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## **Resource Flows, Uses and Populations Territorial Attachments: The Case of the Oyapock Watershed (French Guiana, Amapá State of Brazil)**

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# Resource flows, uses and populations territorial attachments: the case of the Oyapock watershed (French Guiana, Amapá State of Brazil).

## **Abstract**

This article presents a stakeholders' mapping exercise carried out in 2017 and 2018 in the Oyapock watershed. 92 maps were obtained covering almost the entire watershed. Results show that roads are becoming a more significant spatial reference to people, apart from the population minority living along the River. This latter polarizes itself into a Brazilian colonization down and midstream, legal farmers on the Brazilian side and illegal gold diggers on the French Guiana side, and an Amerindian demographic growth upstream, both at the expense of the historical Saramaka/Creole area. Recent roads sticking each bank of the Oyapock River to their hinterland, Brazil and France respectively, like rubber bands, are separating them slowly, despite the bridge, mostly useless for now

## **Keywords**

Perception-based regional mapping (PBRM); Amapá State & French Guiana; Amazonia; Oyapock watershed; Perception

## Introduction

The Oyapock watershed is still a common living area for both banks. Until the arrival and implementation of infrastructures marking their possessions by the Brazilian (2200km) and French (7100km) metropolises, the two banks of the river were quite similar (Boudoux d'Hautefeuille, 2010; 2012). From the beginning of the 20<sup>th</sup> century, France and Brazil gradually established their footprints and, as highlighted by Nonato Jr. (2015), Santos (2021) or Thébaux et al. (2022), the watershed then became twofold: remaining a living basin until the 2000s in the upstream and mostly Amerindian hinterland, which was, it became downstream an interface for exchanges between cultures that gradually differentiated themselves. Numerous studies and long-term observation of this basin, in conjunction with the observation of Amerindian populations on both banks and the establishment of the two Amazonian Parks (the Brazilian PNMT, Parque Nacional Montanhas do Tumucumaque in 2002, and the French PAG, Parc Amazonien de Guyane: Tsayem, 2008 in 2007), have allowed a better understanding of the Oyapock social dynamics. The construction of the Oyapock river transfrontier bridge is of little use even if it has been open to traffic since 2017. Finally, a substantial French fund was dedicated to the study of the overall watershed dynamics, questioning the importance of the bridge opening, under the supervision of the CNRS Human-Environment Observatory (Observatoire Homme-Milieu - OHM) Oyapock <sup>1</sup>.

In this article, we propose to spatially describe the Oyapock territory watershed thanks to the perception of its inhabitants. The aim is to understand, in a way that is both holistic in terms of themes and global in spatial terms, how human communities describe this territory and its components, which they consider necessary and sufficient to characterise it, as well as the places where they live and the resources that enable them to improve their quality of life. The approach presented responds to the notion of populist legitimacy (see Olivier de Sardan, 1995), as opposed to the sole legitimacy of an outside observer, and in particular of scientists working there, by proposing a hybridisation of these knowledges and a formalisation of these perceptions. Here we produce a spatial analysis of the perceptions of the local actors we met, over a relatively short period of time. The Perception-based Regional Mapping (PBRM) methodology (Maestriperi & Saqalli, 2016) responds to this search for an alternative viewpoint by its capacity to inventory the characteristics of a vast territory, as soon as this territory is traversed and included in the Oekumen in the anthropologic sense of Descola (2015), or territory experienced and known as a humanised space. As long as humans are willing to talk about a territory, everything could be mapped.

