

Planimetry of settlements as a confirmation of transformation in the Atalaya region in Peruvian Amazonia

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Abstract

This paper aims to establish criteria for defining traditional and modern settlements, and location factors in relation to their spatial presence in the Atalaya region, in Peruvian Amazonia. The key theme is the planimetry of villages, which depends on many factors. It is a kind of indicator of outside influences, which reveals everyday life habits, ways of doing business, employment, and the presence of certain activities. Human activities, civilisation models, and outside pressures affect the appearance and structure of villages. In Peruvian Amazonia, indigenous influences are shifted by influences imported from areas outside Amazonia. The planimetry of the villages indicates the differences between the two main village groups: traditional and modern villages. A broad analysis of human activities, of habitation and migration, communication infrastructure, and of the history outside of the Amazonian influence is necessary to extract the criteria for defining traditional and modern settlements. Modern settlements occur in regions that have received numerous and different foreign influences and communication flows. Traditional settlements are present in all the investigated areas, with a noticeable reduction in the modern zones.

KEYWORDS: planimetry of settlements, settlement forms, outside influences, Amazon Basin, Peru

Introduction

In this text, our main starting study will be the planimetry of settlements, i.e. in our case, in the area of Peru. This will be described. We will also present a number of descriptions associated with our interpretations of a part of Peru, concretely the Amazonian area, during our visit there or own analysis of the theme. Such an overview will be, we hope, original, especially since such descriptions are relatively rare. We hope that this article of ours will be interesting to geographers, anthropologists and also other scientists.

“Planimetry” is a term for various existing geometric forms in a settlement’s plane. It is derived from the Latin word *planum*, *flat* and the Greek addition *μετρεω* (to measure). The central spatial element of a planimetry of any settlement is the communication area, i.e. streets and squares, where basic differences or similarities in ideas are carried out. Planned settlements are often associated with geometrically correct planimetry, or else with networks of right angles (90°), or radial meshes.

The planimetry of settlements – although a rare term – is a mirror of the lifestyle of people and their economy. The development of modern settlements is an indication of the spread of new forms of life, resulting from the arrival of immigrants and the withdrawal of traditional hunting-gathering, fishing, and rudimentary agricultural lifestyles of the Amazonian natives. Newcomers that came from outside the Amazonian areas comprise almost 90% of the total population of Peruvian Amazonia (Mikkelsen 2012: 156). The population density of Amazonian peoples has traditionally been very low, due to the prevailing hunting-gathering, fishing and simple agricultural lifestyle and economy. Research on historical inhabitation indicates that permanently settled populations lived mostly along the major rivers, because of the more fertile soil (Lathrap 1970; Denevan 1996; Lombardo & Prümers 2010) and the abundance of fish as a source of animal protein (Carneiro 1995; Lombardo & Prümers 2010). This part of the world is enviably urbanised, with 54% of the total population living in towns. Immigrants bring with them other lifestyles (life practices) and their lives are not based on the indigenous hunting-gathering, fishing and simple agricultural culture. They are mainly engaged in plantation agriculture, aquaculture, extensive agriculture, fish farming, timber industry, gathering semi-precious stones, road and river transportation, trade, oil and natural gas extraction, and employment in hydroelectric power stations (Dourojeanni et al. 2009). New activities sometimes caused tensions and conflicts between the indigenous people and the newcomers, and so in Brazilian Amazonia, for example, at the beginning of the 1990s the main reasons for violent conflict were illegal settlement (squatting), unequal land ownership, and deforestation (Alston et al. 2000). In the case of Peru, Amazonia is a vast area for new colonisation by many newcomers from the Peruvian Andes who arrived independently because of their needs to achieve their existence through land use and trade activities. A smaller portion of the Peruvian migrants was sent by the state, for employment as teachers, doctors, etc., and these persons came from the Andes and the Pacific coast. A considerable part of the colonisation was undertaken by Peruvian and foreign companies for their employees. Highly educated company operatives were newcomers and, in general, only temporary residents in the Amazon region.

Franciscan missionaries have continuously operated in the Amazonian region of Peru from the 18th century, from their Andean base in the Monastery of Santa Rosa de Ocopa. In some parts of Amazonia, for instance, in Huaorani, missionaries arrived relatively recently, during the 1950s (Cabodevilla 1992; Sierra et al. 1999). Missionaries encouraged rapid, radical changes in the indigenous medical-religious-political system (Zent 1993; Freire 2007), and in the planimetry of settlements, as in the example of Puerto Ocopa along the Peruvian Perené River. Earlier missionaries particularly emphasised changing the lifestyle of indigenous people, whereas recent trends show a tendency towards protecting the indigenous lifestyle from external change factors.

Today, the influence of missionaries is seen in the construction of the Amerindian University (for indigenous people, natives, Amazonians) and radio stations that provide advice to farmers. Extraction of oil and natural gas is permitted throughout Peruvian Amazonia, except in national parks and in resort areas (havens) that cover 10% of the Amazonian region (Benavides 2009; Orta-Martínez & Finer 2010). Oil companies have replaced the state in various fields, including employment, the construction of wells for drinking water, the concern for health centres and the provision of emergency medical assistance for the local population, donations of power generators, the transport of natives (free drives) and air flight transport of local indigenous authorities to meetings in Iquitos or Lima (Orta-Martínez & Finer 2010). Oil companies encourage migration through the building of new roads and by creating new jobs (Barbieri et al. 2009). The arrival of foreign oil companies causes changes in the social structure and in forms of housing, as a result of pushing indigenous people from nomadism to sedentary life. Hunters and gatherers initially made use of broader forest areas, whereas the present tendency towards concentrating the population on small areas is causing changes in diet, inducing malnutrition and a number of serious diseases (Castillo 2004).

