v. 25 n. 2 2025

cadernos pós
cadernos de pós-graduação em arquitetura e urbanismo

Amazonian Biourbanisms: the millennial pre-colonial Amazonian anthromes

Biourbanismos amazônicos: os milenares athromes amazônicos

Biourbanismos Amazónicos: los milenarios antromas amazónicos precoloniales

Giselle Fernandes de Pinho, Doutora em Arquitetura e Urbanismo, Universidade Federal do Pará.
E-mail: fpgiselle@gmail.com *http://orcid.org/0000-0002-8060-7878*

Ana Cláudia Duarte Cardoso, Doutora em Arquitetura e Urbanismo, Universidade Federal do Pará.
E-mail: aclaudiacardoso@gmail.com *http://orcid.org/0000-0002-1866-453X*

To cite this paper: PINHO, G. F. de.; CARDOSO, A. C. D. Amazonian Biourbanisms: the millennial pre-colonial Amazonian anthromes. *Cadernos de Pós-Graduação em Arquitetura e Urbanismo,* São Paulo, v. 25, n. 2, p. 81-96, 2024.
DOI 10.5935/cadernospos.v25n2p81-96

Submitted: 2025-04-22
Accepted: 2025-04-07

Resumo

Nas últimas décadas a literatura tem explorado conceitos inovadores como biourbanismo e biomimética como potenciais soluções para desafios bioclimáticos. O biourbanismo postula que as cidades não devem ser percebidas como antíteses da natureza, mas sim como biomas altamente modificados moldados pela atividade

humana. No século XX, acreditava-se amplamente que as florestas dificultavam o desenvolvimento de sociedades complexas; no entanto, estudos arqueológicos recentes lançaram luz sobre como, na Amazônia pré-colonial, os humanos foram capazes de se sustentar por milênios através de várias estratégias de biourbanismo. Este artigo explora a formação estrutural dos anthromes amazônicos, aplicando conceitos e ferramentas da Escola Italiana de Morfologia no que diz respeito à teoria da estruturação espacial do território baseada na cultura e ao processo tipológico territorial, considerando fatores como organização social, mobilidade e capacidade transformadora. O exercício baseia-se na organização de dados de pesquisas arqueológicas, resultados sugerem que a região amazônica exibia um mosaico espacial caracterizado por uma distribuição irregular de áreas culturais e tipos territoriais bem definidos associados tanto a sistemas sociopolíticos complexos quanto a sistemas sociopolíticos minimalistas. Independentemente de sua complexidade, um processo de retroalimentação positiva foi observado nos anthromes amazônicos, que sofreram profundas alterações no início de seu ciclo de consolidação devido à influência dos modelos formativos europeus.

Palavras-chave: Biourbanismo; Estruturação espacial do território; Processo tipológico territorial; istemas sociopolíticos; Modelos formativos.

Abstract

In last decades, literature has been exploring novel concepts such as bio-urbanism and biomimicry as potential solutions to bioclimatic challenges. Bio-urbanism posits that cities should not be perceived as antithetical to nature, but rather as highly modified biomes shaped by human activity. At the 20th century, it was widely believed that forests hindered the development of complex societies; however, recent archaeological studies have shed light on how, in the pre-colonial Amazon, humans were able to sustain themselves for millennia through various bio-urbanism strategies. This paper aims to analyze the structural formation of Amazonian anthromes, utilizing the concepts and tools of the Italian School of Morphology with regard to the theory of spatial structuring of the territory and the territorial typological process, considering factors such as social organization, mobility, and transformative capacity. The findings suggest that the Amazon region exhibited a spatial mosaic characterized by an irregular distribution of cultural areas and well-defined territorial types associated with both complex socio-political systems and minimalist socio-political systems. Irrespective of their complexity, a process of positive feedback was observed in the Amazonian anthromes, which underwent profound alterations at the onset of their consolidation cycle due to the influence of European formative models.

Keywords: Bio-urbanism; Spatial structuring of the territory; Territorial typological process; Socio-political systems; Formative models.

Resumen

En las últimas décadas, la literatura ha explorado conceptos innovadores como el biourbanismo y la biomímesis como soluciones potenciales para los desafíos bioclimáticos. El biourbanismo postula que las ciudades no deben ser percibidas como antítesis de la naturaleza, sino como biomas altamente modificados y moldeados por la actividad humana. En el siglo XX, se creía ampliamente que los bosques dificultaban el desarrollo de sociedades complejas; sin embargo, estudios arqueológicos recientes han arrojado luz sobre cómo, en la Amazonía precolonial, los humanos pudieron subsistir durante milenios a través de diversas estrategias de biourbanismo. Este artículo explora la formación estructural de los *anthromes* amazónicos, aplicando conceptos y herramientas de la Escuela Italiana de Morfología en lo que respecta a la teoría de la estructuración espacial del territorio basada en la cultura y al proceso tipológico territorial. Se consideran factores como la organización social, la movilidad y la capacidad transformadora. El ejercicio se basa en la organización de datos de investigaciones arqueológicas. Los resultados sugieren que la región amazónica exhibía un mosaico espacial caracterizado por una distribución irregular de áreas culturales y tipos territoriales bien definidos, asociados tanto a sistemas sociopolíticos complejos como a sistemas sociopolíticos minimalistas. Independientemente de su complejidad, se observó un proceso de retroalimentación positiva en los *anthromes* amazónicos, que sufrieron profundas alteraciones al inicio de su ciclo de consolidación debido a la influencia de los modelos formativos europeos.

Palabras clave: Bio-urbanismo; Estructuración espacial del territorio; Proceso tipológico territorial; Sistemas sociopolíticos; Modelos formativos.