## Methods and sampling

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<sup>1</sup> The study area stretches along both banks of the Oyapock River, a natural border between French Guiana and Brazil. The human-environment observatories (OHM) are a research infrastructure of the Institute for Ecology and Environment of the CNRS. The first one was created in 2007. Today there are thirteen OHM, spread across metropolitan France (6), overseas (2) and abroad (5). They study anthropized systems affected by socio-ecosystemic crises resulting from Global Change and Globalization. The OHM Oyapock is located entirely within the tropical rainforest, and includes the communities of Ouanary, Saint-Georges-de l'Oyapock, Camopi on the French side, and the vast community of Iapoque on the Brazilian side. Sparsely populated, this area is in the process of being opened up to the outside world with the recent opening of two roads that reach all the way to the river. The construction of this transfrontier river bridge should further accelerate these changes. The OHM aims to identify and monitor the key processes which will influence the human population and its environment, their interactions and their dynamics, after the construction of this bridge.

The Perception-based regional mapping (PBRM) is a social survey mapping tool for populations considered relevant in a territory. Relevant here means that they are both concerned by this territory and potentially affected by it, by living there, crossing it, working around, etc.). They have knowledge of it, through practices, through doing things individually and/or through a community and/or through the transmission of book and/or local information. This tool is often described as "participatory" but according to Arnstein scale (1969), participation here stops at the collection of local information. Based on a methodology for the co-construction of shared diagnoses and the co-development of local management plans developed by Caron (2001), among others, we have formalised a tool for collecting and combining local perceptions. The PBRM fills in many gaps in the spatialized approach to the development and territory environmental issues, which goes beyond a classic anthropological approach. Indeed, these gaps corresponded to the lack of a junction between inductive approaches from the human sciences and technical, deductive approaches from the biophysical sciences and are inevitable in such qualitative elaborations:

- The first weakness concerns geographical positioning: integrating mental maps a posteriori, formalising a space without an initial connection to a cartographic base, into a geographical system is a challenge (Bailly, 1986; Touré et al. 2004). Without this reference, the information cannot be understood without the local organisation prior knowledge. Nor can it be confronted with external sources, which is the only way to test a method.
- The second weakness concerns the scale: mental maps, like maps derived from field measurements, rarely go beyond the village territory unless there is a substantial budget. They therefore tend to be thematically restricted to the local context and resources and do not capture regional organisation and dynamics (Lavigne-Delville, 2001) ;
- The third weakness is disciplinary: regional tools are generally based on spatialisable variables, most often biophysical, whereas local tools are largely socio-anthropological (only the linguistics aspect of place names avoid this division). In fact, faced with the large number of unknown local variables to be studied, a number of public operators in rural development, public services and local authorities (for instance for the French counterpart, the army and gendarmerie, the Forest National Office, of French Guiana local authorities, but also NGOs such as Greenpeace and others) rely primarily on external data sources, such as remote sensing, with the Amazonian Park of French Guiana (PAG) being an exception: these sources give an impression of reliability: they are accurate, frequently updated and spatially homogenous, but they are only panoptic variables that can be observed by remote sensing. However, the fact that they are visible in no way justifies their real weight in terms of the issues at stake in the concerned territory. On the other hand, local development actors (NGOs, associations, etc.) working locally tend to rely on their own, mainly qualitative, information. In both cases, the ideological context of these institutions and the academic and social background of their agents and donors also influence the points of view (Olivier de Sardan, 1995).
- Finally, the last weakness is linked to the information itself: any local dynamic only comes to the attention of a survey from the outside: a dynamic is discovered through contact, and is informed by collecting data and information (Bommel, 2009) allowing confirmation or refutation. It is never the collection of data that provides information on the variable at the origin of the data! The PBRM is thus a detector of 'weak' signals by the simple fact that certain dynamics are identified

when they could not be otherwise. The signals identified are not necessarily crucial, but should be explored in a next subsequent investigation.