A *bosquesino*, or “forest-dweller”, hunts, fishes, gathers primary fruit plants, minerals, berries, honey and insects, and catches animals, such as crabs, lizards, reptiles, in the vast forest areas. Unlike him, the farmer cultivates and breeds his produce, and uses a smaller spatial area (Suess & Mendoza 2011). Existential subsistence management or the sharing of meat is widespread in hunter-gatherer communities (Franzen 2007). The activities of forest dwellers were hit (affected) by commercialisation, partly within their community, and partly through tourism or markets in nearby towns. The use of money entered into the community (Suess & Mendoza 2011). In the already deforested territory of the Machiguenga people (alt. Matsigenka, Matsigenga), near the Urubamba River in Peru, where guns are the main hunting weapon, the Peruvian government introduced small-scale aquaculture to stabilise the area’s settlements and reduce dependence on hunting (Levi et al. 2009). Traditional shifting cultivation systems, i.e. mobile agriculture practised by the natives, is more durable and sustainable (Brady 1996), in comparison to farm production (Salisbury & Schminke 2007). Plantation farmers cleared a larger area, along with its plant roots. The effects of shifting agriculture and extensive cattle ranching are responsible for a deforestation rate of 80–85% in Amazonia (Serrao et al. 1996; Salisbury & Schminke 2007). In contrast, the forest-dwellers clear *chakras* (Quechuan term for *field*), smaller areas used for three years, and forests can easily and quickly be

regenerated, since their roots are not removed. Chakra farming is a renovative type of horticulture, whereas typical plantation agriculture is a form of horticulture without renewal or, in cases when plantations are abandoned, the result is degraded forests (Suess & Mendoza 2011). Traditional lifestyle is endangered by the activities of farmers who clear forests in the context of modern agriculture (Brady 1996). In contrast to this “modern type”, indigenous agriculture is cyclical and aligned with the tropical forest ecology. Biodiversity plays a central role in indigenous agriculture (Gari 2001). For cultivative agriculture (horticulture, monoculture) alluvial areas are favourable, yet they make up only 7% of the Amazonian territory (Suess & Mendoza 2011). The policies of the national government often encouraged the conversion of Peruvian Amazonia into productive land for national or foreign investors, who were searching for raw materials, energy sources and biofuels (Orta-Martínez & Finer 2010). State planners often do not understand forest communities, and so they create strategies that enable companies to attain wealth, yet which have an adverse effect on rural communities (Suess & Mendoza 2011).

We will examine in our article a few hypotheses, in connection with planimetry, which we will discuss in our text. The first will be connected to the effect of contemporary economic development which influences the development of present settlements in accord with the typical Peruvian form. The second would be that oil and natural gas extraction would have the most influential result on all other present effects in regard to settlements (i.e. planimetry). The third hypothesis would be connected to the spatial distribution of modern settlements and their tie with traffic hub and oil companies.

In our text we attempt to research, as much as possible, these noted hypotheses and other details, and we focus on the dramatic level of shifts in the Amazonian area, and in our discussion, emphasise some negative effects brought about in regard to local communities, as effects of these (more or less) modern trends. However, our original idea of planimetry is a key factor, which could have an influence on broadening of scientific ideas.

Research area

The Apurimac River, located in the Peruvian Andes, is the longest (furthestmost) source of the Amazon. Downstream, the Apurimac divides into the Rivers Mantaro, Ene, Tambo, Ucayali and finally into the Amazon. Our research area includes the Peruvian section of Amazonia, the end flows of the Rivers Perené and Ene and their confluence zone, the River Tambo in its entirety, the region around the Urubamba River, the confluence region of the Rivers Tambo and Urubamba near the town of Atalaya, and the first part of the Ucayali River. The researched territory can be divided into three main landscape units according to the drainage level: a damp, poorly drained area, a well drained area and the plateau of El Gran Pajonal (Figure 1).

The researched area is a transitional zone from the slopes of the Andes to the low, flat and poorly drained Amazon basin. The area includes the last slopes of the Andes, in the form of hills and mountains, and the separate plateau El Gran Pajonal, but does not continue into the area of the steep slopes of the Andes, with an altitude up to 2,000 metres

above sea level, which are usually included in the Amazonia area. Low, flat and poorly drained Amazonia extends only to a narrow strip along the River Ucayali and its right/eastern tributaries. The broader belt of poorly drained Amazonia begins downstream from the research area.

The moist, less drained area stretches along the bank of the Ucayali, after the last slopes of the Andes, downstream from the Atalaya. The belt of the moist, less drained area is narrower alongside the western bank of the Ucayali River, yet it is broader on the eastern side. This area spreads along the east/right tributaries of the Ucayali, for example along the Rivers Tahuanía and Coengua. In fact, the last slopes of the Andean mountain system extend to the Ucayali River. Here the tropical rain forest is denser and more impassable, in comparison with other landscape units. This area is primarily the homeland of the traditional hunter-farmer tribe Asháninka, and the agricultural and fishing tribe Shipibo (Shipibo-Conibo). Along the banks of the River Ucayali, downstream from Atalaya up to Bolognesi, there is a mixture between the Asháninka and Shipibo tribes. The settlement zone of the Asháninka stops only downstream from Bolognesi, after which merely the Shipibo tribe remains, but this is beyond the scope of our research of the area. The population is denser along the banks of the Ucayali River and all its tributaries, and here deforestation is more widespread. The eastern tributaries of the Ucayali have greater importance for settlement, because these tributaries are navigable all year round and boats can penetrate more deeply into the forests.

The drained area spreads into zones that include the last slopes of the Andes, about 200 to 400 metres above sea level, west of the River Ucayali and around the Rivers Tambo, Urubamba, Perené, and Ene on the west and south sides of the research area. The drained soil is easier to walk upon during hunting, more favourable for agriculture and it is generally better for human health. This area is dominated by the Amerindian warrior-hunter tribe Asháninka, yet most of the population are immigrants from the Andes in the largest regional city Atalaya (15,000 inhabitants in 2011), in which their main jobs include oil extraction, trade and general economic development.

The El Gran Pajonal plateau extends to an altitude of about 1,000 metres above sea level, west of the mouth of the River Tambo into the Ucayali. Asháninka hunters dominate on the plateau. Several mountain rivers flow through the El Gran Pajonal plateau with a steep drop that in the rainy season turns their flow into a flood (a torrent). The population does not use the boats for sailing on these rivers, because they are innavigable. The river valley of the largest river, the Unini, represents a real building challenge in the construction of a road connecting this plateau with the rest of Peru (Puerto Ocopa and Atalaya).