Introduction

McGregor (2022) defines a resilient city as one that is capable of sustaining itself through local biocapacity. In order to avert urban collapse, the consumption of natural resources must be balanced with their equitable distribution — a concept which the author terms 'biourbanism'. Historically, economic stratification and excessive resource exploitation, rather than natural disasters or warfare alone, have been the main causes of the collapse of civilisations, from Stone Age settlements to contemporary urban centres.

The decline of Tikal in Guatemala is a striking example of the impact of environmental degradation on urban collapse. By 600 AD, this city had an estimated population of 45,000 inhabitants and encompassed an area of 160 km². It featured a sophisticated social structure comprising palaces, plazas, pyramid temples, sculptures and painted ceramics. The city's sustenance relied on two distinct ecological niches: the forest and the floodplains. However, the removal of two-thirds of the forest cover for agricultural expansion and residential development induced climatic shifts, reducing rainfall and adversely affecting the city's water management system. The subsequent water scarcity likely endangered the water

supply, irrigation systems and agricultural output in the plains, ultimately causing the city to collapse.

McGregor (2022) argues that humanity has become increasingly disconnected from nature, viewing it merely as a source of resources. The author introduces the concept of 'anthromes' (anthropogenic biomes), developed by the Anthroecology Lab, which categorises biomes according to the extent of human impact. This system classifies twenty anthropogenic biomes into three broad categories: intensive (high impact), cultural (low impact) and wild (no recent detectable impact). Investigations from various disciplines examining 10,000 years of human activity reveal that only 20% of the planet remains free from significant human influence. Consequently, population density serves as an indicator of whether human interaction constitutes 'gardening' (low impact) or 'damage management' (high impact). In Latin America and the Caribbean, 90% of the territory comprises 'cultural anthromes' (low impact), with notable population and territorial expansion of 'populated' and 'remote' forest anthromes in the Amazon until 1500 (Figure 1), followed by a sharp demographic decline (Ellis; Ramankutty, 2008; Ellis et al., 2021).

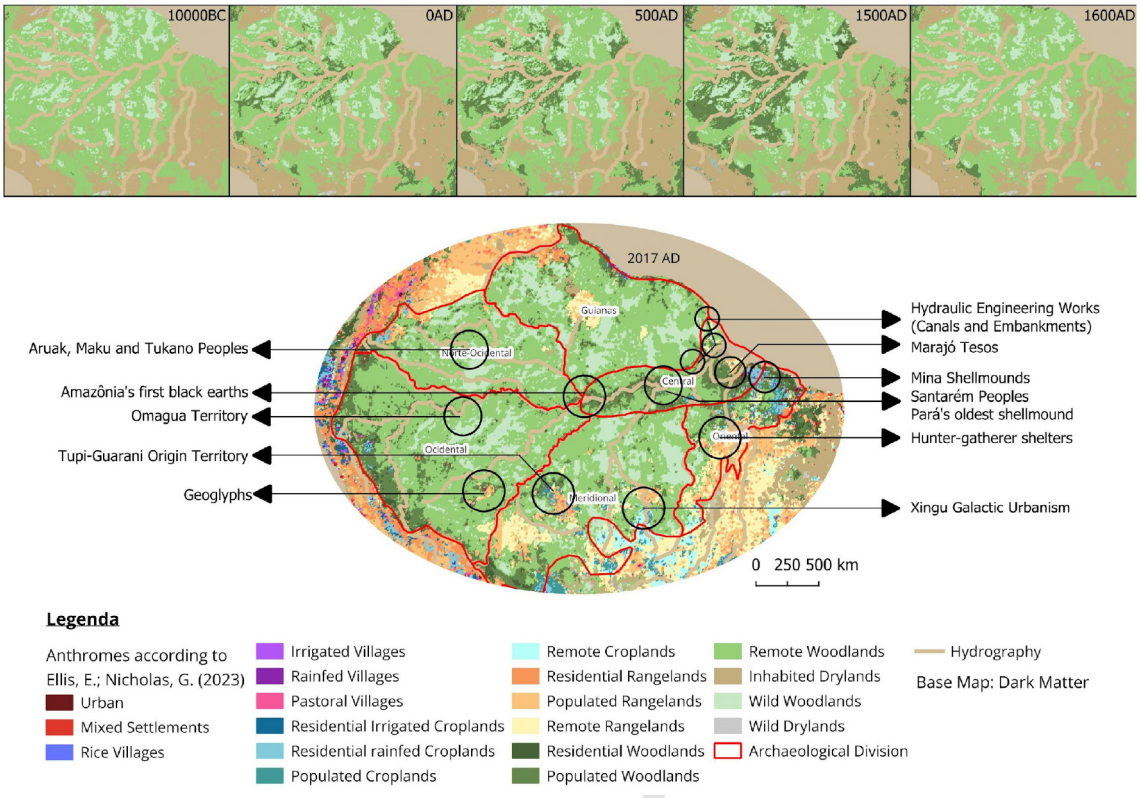

Figure 1: A brief timeline of anthrome formation in the Pan-Amazon region, highlighting areas occupied by indigenous peoples that were the focus of archaeological research and are included in the documentary research for this article.
Elaborated by the authors, 2025.

This text explores how recent archaeological discoveries in the Amazon align with Italian analyses of territorial formation, which excel at integrating cultural knowledge. The aim is to gain an understanding of the forms of biourbanism that emerged from the reciprocal shaping of ecological niches and indigenous peoples. This analysis involves overlaying archaeological findings onto geophysical data (relief and hydrography), guided by documentary research and the principles of the Italian School of Urban Morphology. This approach focuses on the spatial organisation of territories and the typological evolution of landscapes.