The method is quite simple in its structure but requires some attention in its implementation:

Figure 1. Overview of the background maps used for the different PBRM surveys, shown at the same scale

1. We work on the basis of a map incoming in this case from three maps of the Oyapock watershed provided by the cartographic service of the UMR LEEISA CNRS research laboratory, which constitute a background on which we superpose a layer for each interview (Figure 1). The map is printed and treated to resist the meteorological risks (lamination or fabric protection) and is made up in such a way that it covers the targeted territory, in order to "de-localise" the territory, i.e. not to restrict the interview to the local dynamics alone, seen only on a small map. In order this map to be readable by the inhabitants, the indispensable toponymical database drawn up jointly by the UMR LEEISA CNRS and the Amazonian Park of French Guyana (localities, roads, rivers, rapids, rocks, confluences, etc.) was included (Pavé & Fonet, 2010), which is more important than the precision of the rivers meanders, for example, because it is by citing and locating them that the interviewees will be able to situate themselves.
2. The interview sampling should seek, as far as possible, both diversity of profiles (status, origin, cultural capital, gender, age, professional world, etc.) and representativeness (in particular of gender, which is almost systematically biased). Houses and social places should be favoured, but in practice, on both sides of the river Oyapock, they are not very frequented during the day or it is socially difficult to ring the bell, which means that these interviews should be attempted in the early evening. The exceptions are restaurants at midday and of course schools and universities throughout the day. Geographical representativeness implies moving around during the survey campaign, preferably with equal time for each survey base (from city to isolated house, far/near road, river, Brazil vs. France, etc.). Refusals to be surveyed are very numerous: they represent on average 50% of the requests and increase for people in full activity (e.g. shopkeepers, representatives and elected officials). These biases are very difficult to reduce.
3. Mapping is preferably carried out by interviewing two people at the same time, from different fields of knowledge and, if possible, who do not know each other, in order to limit status conflicts or preponderance based on gender, age or other social issues. The results depend very strongly on their willingness to participate to the discussion and on the ability of the interviewers to limit the influence of social dominance relations (Amelot 2013; Guibet-Lafaye, 2014). Placing this knowledge on a map is certainly an obligation for later use and constitutes the least bad form of social domination, referring to the game at school. The methodology is summarised in Figure 2.

Figure 2. Perception-based regional mapping (PBRM) methodology and example of the resulting map.

4. How the interview was conducted:
  - a. It begins by placing the layer on the map and giving pencils to the two interviewees. The first step is to identify the territory known by the two interviewees, by circling the villages they recognise and can describe. Listing the villages and place names verbally avoids fixing the interviewee's mind on a cartographic representation, as some interviewees visualise the villages and classify them according to the criteria they mention, but not clearly their position. By facilitating the link to the map in this way, we allow the interviewee to focus on

his/her own classification and avoid asking questions about the interviewees unknown areas and they will then only talk about their respective areas of knowledge;

- b. The second step consists in dividing the territory: a single question is asked, intentionally "simplistic", i.e. with the least possible bias: "Is it the same everywhere?" suggesting that the differences to be sought are spatial and spatialisable. "In relation to what?" object the majority of interviewees. "We don't know. You're the one who knows this country", leaving it to the interviewee to define this criterion, which could be anything. Only the interviewees define the differentiation criteria, without any suggestion from the interviewer. The origin of these criteria is noted, in addition to the discussions and reactions between the interviewees. The criteria are then mapped according to their values ('here a lot', 'there a little') by drawing sets, individualised spatial units, identified by these criteria and homogeneous in relation to them, called HSU (Homogeneous Spatial Unit). Each HSU is drawn topologically: for a given criterion, to separate the area where a site includes this criterion and the area where a site excludes it, the border right in the middle is drawn without further complexity;
  - c. the third step consists of a "factual" description of each HSU: local infrastructure (markets, religious buildings, dispensaries and hospitals, schools), main economic activities and trade flows between it and other HSUs, the dynamics population living in this unit (settlement and emigration);
5. The data set, consisting of about 100 interviews spatialized for the Oyapock watershed area, is digitised and georeferenced in a Geographic Information System (GIS). The final step consists of combining the maps obtained, i.e. intersecting the HSU polygons and combining the criteria and their declinations. We then obtain a single map with several thousand polygons, each with information weighted by the number of people who spoke about it in their respective maps: for example, 37 people spoke about land use during the interview. If, for a distant area, 4 people described this place, 3 of them as a place of 'hunting' and only one spoke of ' slash-and-burn', then the final polygon will indicate for Land use hunting3+ slash-and-burn1;
  6. The major difficulty of this formalisation is the management of semantic differences, in addition to the syntactic approximations of each HSU category which can in some cases be managed by formalisation or even automatization. One of the advantages of this method is that the syntactic variations range around the same terms is stored in memory.