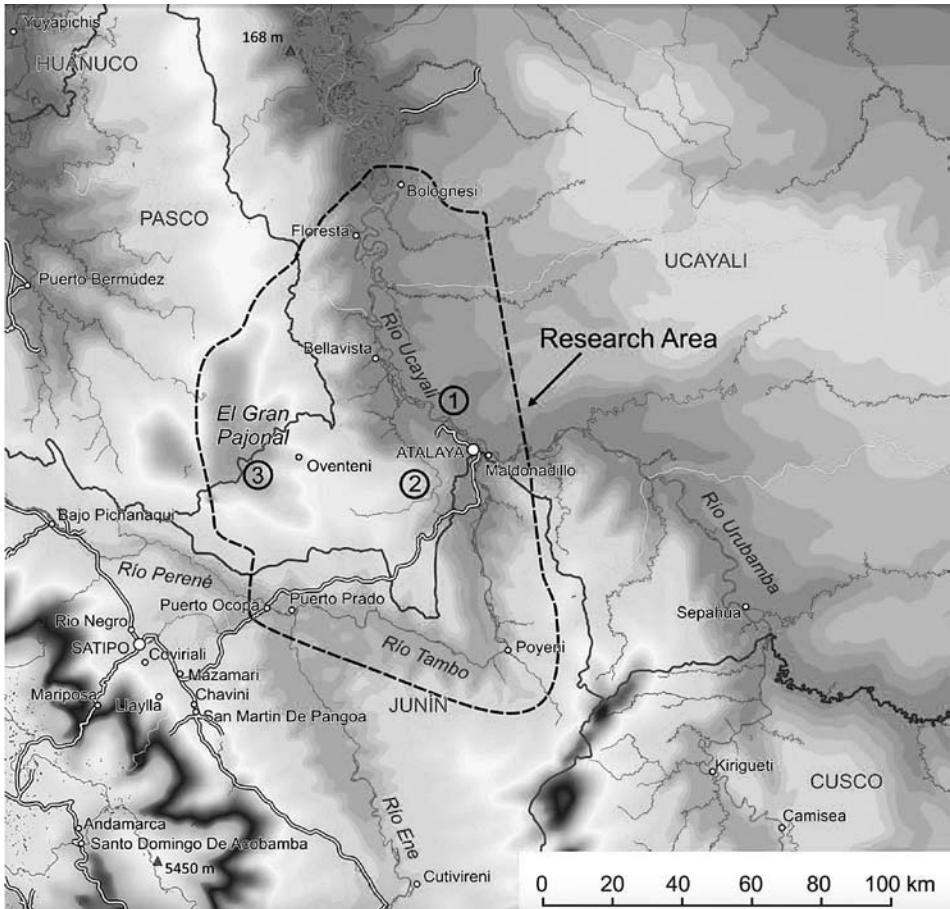


Figure 1: A map of the research area, showing the three landscape units/zones. Legend: (1) a damp, poorly drained area, (2) a well-drained area and (3) the plateau of El Gran Pajonal

Differentiating elements between modern settlements and traditional ones

Planimetry of settlements

The planimetry of modern settlements is equal to the western planimetry of towns/cities with streets, squares and parks (Figures 2, 3, 4, and 7). Streets usually intersect at right angles, as is usual for planned modern cities. The origin of “right angle” planimetry in Peru, resulted from the influence of the Spaniards.

In contrast, the planimetry of traditional settlements is reminiscent of extended yards, unevenly surrounded by houses (Figures 5 and 6). Such houses do not have clearly

defined yards with fences. In traditional settlements, there are no streets and squares. Since there are no streets and yards, the division between private and public spaces is a bit undefined (Figure 6). The public space touches the wall of a house, except for the immediate and undefined area before the front door. Communication within the village does not take place in a linear manner, e.g. via roads or paths, rather on a horizontal plane without defined direction. In a traditional village, there is no division between public and private space. The entire open area belongs to everyone, and all can use it without restrictions. There is no concept of a border, as a dividing line between these two entities. If householders place a few items in front of their house or lay them out on the outside wall, then these objects become part of the house. In modern settlements, the public area encompasses streets, squares, parks, and buildings with public functions. The private area includes houses and private buildings with yards. In modern settlements, the public area is clearly separated from private one by erected fences or clearly visible lines. However, there are no planimetric differences between traditional settlements along rivers, away from rivers, or on a plateau.

Contemporary Amazonian urban settlements designate and arrange their central squares in accordance to the standard model of the Peruvian Plaza de Armas (in the country's capital city, Lima), which is an indication of the spread of the Peruvian identity into Amazonia. This model was created by the arrival of the Spaniards in the 16th century. Newly formed modern Amazonian settlements often, right at the start, foresee and create their own Plaza de Armas. Traditional settlements do not have squares and do not copy this form of Peruvian identity.