The study analysed and consolidated data from an archaeological literature review covering aspects of social organisation, such as governance, the economy and institutions; mobility, such as communication and infrastructure; and transformative capacity, such as society, lifestyle and culture. This process involved five key methodological steps: 1. identifying the fundamental characteristics of each phase and cycle of the pre-industrial territorial formation process; 2. determining the presence of these characteristics in the various stages and forms of Amazonian prehistoric occupation; 3. classifying the forms of occupation and anthropogenic changes for each period; 4. classifying the sociocultural characteristics associated with each type of spatial occupation; and 5. compiling evidence of the positive feedback loop in the Amazonian formative process.

The European Territorial Formation Process and the Structural Formation Periods of Amazonian Anthromes

According to Cannigia and Maffei (1995), the territorial structuring that led to the creation of Italian anthromes occurred in four stages throughout the prehistory and history of 'European man'. These cycles are detailed in Table 1 and delineate the transition from nomadism to sedentism, as well as the evolution of landscapes that occurred alongside it.

Primary Cycle: This cycle began with the identification of resource-rich areas along nomadic routes (phase 1). It then progressed to the establishment of seasonal settlements and the management of natural resources (Phase 2), followed by the domestication of nature through artificial production in permanent settlements (Phase 3). The cycle culminated in social hierarchisation and commercialisation, resulting in the emergence of distinct cultural areas (Phase 4).

Consolidation cycle: This cycle represented an inversion of the previous logic. It involved interconnecting urban centres via valley routes and subsequently linking median routes with promontory settlements. This ultimately resulted in environmental degradation.

Recovery cycle: This is characterised by the conversion of rural land into urban areas and the expansion of production into distant territories.

Restructuring cycle: This cycle, which began in the 13th century, continues to this day, reflecting the ongoing transformation of the European landscape.

Primary Cycle: Initiated with nomadic routes along crests and the identification of resource-rich areas (Phase 1), it evolved into seasonal settlements and the management of natural production (Phase 2), the domestication of nature through artificial production in permanent settlements (Phase 3), and social hierarchization, culminating in commercialization with the emergence of cultural areas (Phase 4).
Consolidation Cycle: Inversion of the logic, with the interconnection of urban centers by valley routes, followed by the connection of median routes and promontory settlements, resulting in environmental degradation.
Recovery Cycle: Characterized by the conversion of rural land into urban land and the expansion of production into distant areas.
Restructuring Cycle: Began in the 13th century and is ongoing to this day, reflecting the continuous transformation of the European landscape.

Table 1 - Schematic description of Italian anthrome formation cycles, according to Cannigia and Maffei (1995)

Cannigia and Maffei (1995) provided a framework for empirical comparison by establishing cycles based on spatial, political-cultural, and socioeconomic characteristics. Using this framework, we were able to identify the phases and cycles of 'Amazonian' territorial structuring by observing parallelisms, antitheses and simulacra within the available archaeological data. While this data only partially represents Amazonian reality, it is important to acknowledge that the study of Amazonian prehistory is an ongoing process.

Our analysis revealed that the first cycle of Amazonian occupation, spanning from 12,000 to 7,000 years before present (BP), which we refer to as the Lithic Period, exhibits a distinct migratory pattern compared to the European equivalent. Initially, hunter-gatherers traversed savannah corridors, adapting to seasonal changes and establishing semi-permanent shelters in caves. Over 40 such shelters have been identified across the Amazon region, from the cliffs in Colombia to the Serra dos Carajás in the Brazilian state of Pará. Unlike in Europe, where people moved down from the ridges to the valleys, in the Amazon region people moved from the uplands (*terra firme*) to the floodplains (*várzea*), establishing semi-permanent settlements in both environments. The climatic transition of the Middle Holocene (8200 to 4200 BP), characterised by forest expansion, shifted the focus to the floodplains. These areas became zones of high natural productivity, fostering the development of permanent settlements (Magalhães, 1994; 2005).

The primary evidence suggesting that the earliest Amazonian trade routes were valley-based rather than ridge-based is the proximity of major archaeological sites to the main rivers of the Amazon basin. This implies that these rivers were the earliest and most significant routes used by indigenous peoples, and that the production of vessels was one of their first specialisations (Souza, 2019).

The Lithic Period (12,000 to 7,000 years before present) thus encompasses the first two phases of territorial structuring. The third phase in the Amazon region begins with the Early Ceramic Period (7,000 to 3,000 BP). This phase is characterised by the emergence of circular, single-nucleus human settlements. These settlements were probably semi-sedentary and isolated, and predated intensive agriculture. They relied on the domestication of palm trees and tubers for their subsistence, without forming black earth (*Terra Preta*), and they were established on natural riverbanks. From these vantage points, inhabitants could manage the seasonal 6-month cycles associated with floods and low waters (Heckenberger *et al*., 1999; Moraes & Neves, 2012; Neves, 2010, 2022).

Monumental constructions are observed in ecological niches where natural riverbanks are less common and water level variation is more pronounced, with flood and ebb cycles occurring every 12 hours. These structures, which can reach heights of 30 metres, offer the inhabitants of these areas advantages similar to those of people living on natural riverbanks.

Therefore, the Early Ceramic Period is considered to be in full alignment with the third phase of the first Amazonian formative cycle. Unlike the European human occupation model, it does not replace natural production with artificial production.