In the framework of the FEZOADA<sup>2</sup> research project of the Human-Environment Observatory (OHM) Oyapock, we applied this three-step zoning methodology for logistical reasons: A first series of surveys at the end of 2017 took place in St-Georges de l'Oyapock, then in the hamlets of Tampak, Trois-Palétuviers and finally in Ouanary municipality near the Oyapock watershed outlet;

1. A second series took place in June 2018 in and around the French municipality of Camopi, and its Brazilian counterpart Villa Brasil on the other bank of the Oyapock River. We were unable to include the hamlet of Trois-Sauts, upriver 150km away;
2. Finally, work continued in July 2018 in and around the Brazilian city of Oiapoque in collaboration with UNIFAP, the Federal University of Amapá, with different populations including some members of the Palikur and Galibi Amerindian population.

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<sup>2</sup> Formalisation des Emprises territoriales par Zonage sur l'Oyapock A Dires d'Acteurs

## Results

The results, as with any survey, present representativeness biases presented in Table 1: officials (from both countries, teachers, but also medical personnel, gendarmes and military personnel, etc.) are over-represented and the age and gender factors are biased towards older men. This limitation of the study, indeed a very common one in social surveys, is however simply recalled here, the method having been extensively explained, discussed and subjected to reflexivity in several previous articles (Saqalli et al. 2009; Maestriperi & Saqalli, 2016; Saqalli et al. 2018; Saqalli et al. 2020)

Table 1. Respondents' representation by age, occupation and gender in the Oyapock watershed

Visible in Figure 3, the PBRM spatial coverage is significant (26,000 km<sup>2</sup>, i.e. the equivalent of 97% of the watershed), in 90 man-days, admittedly more or less intensively covered according to the number of people knowing the place. Certain hollow spaces appear and correspond to the hollows of habitation, places of passage only, to be investigated during future surveys if possible. Thus, some areas are known to only two or even one interviewee. Ten criteria were identified, of which we present the two most frequently reported.

Figure 3: Total coverage assessed by all the PBRM mappings in the Oyapock watershed

Figure 1 : Total coverage assessed by all the PBRM mappings in the Oyapock watershed, showing the knowledge density

Figure 4 shows the territory knowledge density described by the sum of the PBRMs: the more red an area is, the more maps describe the area. This figure illustrates the polarisation around the road and river axes, with the known rural areas forming a halo around the three centres of Oiapoque, St Georges and Camopi and remaining the preserve of hunters, fishermen and farmers. The interviewees, both Brazilian and Guyanese, who mentioned the road as the main axis, were mostly urban: officials, traders or transporters, but also young people from the two towns who had recently become established locally. Those who see the river and its tributaries as the main axis are rural (farmers, pirogue drivers, hunters, etc.) and almost exclusively Amerindians, Creoles or Saramakas, in short, they are perceived as the most ancient people in the area. The territory described here is more extensive around the axes, as they hunt and farm. Important point: The Palikur ethnic group area in the north of the Oiapoque-Macapá road and the colonisation area to the south of this road are thus "countries", the only rural areas covering a territory that is not only fluvial but has been built around coastal rivers. The Wayãpi-Teko ethnic space is also a country. Personal anchorage and representation of the territory are thus intrinsically linked.