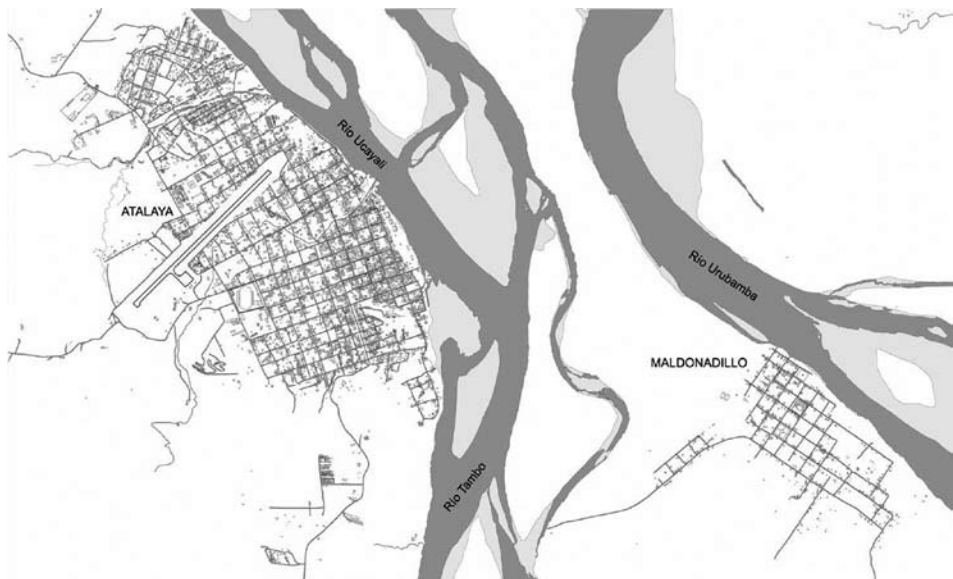


Figure 2: The planimetry of modern settlements: Atalaya and Maldonadillo



Figure 3: The planimetry of modern settlements: Oventeni

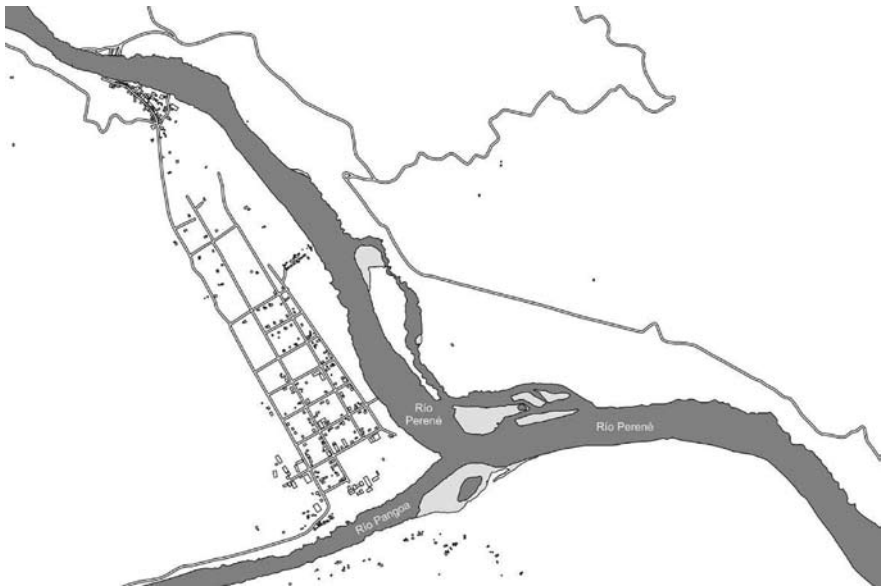


Figure 4: The planimetry of modern settlements: Puerto Ocopa

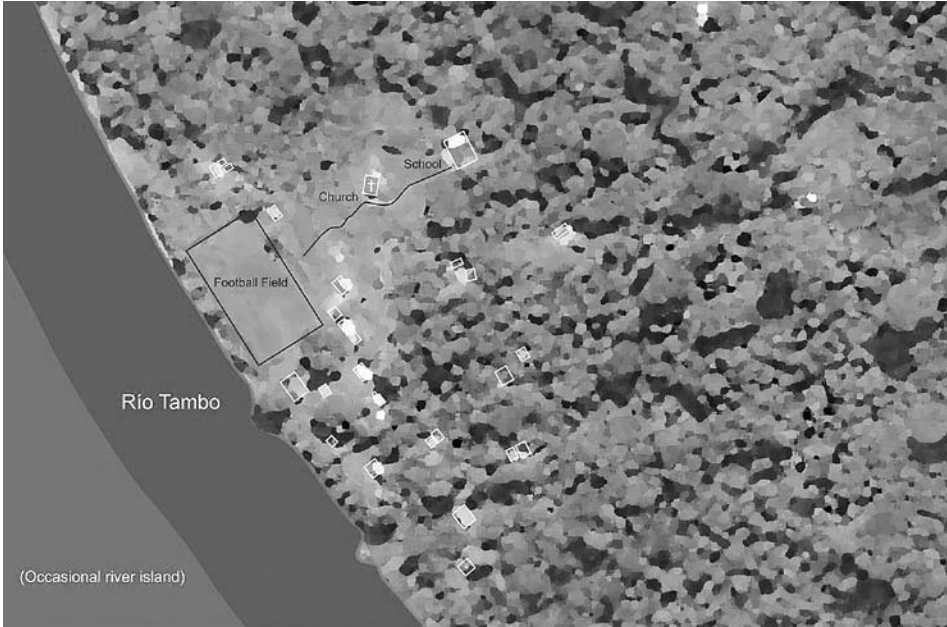


Figure 5: The planimetry of a traditional settlement: Buenos Aires

Demographics of settlements

Larger settlements, from the perspective of their population size, are *modern*, whereas the small ones are traditional and modern (Table 1). Traditional settlements are inhabited by hunters, fishermen, fruit gatherers, and traditional farmers, who can only survive in areas with a very low population density so that the small number of inhabitants could use the abundance of territory, forests and water. In traditional settlements the inhabitants are natives, and there are no immigrants, or very few. Immigrants in traditional settlements are usually marriage partners and temporary teachers in schools. In modern settlements, the inhabitants are mostly newcomers, but there are also numerous natives who have accepted the way of life of the immigrants (Table 1).

In a traditional village, it is common for a son, after marrying, to build his own house, located close to his parents' home. In this sense, traditional villages are extended family or relative communities. Larger traditional villages are collectives including two to three families and/or kinship groups. In each house, several related persons, parents and children, reside. The third generation, grandmothers and grandfathers, live next to their sons and daughters. We should emphasize that marriages begin at a much earlier age than among people in the West, and therefore many people become grandparents during their lives in their late 30s. It often occurs that parents are still raising their fourth or fifth child at the time when their eldest son or daughter becomes a parent. Hunters, fishermen, gatherers or basic farmers (planting a few bananas and yuccas) are fully active, or at least partially, until they reach 60 years of age. Help for elderly and for disabled persons is

resolved through a system of sharing food, and hence the pension system is not required. Yet the living conditions have had an effect, and therefore the percentage of persons over the age of 60 has been low. Family ties in *modern settlements* are not frequent. As in all cities, people migrated there from various parts of the Amazonian region, from numerous villages and other areas of Peru, and therefore they no longer live in a situation similar to the one in a traditional village, in which all or most of the inhabitants belong to one extended family (kin group). In modern settlements of the rural type, it is evident that several family (or kin) groups, in other words, a larger number, make up the settlements. Traditional villages tend to be composed only of one extended family (Table 1).

Modern influences

Modern settlements emerged in recent times, in the period up to a few decades ago, whereas traditional settlements constantly appeared, regardless of any period, from the distant past until recently. Modern settlements developed under the influence of immigrants from outside Amazonia. The greatest transformation force was the extraction of natural resources, in which companies dealing with oil and natural gas had a particular emphasis. Oil officials significantly altered the structure of activities of the local population and encouraged the arrival of a large number of outsiders (engineers, managers, workers). Entire settlements of the modern type developed, based on petroleum activities (Table 1). Foreign companies, involved in constructing large plantations and farms, had a substantial effect, which significantly altered the landscape of Amazonia and influenced its demographic changes. With the arrival of trade and trade relations to the local Amazonian community, settlements and the way of life in this area transformed. In this way, trade relations instead of a subsistence economy with a system of sharing entered into the scheme. The stronger presence of trade relations and of foreign companies stimulated the formation of larger settlements, mostly of the urban type. Port functions affected the spontaneous emergence of modern settlements, such as Puerto Ocopa, where a lower level modern settlement was built on the incoming road to the Perené River (Figure 4). At that position, road transport shifts to riverboat lines, or continues further by way of the local ferry (Figure 4). Missionaries sometimes transformed Amazonian villages inhabited by natives into places similar to western ones – with streets at right angles, and houses with a yard and fence. These rare tendencies took place 50 years ago in a few cases, for instance in the indigenous village of Puerto Ocopa (Figure 4).