Next, we analyse the fourth phase, which is characterised by the organisation of settlements into hierarchies and the establishment of trade routes. These features emerged in the Amazon during the so-called Middle Ceramic Period (3,000 to 900 BP). During this period, there was gradual demographic growth and settlements expanded in size, growing from approximately 1 hectare to between 30 and 50 hectares. These settlements were gradually hierarchised, with their strategic placement within the territory. These settlements varied in size and function, and were interconnected by well-defined roads (Heckenberger, Petersen & Neves, 1999; Heckenberger et al., 2008).

In summary, the fourth phase of the first cycle of territorial formation in the Amazon is characterised by population densification, with primary centres remaining in the várzea and secondary centres being established in nearby areas, either on uplands or alongside rivers. This period also saw the emergence of broad cultural areas, primarily defined by linguistic families, as well as an exponential increase in the anthropisation of the forest.

Crucially, not replacing the natural order with artificial production fostered a positive feedback process that did not lead to environmental degradation. In fact, studies indicate that older settlements are often found in areas with better environmental conditions. This is evidenced by the presence of black earth and brown earth (fertile soils) amidst the typically yellow, nutrient-poor Amazonian soil.

This state of non-degradation persisted until the end of the Late Ceramic Period, the first phase of the Amazonian consolidation cycle. Spanning from 900 to 550 BP

(a few centuries prior to European contact), this period is primarily characterised by a decline in population. This resulted in circular villages being abandoned or reduced in size, or an abrupt shift to linear settlements.

Following the arrival of the Europeans, the Amazonian territorial context underwent a sudden and profound transformation. The brief spatial reorganisations initiated by the Tupi expansion and the stabilisation of cultural areas were largely superseded by European colonisation. This limited the consolidation cycle of the positive feedback system to the territorial organisation of the surviving indigenous peoples. Subsequently, traditional groups such as ribeirinhos (riverine communities) and quilombolas (descendants of runaway Afro-Brazilian slaves) preserved or revived indigenous subsistence practices through recovery and restructuring cycles. This favoured a natural order over an entirely artificial production system (Saunier & Cardoso, 2025; Alencar & Sousa, 2016; Lopes, 2008).

Sociocultural Characteristics of the Amazonian Formative Process

During the Lithic Period in the Amazon, it is believed that social organisation revolved around family groups of up to four people, led by a shaman. The labour involved in these groups included crafting stone tools, hunting and preparing food. The main cultural artefacts from this period are cave paintings depicting hunting scenes, dances and elements of the local flora and fauna. While the origin of ceramics remains unclear, they were initially used for rituals and were probably only accessible to a select few. Over time, the use of ceramics broadened to encompass everyday activities, particularly storage, though not cooking (MAGALHÃES, 1994, 2005).

The Early Ceramic Period in the Amazon reveals the emergence of a hierarchical society. Evidence suggests a distinction between chieftains and ordinary villagers, as seen in the variety of ceramic styles (simple for everyday use and elaborate for rituals), the different burial practices for the elite and ordinary villagers, and the intricate decorative patterns. A tripartite territorial organisation also solidified during this time, encompassing familial-clan, religious and political structures, which were led respectively by the head of the household, shamans and local chiefs. Notable societies from this period include the Santarém, who are renowned for constructing the Taperinha shell mound in Pará State; the creators of the Bacanga shell mound in Maranhão State; and the early settlements in Central Amazonia and Marajó Island (Roosevelt, 1993; Eriksen, 2001; Cruls, 2003).

During the Middle Ceramic Period, population growth fuelled an increase in social complexity in the Amazon region. Various forms of hierarchy emerged, ranging from villages governed by a single chief or council, to extensive chiefdoms that controlled vast territories. These hierarchical structures were often based on kinship ties, which were strengthened through strategic marriages (Roosevelt, 1993; Eriksen, 2001).

At its peak, the Middle Ceramic Period was characterised by a vibrant Amazonian culture, expressed through diverse art forms such as ceramics, adornments, and feather art. The economy relied on a long-distance exchange system that connected cultures across South America. This network fostered specialisation in technologies such as producing artefacts from wood, stone, clay and metals. It also facilitated the trade of natural resources and the spread of ideas and cosmologies, resulting in the cultural dominance of the Arawak linguistic family — a period known as the Arawak expansion. Ceramic production and child education, which were often considered feminine activities, played a crucial role in cultural transmission, excluding male or shamanic knowledge. The tripartite territorial organisation persisted, now with micro-regional chiefdoms. Notable societies from this period, such as the Marajoara, Tapajó and Manoa, highlight the sophistication of the Amazon's social and cultural landscape (Roosevelt, 1993; Eriksen, 2001; Cruls, 2003).

During the Late Ceramic Period, which was characterised by the dominance of Tupi-speaking peoples, there was an increase in agricultural activity, with black earths (*terras pretas*) being used for food production. This transition was facilitated by a shift in settlement patterns from circular to linear. However, the economy, already weakened by conflicts and demographic decline, experienced a reduction in trade routes. Paradoxically, these routes later played a role in both cultural exchange and the devastating spread of slavery and epidemics following European contact (Eriksen, 2001; Souza, 2019). Despite these challenges, the tripartite territorial organisation (familial, clan, religious and political) endured, with macro-regional chiefdoms overseeing entire sub-basins. Prominent societies of this period included the Tapajós, Omáguas and Yurímagoas.

Figure 2 provides a summary table that illustrates the reasoning behind the first three stages of the analysis method.