Several dynamics can thus be observed:

- The road at the expense of the river: For both sides of the border, the road is becoming part from the inhabitants' customs as they are less and less "from the river" and "from the country" and more and more urban, coming from elsewhere. St-Georges and its Brazilian twin town of Oiapoque have become the link between the Cayenne-Macapá axis and the Oyapock River, from Ouanary to Trois-Sauts village (Boudoux d'Hautefeuille, 2014). But outside this axis, it is the rivers and their tributaries that are the routes of transit, entry and the territory knowledge. To get around, alternating roads and rivers is certainly a shared practice, but it is now much easier to be connected to regional capitals than to the distant banks of the river. This geographical differentiation between two worlds, road and river, is therefore also a generational and cultural

differentiation. The Maripa falls divide appears (Figure 3): the 'potamo-oekumene'<sup>3</sup> of this basin, a communication, life and food route, is populated downstream and on both banks by Brazilians, shifting the majority of the population towards an urban and road lifestyle, and upstream by Amerindians thanks to significant population growth (up to 4 children per woman) (Toss, 2016). However, although the young people of Camopi circulate, they explore less than their elders, hesitating to organise expeditions lasting several days or even weeks on the tributaries of the Camopi (Grenand & Grenand, 1979; Davy et al. 2012; Tritsch et al. 2012);

- Mines and slash-and-burn cultivation: settlement was never strong in French Guyana and certain traces (Regina, Maripa falls) attest to attempts to set up an export agriculture that failed. The Creole or Saramaka farms suffer from most their operators advanced age and there is no longer any installation of young farmers on the French side of the Oyapock river, supported by restrictive forestry legislation (Sévelin-Radiguet, 2012).
- Farms along the BR 156 road could be oriented towards supplying Oiapoque and St-Georges (Tchansia, 2012; Laurença, 2012). This leaves livestock and cash crops on the Brazilian side due to low wage costs and illegal gold panning, whose territory is defined by the area of control authorised by the French gendarmerie (Figure 5).

Figure 5: PBRM mapping of predominant landscapes and land uses in the Oyapock watershed, between Brazil and French Guiana

From then on, the slash-and-burn surfaces became family retreat areas where the grandparents lived, with food crops, primarily cassava. People come to meet, hunt and fish at weekends (Richard-Hansen et al. 2019), whether in the large Palikur-Galibi-Karipuna swamp area on the downstream side of Brazil (Vidal, 2007, Crespi et al. 2015) or in the Wayãpi-Teko countries on the upstream side of Guyana (Davy et al. 2012; Tritsch et al. 2012), each of which is protected by a national park.

- Ethnic groups: this notion is a structuring criterion for the interviewees' discourse (22.4% of the interviews). Figure 6 shows this spatial distribution and dynamics: :

Figure 6. Results regarding ethnicity and/or nationality dominance on the territories covered by the PBRM methodology over the Oyapock watershed, between Brazil and French Guiana

- Expansions Brazilian and Amerindian expansion: the space between Montabo falls and the Sikini River, including the latter, has become a de facto quasi-Brazilian space, through the continuous infiltration of garimpeiros, i.e. gold diggers, and the supply bases establishment, between the "road" space described above and the upstream river space. The Sikini River is seen as too dangerous for non-garimpeiros. This infiltration is far from over and could be reactivated by the economic difficulties and political orientations that affect and will affect these territories. Amapá State south of Oiapoque and along the BR-156 road to Macapá is also gradually being fragmented by agricultural expansion and the regular arrival of Brazilian settlers, who are being held back by Amerindian reserves and the Cabo Orange Park on the coast. Finally, the recent demographic vigour of the various Amerindian groups has not yet been reflected in its spatial dimension, as the new generation is not yet adult in 2020.
- Mixed origins and isolated groups: the map shows the dominant groups but also highlights the growing importance of mixed-race identities in the city (St Georges, Oiapoque) and in the