Table 1: Criteria for the defining of planimetry in traditional and modern settlements

CRITERIA – LOCATION FACTORS – REASONS FOR OCCURRING		
	Traditional settlements	Modern settlements
Position – location	Far from routes, but next to one route (a river) Everywhere in a naturally favourable position	Along routes (rivers, roads, airport runways), transport hubs Next to oil fields, farms, plantations
Origin of the location	Older settlements, but also new ones Formation and dispersal	In more recent times (several decades ages). Formation and continuation
Demographic structure	Natives (the vast majority or all)	Immigrants, natives
Size of the settlement	Small settlements (about 10 to 50 inhabitants)	Larger and smaller settlements (from about 100 to 15,000 inhabitants [Atalaya])
FEATURES – APPEARANCE – DIFFERENCES		
	Traditional settlements	Modern settlements
Planimetry of the settlement	Extended yards	Public and private areas, roads, squares and yards
Houses	One room, without windows Covered floor, no extra rooms Materials from nature, the surroundings, mud, canes	More rooms, with windows Materials, bought in stores
Public functions	No public functions, or a small amount, e.g. schools, chapels, health centres	Numerous public functions
Family ties	The same family, an extended family, no more than 2–3 families	Numerous families and individuals

Public functions

Modern settlements, particularly urban types, have a number of public functions in regard to government administration, schools, commerce, manufacturing, offices, restaurants, hostels, the army, the police, and so on. Traditional settlements or villages have considerably less public functions. Most traditional settlements in the Amazonian area are small, without functions, with only a few houses belonging to the same family. In many traditional villages, there is not even a modest store. In a traditional village, there is rarely a common water tap or a toilet with a public function. In some larger traditional villages, such as Buenos Aires (Figures 5 and 6), two municipal service functions can be seen: a rural assembly site similar to a porch, and a small house in which the diet of children is monitored, in order to enhance nutrition. Within such, a house a bulletin board was placed

with a table monitoring the children's nutrition and development. The villagers receive food every day for their children. The assembly site, similar in appearance to a porch, is typical in the case of traditional villages. The porch is huge and can be filled at once by all the villagers. The porch has just a roof supported by columns, and inside it there are benches. On the narrower side of the porch, a bench with a table is located, intended for the chief and the authorities of the village. It is interesting to note that such porches used for rural assemblies look the same in most traditional villages as well as in villages with a modern planimetry. Yet, in general, in larger modern settlements and cities the traditional porch has disappeared, and buildings with offices and assembly halls are already being constructed, with the same design as in other parts of Peru.

Nevertheless, the modern village of Puerto Ocopa, for example, kept its old porch and did not construct an assembly building with offices and a hall. The very existence and size of the porch serve as an indication of the system of direct democracy in traditional Amazonian villages, which represents a specific democratic high-point in the method of governance. In small traditional villages, all adult residents have a right to vote. It is interesting to add that in regard to issues concerning health and education the views of both women and men are equally recognised, yet when the issues have to do with politics and the economy mostly men express their views. Peruvian national elections, together with election campaigns, take place in all the modern settlements. However, campaigns and the elections themselves are also held in many traditional settlements. In some larger traditional villages, there are several modern public functions, for example, linked to schools, churches/chapels, clinics, and football fields. These are the four most typical modern elements that have been added to larger traditional settlements. Such added elements sometimes are located outside of traditional settlements, immediately at their margins. Thus, in Buenos Aires, the porch and football field are located on the village's boundary, although they are visible parts of the settlement, whereas the church and school are situated further away from the traditional village. Nevertheless, we must emphasise that there are no rules concerning the planimetric position of added elements in traditional villages.

Appearance of houses

A traditional house/cottage is a small dwelling consisting of one room, with no windows, and with just one door. Glass as a building material is not used at all. Some traditional houses have a covered terrace in front of their entry door. The floor of the house is made of ground earth or wooden floorboards if the house is elevated and the terrace covered. The materially most modest houses, in the form of pile dwellings, have only a roof, some type of overhead porch or just a covered floor. These houses do not have walls or rooms. The area immediately in front of the house serves as a fire area and is visually and functionally part of the house. Thus, the kitchen is located outside the house, under a clear sky. The second fireplace is located in the middle of the covered dwelling, on the ground, where it is used for heating feet during the night, especially among the Asháninka people. Traditional houses are made of poles, as the basic fixtures, and they are woven together by intertwined bushwood. These traditional houses in the research area do not use mud

to strengthen the reinforcements made by the poles and bushwood, as is common in other parts of the world, for example among the Kenyan-Tanzanian Masai. These houses and their furnishings are fashioned from materials found in nearby natural environments. Industrial products, in general, are not used, or only very rarely. A house in a traditional village costs very little to set up, and it can be raised without the services of retailers and industrial-craft producers. The architecture is simple and does not depend on the knowledge of an expert. Building work, as a profession in the Western sense, do not exist in traditional villages. The vast majority of indigenous people knows how to select correctly wood and other materials for their houses, and is, therefore, able to construct such homes without any outside help.

Houses in modern settlements, whether in a village or in a city, are similar to such western buildings. They have several rooms, one floor or more, doors and windows. Windows usually have glass, but some rural houses have windows without glass, with boards as windowpanes. Construction materials are boards (wood), bricks or concrete. In a modern village, there are often additional edifices in the yards. Next to residential houses, farm buildings or facilities for animals are constructed. Some of these structures may be similar to traditional village houses. In the central parts of cities, there are commercial buildings. Houses are high, with several floors. In urban areas, most houses have small business areas on their ground floors with entrances from a street, and these sections are used for shops, restaurants and for a variety of service activities.