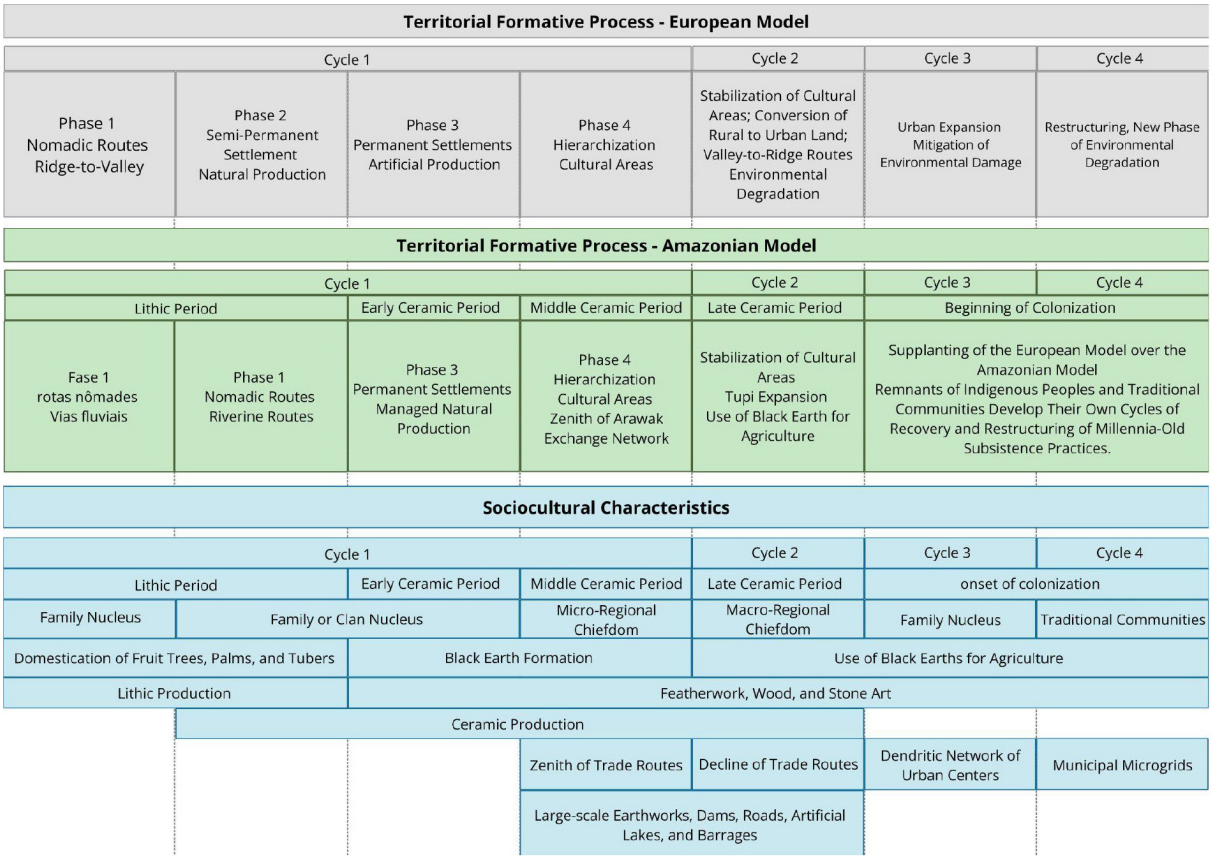

Figure 2: Summary table of the methodological process.
Elaborated by the authors.

Spatial Forms and Anthropic Action in the Amazonian Formative Process

During the Lithic Period, Amazonian hunter-gatherers adapted their living spaces according to the seasons, using caves during the rainy season and valleys during the dry season. Their environmental impact was minimal, consisting mainly of selecting edible plant species. These groups were highly mobile, typically moving within a radius of 40 km. Their simple shelters served multiple purposes, including dwelling, production, ceremonies (such as funerals) and memory (sites of rock paintings). Dwelling-production shelters usually faced east and were organised based on light, humidity, and temperature. Brighter areas were used for work and food preparation; intermediate zones offered stable temperatures for rest; and darker, less humid areas were used for storage. The natural slope of the ground, and sometimes nearby springs, helped to maintain healthy living conditions (Magalhães, 1994, 2005).

During the Early Ceramic Period, the management area expanded to a radius of 5 km, though terrestrial mobility remained limited. This era was pivotal for the domestication of key crops such as manioc, which emerged around 6,500 years

ago, as well as peach palm and other tubers. It also saw the initial formation of black earths (*terras pretas*) and the development of fluvial trade routes (Clément, 2014; Arroyo-Kalin, 2010).

Shellmounds (sambaquis), the iconic structures of this period, are now under threat from human and natural forces. Their open-air nature makes uncovering intact archaeological remains challenging, which complicates our understanding of their precise function. While older Bolivian shellmounds were used as elevated bases for settlements on alluvial plains, enabling communities to stay above flood levels during heavy rainfall, Brazilian shellmounds were inhabited until around 1200 AD. Their long history suggests that their function may have evolved, leading to an ongoing debate among specialists. Some specialists view them as residential bases, while others consider them to be primarily funerary monuments. The latter theory would imply a distinct separation between living and ceremonial spaces, with several residential areas linked to a single ceremonial site (Py-Daniel et al., 2017; Roosevelt, 1993).

During the Middle Ceramic Period, significant human-made alterations were made to the Amazonian landscape, including earthwork systems, roads, dams and artificial forest islands. This era was characterised by three distinct forms of occupation:

Geoglyphs in Acre State: These large geometric earthworks, which include perfect and semi-perfect circles and rectangles spanning 3 to 7 hectares, contain a wide variety of archaeological remains. This suggests that they served a variety of functions, including ceremonial, residential and trade purposes (Schaan; Ranzi; Barbosa, 2010).