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<sup>3</sup> From the ancient Greek words Potamos (river) and oekumene (inhabited land)



forest, such as between the shores of Camopi-Villa Brasil or Trois-Palétuviers-Yamna, where Brazilian Creole and Brazilian Amerindian couples and children are gaining in importance. These new "local identities" emergence has enabled the now well-established rapprochement of Amerindian groups among themselves (Teko and Wayãpi, Palikur, Galibi and even Patuà) but also with and among others with similar customs and practices: what is cultivated, gathered, hunted and eaten, as well as the way it is eaten, are identifiers of the way in which one sees oneself, of what unites. This is what can create a link (Poulain, 2002), when this is actually desired, in contrast to the isolated groups that are the Saramaka remnant of Tampak or the Creole remnant of Ouanary village.

Comparison with other results on this Oyapock basin focus mostly on the actual impacts of the bridge openings and there is a common agreement that it has little consequences over the societies on the two banks of the River and even are separating each other, through the progressively easier connexion of each bank towards its hinterland and the progressive closure of the border mostly due to the application of national regulations in a territory where informal arrangements were common (Granger & Silva, 2021; Letniowska-Swiat & Morel, 2021; Santos, 2021a, 2021b, 2021c; Thébaux et al. 2022). Indeed, roads and new connections do modify local mobility (Boudoux d'Hautefeuille, 2014; Damien et al., 2012; De Figueiredo Azze, 2019; Nonato, 2015; Santos, 2020; Tritsch et al., 2015, 2012). Our work complete these works by showing the spatial and by then social differentiation between the "roads world" and the "River world", the latter losing progressively its emprise. Even more, we show the intertwining between such a disparity and a still-palpable differentiation based on ethnicity, which plays a major role in defining identities. However, identity intercrossings, such as the combination of ethnicities and nationalities, are here pregnant, mainly due to the very strong inequality of statutes, infrastructures and supports one may encounter between the two borders : the "road world" insinuates itself also through the more complex identities appearing in the fading "River world". As a matter of fact, equivalent works reveals equivalent dynamics in other Amazon areas, such as in Ecuadorian Amazon where mixed identities, families and villages are building a melting pot of specific identities (Maestriperi & Saqalli, 2016; Saqalli et al. 2020).

## Conclusion

We obtained a snapshot of the perception of almost the entire Oyapock catchment area using the PBRM tool. It remains fragmentary because the representativeness of the interviewed sample needs to be improved and the perceptions can be seen as biased in some respects. This analysis should be completed by a survey in Trois-Sauts village, Villa Brasil and the territories managed by Funai (Fundação Nacional do Índio)<sup>4</sup> in Brazil, near Cabo Orange and Tumucumaque national parks. The results presented are a first overview of the thematic richness of local views on the different dynamics affecting this territory, whether environmental, health, socio-economic or security-related. The territory seems to be experiencing a crystallisation of habits around the roads to the detriment of the river and its practitioners. When we compare the knowledge territories of the rural interviewees with those of the urban ones, those of the groups most attached to the places (Debenedetti, 2005) with those belonging to the most recently arrived groups and those of the oldest interviewees with the youngest, a striking contrast emerges which, in our opinion, reflects a

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<sup>4</sup> The Brazil National Indian Foundation.

strong dynamic underway: the rural culture linked to the river, even if it remains prevalent, is gradually being covered by the urban culture inherent in the roads, due to the differential evolution of the demographic weight. These roads, as well as nationalist assertions and the COVID-19 pandemic, has well bring each bank back to their respective hinterlands, French Guyana and Amapá, like rubber bands, depending on the intensity and recurrence of these present and future crises. As a matter of fact, a first restitution was given at the end of the 2018 surveys. Since then, the conjunction of constraints, i.e. the pandemic, the Bolsonaro regime and ideology and the budget restrictions on both sides were restricting de facto access to Brazilian and French field sites until the 2023 President Lula da Silva election. Only then definitive results may be transmitted to local institutions, universities, municipalities, local governments and populations.

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