Houses/cottages in traditional settlements do not have toilets, running water, or electricity. Urination and defecation are done outside the village, in a forest, but only in a few specific areas. If there is liquid water, it is usually shared by all using a common tap. Slightly larger traditional villages have erected public male and female toilets. Modern settlements of the urban type, such as Atalaya, have water supply lines and drainage systems. Before the installation of sewage ducts, in some modern settlements and also in traditional villages, two septic tanks/pits, next to each other, were used as a sewage system. This system was designed and initiated by missionaries. Solid waste would break down in the first septic pit, and the excess liquid would spill over into the second pit. When the second pit would be filled with waste, the heavier waste would fall to the bottom of the pit, and the liquid part, fairly cleaned, would flow out of the pit into the ditches, streams, or rivers. In the first pit, worms would break down the waste. Even though sewerage systems or septic pits are not present in traditional villages, there is no foul odour in the villages, since the “toilets” are located outside the villages in the countryside. The natives who live along the rivers have a daily habit: men in the early evening, and women later in the evening bathe and wash in the rivers. Hygienic conditions are on a higher level than in many typical urban slums without sewage and water networks, and garbage disposal. Amazonian cities such as Atalaya have organised garbage disposal. Hygienic conditions are weaker in the highlands of El Gran Pajonal and in regions further away from rivers. Houses in traditional villages along rivers and in non-drainage areas are elevated pit dwelling types, whereas in the highlands of El Gran Pajonal and further from rivers and torrential flows, houses in drained areas are not on high levels, and the ground is often the floor of these houses.



Figure 6: Traditional settlement: Buenos Aires



Figure 7: Modern settlement: Atalaya

Spatial distribution

Modern settlements are located near transportation junctions, which in the Amazonian case primarily means along central navigable rivers (Ene, Perené, Tambo, Urubamba and Ucayali). Traditional settlements are situated everywhere, near the main roads and rivers and in remote regions (Figure 8). Traditional settlements without any functions are often semi-permanent. This is the case mostly in regard to newer settlements, which were abandoned over time. Hunting, fishing, and food gathering (or the gathering of other key raw materials) involve mobility, whereas agriculture requires a sedentary lifestyle. Besides the logic of such activities, there is likewise underway a natural geographical “logical” shift of the riverbeds of large streams. Settlements are threatened by river erosion and therefore move away from the banks. Other reasons for the relocation of settlements can be death in a family, the fragility of house structures and a move to establish new chakras. With the introduction of the first specific functions, especially schools, a traditional village becomes permanent. Over time, such a traditional location can turn into a modern settlement. In the last forty years, some indigenous settlements received from the Peruvian state the status CCNN – Comunidad Nativa (meaning native village), and so these traditional villages are indications of a modern planimetry.

Wet, poorly drained areas along the Ucayali River are the region of traditional settlements: Bolognesi and Nueva Italia are the only modern settlements in this region. Chicosa is a traditional settlement, with a large newly built school, and it has the planimetric layout of a modern village. Around Chicosa there are many chakras. Viewed from the perspective of planimetry, there is no difference between such traditional settlements and other traditional ones in the regional framework of this study. Differences exist in the appearance of houses and their material settings, and in the technological level of tools and implements. Houses in the traditional settlements of the farming-fishing tribe Shipibo are more advanced than the houses of the hunting-farming tribe Asháninka. Shipibo houses have one room, as opposed to a covered floor without a room which occasionally occurs in the Asháninka tribe. Houses of the Shipibo tribe are materially better equipped, and their tools are on a higher technological level in comparison to those of the Asháninka.

Embroidery and decoration on clothing (folk costumes) and ceramics are among the Shipibo more advanced than the modest expressions of the Asháninka. Shipibo design is very innovative, a real cosmology, whereas the simple designs of the Asháninka are dominated by only lines and a few rare patterns. The weaving equipment of the Shipibo is also technologically much more advanced. Interestingly, the shamans/curanderos of the Asháninka tribe, when using ayahuasca in their treatment or when seeking answers to various questions, transfer a picture of their visions/trans in a very complex cosmological manner, producing real masterpieces, yet in this-world/daily abstractions the Asháninka express themselves very simply. The Shipibo shamans also generate similar complex hallucinogen/trans visions, like the Asháninka but, in contrast to the latter, their everyday design is highly complex.

A drained area is favourable for building permanent larger settlements, and in this region, there are a few more modern settlements than in other landscape units, especially along the lower reaches of the River Tambo, which is the main traffic axis between Ata-

laya and Satipo, the input-output station of Peru in this part of Amazonia. Modern settlements along the lower flow of the Tambo are more recent, as a result of the modernisation of this part of Amazonia and the arrival of companies. These newly established modern settlements have a regular network of streets with squares, yet the houses in them are only sporadically built. They are planned urban settlements in the making. All modern settlements in the drained area are located along rivers as their main traffic axes. The largest town, Atalaya (Figures 2 and 7), is situated at the confluence of the Rivers Urubamba and Tambo in Ucayali. The convergence of these two rivers is the main transportation hub in the entire area of our research. In this city, there is an important military base, and the city can be considered safe and guarded. Nearby there are numerous oil fields and natural gas fields. Earlier established modern settlements are Puerto Ocopa (Figure 4) next to the Perené, and Puerto Prado at the confluence of the Rivers Ene and Perené.

Recently 12 modern settlements began to be constructed along the lower reaches of the Tambo River and one town, Maldonadillo (Figure 2), near the mouth of the River Urubamba. These are examples of the transition from traditional scattered forms of villages to modern planned and concentrated types of settlement. Maldonadillo, for instance, developed as a result of the effects of a nearby plantation (Figure 2). Puerto Ocopa was a typical indigenous settlement, which under the influence of missionaries about ten years ago took on a modern, Western form (Figure 4). Poyeni was an old indigenous settlement, which gained its modern form as a result of the development of police control functions when the army and police distributed weapons to its inhabitants in order to assure defence from Shining Path (Sendero Luminoso) terrorists and from drug traffickers. Among traditional settlements, there are no differences, regardless of their location near rivers or far from them. However, traditional settlements are sometimes transformed into modern planimetric forms of settlements.

On the El Gran Pajonal plateau, the settlement Oventeni is the only modern town (Figure 3). In this area, according to the official Peruvian statistics, there are still 48 traditional Indian villages. Oventeni was founded in 1936 by the Peruvian government, with the collaboration of the Franciscan missionaries from the Andean missionary centre in Santa Rosa de Ocopa. Most of the newcomers in Oventeni came from the Andean city Huancayo, located near the mentioned missionary centre. The aim was to more intensely populate the Amazonian El Gran Pajonal plateau. The newly formed town Oventeni became the activator for populating the region and for changes. Newcomers were given permanent ownership of land.