Galactic Urbanisms in Central Amazonia: This is best exemplified by the Kuikuro in the Upper Xingu and represents a complex, multi-component territorial organisation at micro and macro-regional scales. Residential zones were surrounded by production areas (2 km for direct production and 5 km for orchards), and dense forests acted as buffers between different chiefdoms.

Artificial mounds (tesos) on Marajó Island: These mounds symbolised prestige and leadership within Marajó society. The chiefdom featured 37 residential tesos clustered around Camutins, a large ceremonial teso measuring 12 metres in height and covering 2.5 hectares (100 x 250 metres). It is believed that the Marajoara constructed these tesos to create artificial lakes for managing aquatic fauna during dry seasons and maintaining agricultural production, despite agriculture not being the primary driver of their economy. The Marajoara civilisation peaked around the 5th century, after which it declined possibly due to external factors. This marked the end of an era before the Tupi expansion (Roosevelt, 1993; Cruls, 2003).

During the Late Ceramic Period, the expansion of the Tupi people brought about a significant transformation in the spatial organisation of the Amazon region.

This included the fragmentation of territorial occupation, with many sites being abandoned and new, short-lived settlements emerging. Fortified settlements also appeared, with site shapes varying from circular sites with defences (Arawak and Macro-Jê) to linear sites (Tupi-Guarani and conquered settlements).

The Santarém region of the state of Pará in Brazil was a crucial cultural hub in the Amazon, with evidence of human occupation dating back 11,200 years and ceramics from 8,000 years ago. During the Late Ceramic Period, the region experienced its zenith, with a hierarchical chiefdom and villages connected by roads, reminiscent of the urbanism observed in the Xingu River region. The diverse economy featured elaborate ceramics, textiles, poisoned arrows and muiraquitãs, indicating an advanced exchange system. The raw materials (green jadeite or white stones) were sourced from Guianan peoples, and the finished products were exclusive trade items for the elite (PY-DANIEL et al., 2017).

Figure 3 provides a summary table illustrating the different occupations that occurred during each period of the Amazonian Formative Process. This table was compiled using various sketches.

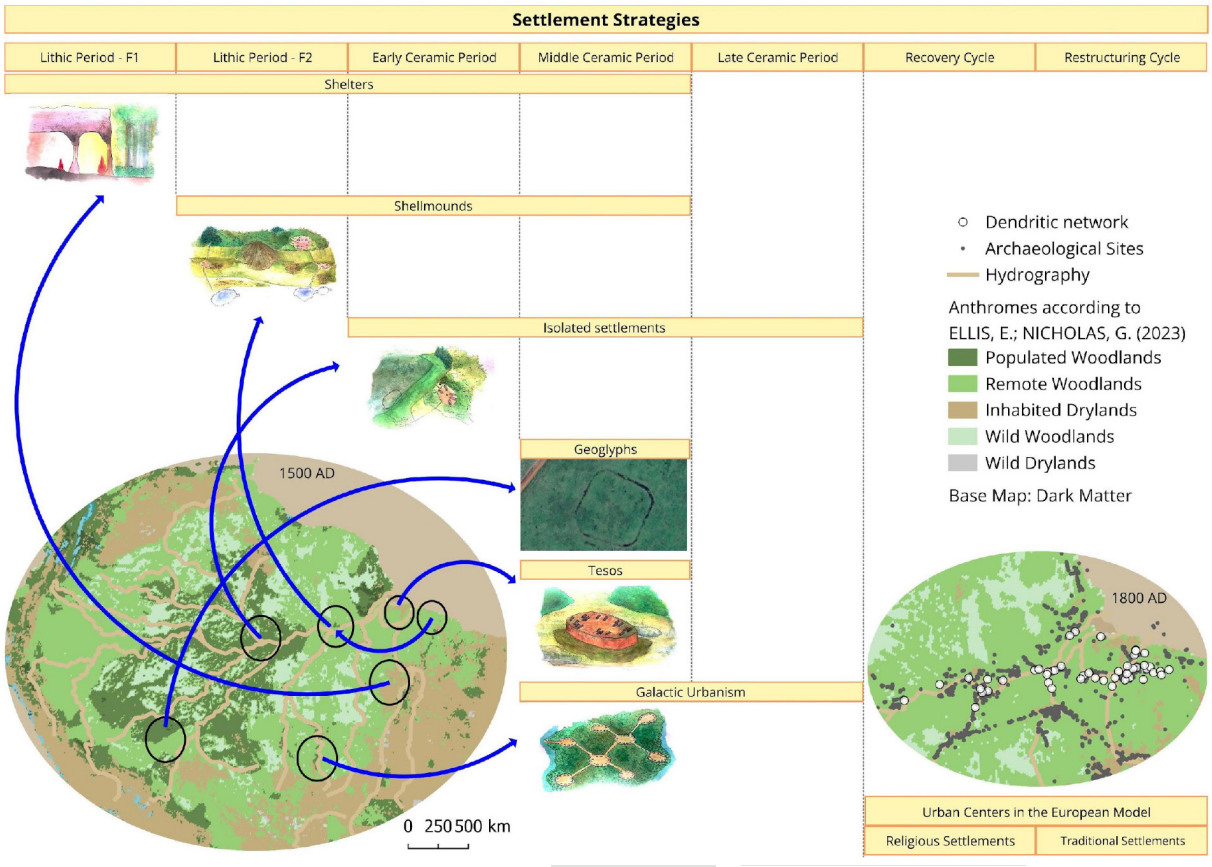

Figure 3: Summary table of occupation forms.
Elaborated by the authors.

