) 500 sites prospected by the authors. I think this statement is reckless, given that in this article alone 289 sites were prospected, where 206 shows traces of roads and paths, corresponding to 71.28% of sites with these characteristics. For this author who has already listed (+) 500 sites of the type geoglyphs, it is clear that the percentage of sites with traces of roads and paths is much greater than 25%. What is certain is that the exact number of geoglyphs is not exact, a new site is found all the time, just deforest and they appear.[56–65]

In this survey, it was verified the importance that this site (Tequinho) had in the region, as a center of public convergence that integrated several other nearby sites. It was also observed its location and direction of its roads and paths, as well as its physical and conceptual characteristics, thus building a concrete typology that allows a better understanding of this specific type of archaeological remains.

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Conflicts of interests

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