Traditional settlements are raised next to constant streams and water sources. On the plateau, there are only smaller tributaries and smaller rivers, which do not represent a transportation axis. The dirt road connection Puerto Ocopa-Atalaya is the only transportation axis. Before this extension, the only link with the rest of Peru and with other parts of Amazonia was a ground runway in Oventeni for cargo aircraft of the Hercules and Antonov type (Figure 3). Most of the Oventeni residents have chakras or gardens, orchards, fenced areas for animals, and farms and coffee fields located at a distance of several walking hours. A special feature is that during the wet period of the year they plant rice, which they harvest just like wheat during the dry period. Rice fields are not covered by

water most of the time. Crops obtained from the chakras are for personal use. Throughout the school year, the population resides in Oventeni, but some of the families live and constantly work on their chakras. On the chakras, they live in houses of the traditional style. The reasons for staying in Oventeni are the attendance of primary and secondary schools, masses and fairs, and also for trade, health care and administrative activities. From the aspect of its planimetry, Oventeni is a modern settlement of the typical Spanish form, with the main square called Plaza de Armas (Figure 3).

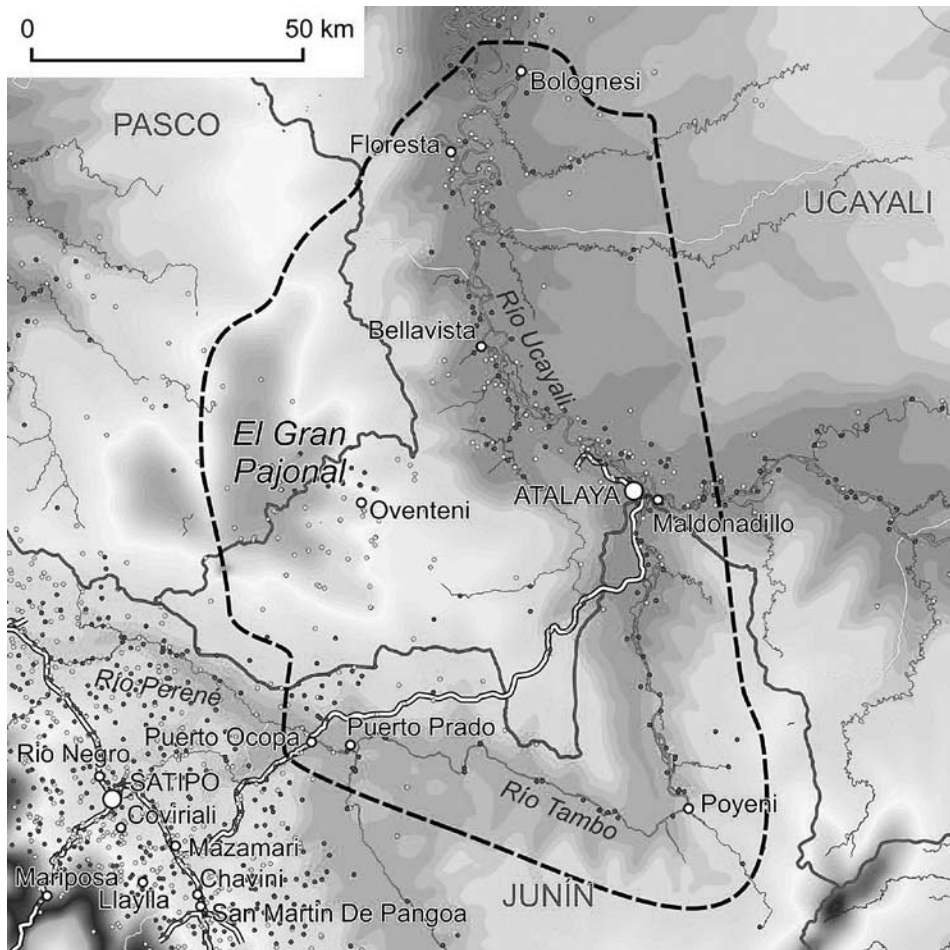


Figure 8: Spatial distribution of settlements. Legend: large towns or settlements (large white marks); small villages (darker makes); smallest villages (lighter makes).

Discussion

Recently, rapid development has taken place in modern settlements in the area of our research, as a result of the arrival of companies and the transformation of the economic activities of the people. Annual oil production in the Peruvian Amazonia equals nearly 4 hours of oil production in the world (Orta-Martínez & Finer 2010). For this small amount of oil on a global scale, the world pays a high price for the loss of biodiversity and the indigenous or world knowledge about Amazonia (Orta-Martínez & Finer 2010). Licences have been granted for the extraction of oil and/or natural gas within over 55.2% of the land of indigenous people and in the most remote, untouched parts of Peruvian Amazonia (Finer & Orta-Martínez 2010; Orta-Martínez & Finer 2010). In addition to the oil industry, the construction of hydroelectric power plants and transmission lines is planned. Projects of the Peruvian government, which include the construction of new hydropower plants, will have a negative impact on the local population and the biodiversity next to the Tambo River (Cabrera et al. 2012). The plan is also to utilise minerals; improve and expand the railway and road network; construct and manage water and waterways; intensify agriculture (by using fertilizers, pesticides), undertake forest harvests (the export of logs) (Dourojeanni et al. 2009). Recently, for its cocoa plantations, a company illegally cut down forests in Peruvian Amazonia, almost as much as 7,000 hectares from 2012 to 2015 (Hill 2015). An increase in social conflicts is predicted, because of the violation of human rights, especially of politically unorganised Indians (Dourojeanni et al. 2009). Between 2009 and 2021, many ambitious projects for the development of Peruvian Amazonia have been proposed, including the construction of 52 hydropower plants, 53 oil fields, many oil and gas pipelines, the issuing of 24,818 permits for new mines, building 4,486 km of improved roads, comprising 880 km of new roads and 2,089 km of paved roads, likewise about 2,000 km of railways, 4,213 km of waterways and also establishing new plantations for the production of biofuels (Dourojeanni et al. 2009: 125). Never in the history of Peru have so many projects been devised all at once, but it is improbable that all these projects will be realised. By 2041, deforestation and degradation will probably expand over at least 56% of the forests, whereas pessimistic forecasts speak of 91%. Only 9.9% of Peruvian Amazonia is under protection.