Final Considerations

If, as defined by MacGregor (2022), biourbanism is based on the fair distribution of natural resources while respecting local biocapacity, then pre-colonial Amazonian societies provide a striking example of this concept through their positive feedback system (Figure 4). Within this system, the physical configuration — specifically, the intricate connection between residential areas and spaces dedicated to the production and domestication of terrestrial and aquatic flora and fauna — was significantly enhanced by extensive engineering works. This approach fostered an intensive and extensive agroecology, resulting in a subsistence model that integrated with, rather than replaced, natural production. The complexity of this system varied according to the governing political dynamics. The proliferation and diversification of political and linguistic groups led to the development of distinct cultural areas that were interconnected through exchange networks and war. This implies that political dominance was not primarily territorial, but populational; the influence of chiefs or leaders was directly proportional to the number of followers or subjects they commanded. Consequently, their ability to mobilise larger populations for engineering projects and the construction of their 'biourbanisms' led to more extensive managed areas and greater agroecological output, thereby sustaining a larger population.

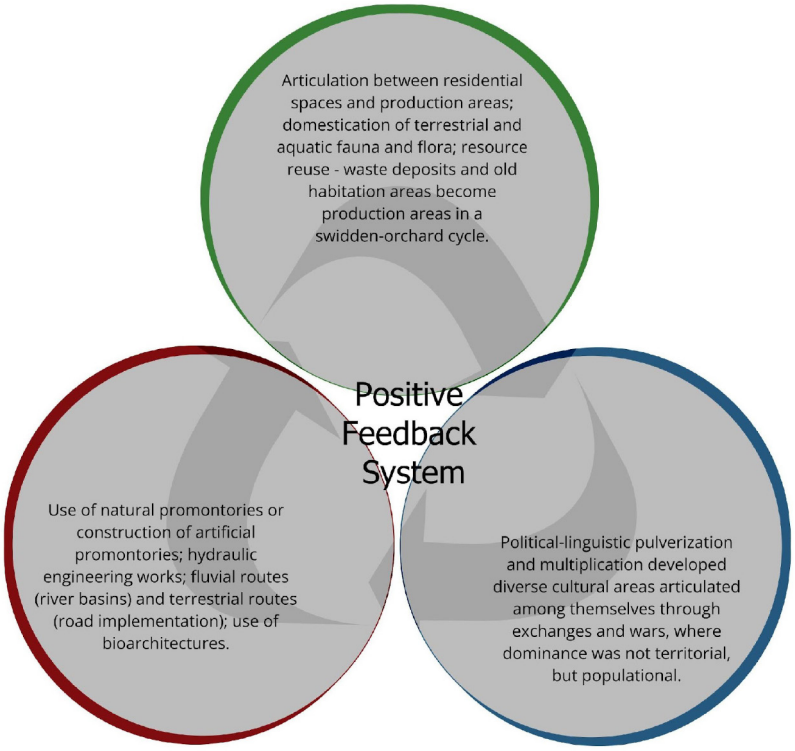

Figure 4 – Diagram of the Positive Feedback System.
Elaborated by the authors.

The history of human occupation in the Amazon, from the Lithic Period to European contact, reveals a complex, non-substitutive evolutionary trajectory. Throughout this extensive period, hunter-gatherer societies coexisted with more hierarchical cultures, all of which were closely connected to their water and forest environments. Amazonian peoples ingeniously developed distinct forms of occupation that optimised their use of natural resources. In areas prone to significant flooding and drought, they constructed large-scale hydraulic structures, such as the Tesos of Marajó Island and the extensive canals and embankments in Amapá State. In mountainous regions, cave shelters proliferated, enabling the simultaneous management of multiple ecological niches. In areas with more natural riverbanks, an intricate relationship developed between floodplains (*várzeas*) and uplands (*terras firmes*), facilitated by the organisation of multiple settlements under the authority of a single chief. The Acre State geoglyphs, located in a plateau region, appear to have constituted a major epicentre for continental-scale exchanges. Unfortunately, much of this sophisticated ingenuity did not survive the period of colonisation, as can be seen from the maps produced by the Anthroecology Lab. These maps starkly illustrate a significant population increase across vast areas of cultural forest, followed by a sudden and dramatic decline between 1500 and 1700.

The onset of colonisation marked the end of this indigenous developmental process, as Amazonian knowledge systems were largely replaced by European territorial concepts. According to Adams, Murrieta and Neves (2006), the Amazon Forest is currently home to three societal groups that are relatively invisible in terms of their politics and society: the descendants of indigenous peoples, traditional or historical peasants (including *caboclos, quilombolas* and survivors of the Cabanagem rebellion), and neo-peasants (migrants who relocated to the Amazon region since the 1960s). These three groups can be distinguished by their respective spatial occupation practices in relation to urban centres. This historical trajectory suggests that the Amazonian formative process ultimately resulted in three distinct spatial structuring models: the ancestral model, preserved by indigenous peoples; the Amazonian model, maintained by traditional communities; and the Luso-Brazilian model, pertaining to municipal centres, company towns, and neo-peasant settlements.

Just as the European territorial formation process is recognised as valuable and has served as a benchmark for scholarly studies, it would similarly be possible to reconstruct and celebrate an Amazonian territorial formation process. This is particularly pertinent given the positive feedback system that continues to manifest itself in the spatial practices of indigenous peoples and traditional communities. To a lesser extent, this system is also evident in the settlements of neo-peasants who persist in cultivating forests.

References

ADAMS, C.; MURRIETA, R.; NEVES, W. (orgs.). *Sociedades caboclas amazônicas*: modernidade e invisibilidade. São Paulo: Annablume, 2006.

ALENCAR, E. F.; SOUSA, I. S. de. Tradição e mudanças no modo de habitar as várzeas dos rios Solimões e Japurá, AM. *Iluminuras*, Porto Alegre, v. 17, n. 41, p. 203-232, jan./jun. 2016. Disponível em: https://www.researchgate.net/publication/303750354_TRADICAO_E_MUDANCAS_NO_MODO_DE_HABITAR_AS_VARZEAS_DOS_RIOS_SOLIMOES_E_JAPURA_AM Acesso em: 10 jan. 2019.

ARROYO-KALIN, M. A domesticação da paisagem: os solos antropogênicos e o formativo na amazônia. *In*: PEREIRA, E.; GUAPINDAIA, V. (org.). Arqueologia Amazônica 2. Belém: Mpge; Iphan; Secult, 2010. p. 879-908.

CANNIGIA, G.; MAFFEI, G. L. *Tipologia de la edificacion*: estructura del espacio antropico. Madrid: Celeste Ediciones, 1995.

CLEMENT, C. R. Crop domestication in the Amazon. *Encyclopaedia of The History of Science, Technology, and Medicine in Non-Western Cultures*, [s.l.], p. 1-7, 2014. Springer Netherlands. DOI: http://dx.doi.org/10.1007/978-94-007-3934-5_9876-1

CRULS, G. Hiléia amazônica. Belo Horizonte: Editora Itatiaia, 2003. (Reconquista do Brasil, v. 170).

ELLIS, E. C; RAMANKUTTY, N. Putting people in the map: anthropogenic biomes of the world. *Frontiers in Ecology and the Environment*, [S.L.], v. 6, n. 8, p. 439-447, Oct. 2008. Wiley. DOI: http://dx.doi.org/10.1890/070062.

ELLIS, E.; NICOLAS G. *Anthromes 12K DGG v1 shapefile*. Harvard Dataverse, v.1, 2023. DOI: https://doi.org/10.7910/DVN/SZFCPX

ELLIS, Erle C. *et al*. People have shaped most of terrestrial nature for at least 12,000 years. *Proceedings of the National Academy of Sciences*, [S.L.], v. 118, n. 17, p. 1-8, 19 abr. 2021. Proceedings of the National Academy of Sciences. DOI: http://dx.doi.org/10.1073/pnas.2023483118

ERIKSEN, L. *Nature and culture in prehistoric Amazonia*: using G.I.S. to reconstruct ancient ethnogenetic processes from archaeology, linguistics, geography, and ethnohistory. Lund: Lund Universiry, 2011.

HECKENBERGER, M. J.; PETERSEN, J. B.; NEVES, E. G. Village size and permanence in Amazonia: two archaeological examples from Brazil. *Latin American Antiquity*, Cambridge, v. 4, n. 10, p. 353-376, 1999.

HECKENBERGER, M. J., et al.. Pre-Columbian Urbanism, Anthropogenic Landscapes, and the Future of the Amazon. Science, v. 321 n. 5893, P. 1214-1217, 2008. doi: 10.1126/science.1159769.

LOPES, L. O. do C. *Várzea e varzeiros da Amazônia*. 1. ed. Belém: Museu Paraense Emílio Goeldi, 2008.

MAGALHÃES, M. P. *A phýsis da origem*: o sentido da história na Amazônia. Belém: Museu Paraense Emílio Goeldi, 2005.

MAGALHÃES, M. P. *Arqueologia de Carajás*: a presença pré-histórica do homem na Amazônia. Belém: Companhia Vale do Rio Doce, 1994.

MCGREGOR, A. *Biourbanism*: cities as nature: a resilience model for anthromes. London: Biourbanism Publishing Pty Ltd, 2022.

MORAES, C. de. Aldeias circulares na Amazônia Central: um contraste entre fase paredão e fase guarita. *In*: PEREIRA, E.; GUAPINDAIA, V. (org.). *Arqueologia amazônica 2*. Belém: Mpge; Iphan; Secult, 2010. p. 581-604.

MORAES, C. de P.; NEVES, E. G. *O ano 1000*: adensamento populacional, interação e conflito na Amazônia Central. *Amazônica*, Belém, v. 1, n. 4, p. 122-148, 2012.

NEVES, E. G. Arqueologia da Amazônia Central e as classificações na Arqueologia Amazônica. *In*: PEREIRA, E.; GUAPINDAIA, V. (org.). *Arqueologia amazônica 2*. Belém: Mpge; Iphan; Secult, 2010. p. 561-580.

NEVES, E. G. *Sob os tempos do equinócio*: oito mill anos de história na Amazônia Central. São Paulo: Ubu Editora/Edup, 2022

PY-DANIEL, A. R. *et al*. *Uma Santarém mais antiga sob o olhar da Arqueologia*. Belém: Mpeg, 2017.

ROOSEVELT, A. C. The rise and fall of the Amazon chiefdoms. *L'Homme*, [S.L.], v. 33, n. 126, p. 255-283, 1993. PERSEE Program. DOI: http://dx.doi.org/10.3406/hom.1993.369640. Disponível em: https://www.persee.fr/doc/hom_0439-4216_1993_num_33_126_369640. Acesso em: 31 set. 2022.

SAUNIER, C. de N. M.; CARDOSO, A. C. D. Senhores das águas: quilombos da Amazônia paraense (século XIX). *Anais do Museu Paulista: História e Cultura Material*, São Paulo, v. 33, p. 1-40, 2025.

SCHAAN, D. P.; RANZI, A.; BARBOSA, A. D. (org.). *Geoglifos*: paisagens da Amazônia Ocidental. Rio Branco: Gknoronha, 2010.

SOUZA, M. *História da Amazônia*: do período pré-colombiano aos desafios do século XXI. Rio de Janeiro: Record, 2019.