Furthermore, as has been emphasised, deforestation of tropical rainforests produces about a fifth of greenhouse gas emissions (Mann 2013: 391). Climate, according to a historical-sociological overview, is the reason for the expansion of a potential global crisis (Mann 2013). According to a plan adopted in 2011, Peru intends to build a series of massive hydroelectric power plants with dams and reservoirs on the River Marañon, over a length of 1,700 km, which will irrecoverably eliminate the splendour and exceptional features of nature (Hill 2015b). By analogy, we could conclude that the rivers in the contact region between the Andes and the Amazonian Basin, such as the Ene, Perene, Urumbaba and Tambo, could become target goals for entrepreneurs searching for locations for new hydroelectric power plants.

Oil fields have been investigated mostly next to the River Urubamba; the largest hydro-energy potential is along the River Tambo, whereas the most favourable conditions

for plantations and farms are drained areas, which are also present on the western (left) side of the Ucayali. This is especially true for the zones along the River Tambo, for several reasons: 1) drainage along the river's banks; 2) the Tambo is a transportation axis between Atalaya and Satipo; Peru's entry track into Amazonia; and 3) due to an influx of various companies. It is expected that traditional settlements will be reduced and disappear and that the traditional way of life will be moved away from the rivers and the main roads into very remote regions or into areas under special protection.

The modernisation processes, during which the customs and habits of the Amazonian natives have been changing, have resulted in an irrevocable loss of world knowledge about the tropics. The loss of traditional knowledge is linked to the inclusion of the local population into the market economy, and at the same time to the abandonment of the existential self-serving subsistence economy (Kramer et al. 2009). Oil extraction activities have had an adverse effect on biodiversity and have stimulated the inclusion of indigenous people into the market economy, which altogether leads to the loss of traditional ecological knowledge (Finer & Orta-Martínez 2010; Suarez et al. 2009; Orta-Martínez & Finer 2010). The poorer transfer of knowledge from father to son, as a result of moving to the cities, also fosters the reduction of traditional knowledge concerning nature (Pinton 2003). Traditional knowledge is lost because of the expansion of the globalisation network (Reyes-Garcia et al. 2005; Kramer et al. 2009). The arrival of money, organised education based on the Peruvian national programmes, access to markets and industrial products, are overall changing the elements of traditional society (Suess & Mendoza 2011). An individual from a forest society, specifically a native, is in many ways capable of doing a full range of activities, whereas a city person is one-dimensional and active only in one way in his job. Because of the expansion of modernity and Westernisation within the Amazonian regions of the world, there has been an irreversible and irreparable loss of knowledge about the nature of tropical areas, or – in other words – modernisation of the tropics is reducing the amount of knowledge in the World. The people in Amazonia will gain more modern knowledge; however, this does not represent an overall increase, but rather a decline in the World's level of knowledge.

Conclusions

The planimetry of settlements reflects the way in which people carry out their work actions and daily activities. The spatial distribution of modern settlements in Amazonia is an indication of how power, timing, and the expansion of modern transformation processes functioned in the Amazon region. The traditional lifestyle of the indigenous people, based on hunting, fishing, collecting fruit, and simple agriculture, requires a low population concentration and life in small settlements. Traditional settlements include, as a maximum, two to three families, in several houses with a planimetric form that resembles an extended yard without a clear division between private and public spaces. Modern settlements came about as a result of new activities such as the oil industry, hydropower, plantation agriculture, or trade, and because of a greater concentration of population. The planimetry of modern settlements is in line with the general Peruvian, Spanish-type of

town, with a regular grid of streets and a main square with a conventional design, function and name: Plaza de Armas. Attractive areas for the creation of modern settlements extend along major rivers as transportation axes in the area of our research, especially along the lower flow of the Tambo River. On the micro- locational level, river banks in drained areas and with mild slopes have an advantage. The largest city, Atalaya, is located in Ucayali near the confluence of the Tambo and Urumbamba, which is the most important transportation hub. Atalaya is becoming the source location for the spread of effects leading to modern transformation.

It can be presumed that the process of transforming the Amazonian rainforest into deforested regions, into areas for agriculture, oil and gas fields, hydropower plants and lake reservoirs with modern settlements, will be accelerated even more. This process will be the most intense along river banks, and in the very near future along paved roads. Atalaya as the center of the transformation process will continue to increase its economic and demographic dimensions. Further modernisation processes, headed by companies, will provide the Amazonian regions with a significantly higher total GDP and per capita GDP in comparison to what was the case when hunting-gathering, fishing, and simple agriculture constituted the prevailing economy in these regions. Such further development of Peruvian Amazonia will have a positive impact on the overall growth of Peru's economy. However, the world will irrevocably lose much of its knowledge and many specificities linked to the tropical world, and the biodiversity of the Amazonian region will also decline. Peru will receive something, but the world will certainly lose quite a lot of its traits.

Finally, what can we systemize or summarise regarding our thesis on planimetry? In short, we can say that planimetry is an indicator of shifts in ways of life and it is a good indication of the directions resulting from modern development.

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Povzetek

Namen tega prispevka je vzpostaviti kriterije za opredelitev tradicionalnih in modernih naselbin ter lokacijskih dejavnikov glede na njihovo prostorsko prisotnost v provinci Atalaya v Perujski Amazoniji. Ključna tema prispevka je planimetrija vasi, ki je odvisna od številnih dejavnikov. Je nekakšen pokazatelj zunanjih vplivov, ki razkriva vsakdanje življenjske navade, načine poslovanja, zaposlitve in prisotnost določenih dejavnosti. Človeške dejavnosti, civilizacijski modeli in zunanji pritiski vplivajo na videz in strukturo vasi. V Perujski Amazoniji domorodne vplive izrinjajo vplivi, ki prihajajo z območji zunaj Amazonije. Planimetrija vasi pokaže razlike med dvema glavnima skupinama vasi: tradicionalnimi in modernimi. Za določitev kriterijev za razlikovanje med tradicionalnimi in modernimi naselbinami je potrebna široka analiza človeških dejavnosti, poselitve in migracij, komunikacijskih infrastruktur ter zgodovine zunaj amazonskega vpliva. Moderne naselbine se pojavljajo na območjih, ki so bila podvržena številnim in raznolikim tujim vplivom in komunikacijskim tokovom. Tradicionalne naselbine so prisotne v vseh območjih, ki smo jih raziskali, vendar jih je v modernih conah občutno manj.

KLJUČNE BESEDE: planimetrija naselbin, oblike naselbin, zunanji vplivi, Amazonsko nižavje, Peru

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