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Perceived environmental degradation by long-term residents of an Amazonian urban stream

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ARTICLE

PERCEIVED ENVIRONMENTAL DEGRADATION BY LONG-TERM RESIDENTS OF AN AMAZONIAN URBAN STREAM

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Abstract

This study investigates the perceptions of long-term residents living along an Amazonian stream (Santarém, Pará) regarding potential local environmental degradation processes between 1988 and 2018. The methodology involved problem-centred interviews (N = 31) with local residents and on-site visits to strategic points along the stream's main course. The transcriptions of the interviews were analysed using the Discourse of the Collective Subject (DCS) methodological strategy. Based on five guiding questions, 27 DCSs were generated, highlighting the following predominant central ideas: "Vegetation was suppressed by humans"; "Stream was good for use"; "Emergence of invasions"; "Humans"; and, finally, "due to the degradation of the stream." The data suggest significant suppression of native vegetation, degradation of the water source, the emergence of illegal land occupations, and a lack of action by local public authorities. The findings illustrate how collective environmental memory is shaped by observed biophysical degradation and a perceived absence of governance, aligning with social representations theory but also revealing place-based ambivalence toward past and present land use.

Keywords: Environmental Perception; Environmental Degradation; Collective Subject Discourse; Deforestation; Social Representation.

Resumo / Résumé

PERCEPÇÃO DA DEGRADAÇÃO AMBIENTAL POR MORADORES ANTIGOS DE UM IGARAPÉ URBANO AMAZÔNICO

Este estudo investiga a percepção de moradores antigos que residem ao longo de um igarapé amazônico (Santarém, Pará), acerca dos possíveis processos locais de degradação ambiental, entre 1988 e 2018. O método incluiu entrevista centrada no problema (N = 31) com moradores locais e visitas in loco a pontos estratégicos do curso principal do igarapé. As transcrições das entrevistas foram analisadas segundo a estratégia metodológica do Discurso do Sujeito Coletivo (DSC). A partir de cinco perguntas, foram gerados 27 DSC, com as seguintes ideias centrais predominantes: "supressão da vegetação pelo homem"; "igarapé era bom para uso"; "surgimento de invasões"; "o ser humano"; e por fim, "devido à degradação do igarapé". Os dados sugerem profunda supressão da vegetação nativa, degradação do manancial, surgimento de invasões e falta de atuação do poder público local. Os achados ilustram como a memória ambiental coletiva é moldada pela degradação biofísica observada e por uma percepção de ausência de governança, alinhando-se à teoria das representações sociais, mas também revelando uma ambivalência baseada no lugar em relação ao uso da terra no passado e no presente.

Palavras-chave: Percepção Ambiental; Degradação Ambiental; Discurso do Sujeito Coletivo; Desmatamento; Representação Social.

PERCEPTION DE LA DÉGRADATION ENVIRONNEMENTALE PAR LES ANCIENS HABITANTS D'UN IGARAPÉ URBAIN AMAZONIEN

Cette étude examine la perception des anciens habitants résidant le long d'un igarapé amazonien (Santarém, Pará) concernant les processus locaux de dégradation environnementale possibles entre 1988 et 2018. La méthode utilisée a inclus des entretiens centrés sur le problème (N = 31) avec des habitants locaux et des visites sur le terrain à des points stratégiques du cours principal de l'igarapé. Les transcriptions des entretiens ont été analysées selon la stratégie méthodologique du Discours du Sujet Collectif (DSC). À partir de cinq questions, 27 DSC ont été générés, avec les idées principales suivantes : « suppression de la végétation par l'homme » ; « l'igarapé était bon pour l'usage » ; « apparition d'envahissements » ; « l'être humain » ; et enfin, « en raison de la dégradation de l'igarapé ». Les données suggèrent une profonde suppression de la végétation native, une dégradation de la ressource en eau, l'apparition d'envahissements et un manque d'action de la part des autorités locales. Les résultats illustrent comment la mémoire environnementale collective est façonnée par la dégradation biophysique observée et par une perception d'absence de gouvernance, s'alignant ainsi sur la théorie des représentations sociales, tout en révélant une ambivalence ancrée dans le lieu concernant l'utilisation passée et présente des terres.

Mots-clés: Perception Environnementale; Dégradation Environnementale; Discours du Sujet Collectif; Déforestation; Représentation Sociale.

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INTRODUCTION

Discussing environmental perception requires an exploration of the very concept of the environment. Hannigan (2006) understands the environment as a space where the social is intimately tied to the cultural, while simultaneously these two dimensions are in competition with one another. Brazil's National Environmental Policy, established by Law No. 6,938/1981, defines the environment as: "The set of conditions, laws, influences, changes, and interactions of a physical, chemical, and biological nature that enable, house, and govern life in all its forms" (Brasil, 1981, Art. 3, our translation).

This legal understanding addresses and regulates both natural resources and human activities in relation to the environment. In this context, urban environmental management represents an immense challenge for contemporary society, which is predominantly concentrated in cities (Lima Júnior, 2003). This challenge is connected not only to the conservation of environmental resources but also to the need to provide decent living conditions for the population.

Cities are spaces prone to environmental degradation, ecological imbalances, and social problems, necessitating public policies aimed at addressing such issues. In this sense, Ganzer et al. (2017) and Lima Júnior (2003) argue that the relationship between humans and the environment, as well as socio-environmental issues, provides an appropriate starting point for planning policies targeting urban areas.

This study focuses on an Amazonian stream located in the city of Santarém (Pará), within the interior of the Brazilian Amazon. Founded in 1661, the city has undergone constant changes in its urban landscape due to human activity. Santarém occupies a privileged location compared to other municipalities in the western region of the state of Pará, being flanked by the Tapajós River to the west and the Amazon River to the east. This makes the city a vital commercial hub, which, over the past 40 years, has attracted an increasing number of people seeking better living conditions. This has contributed to local population growth.

According to Lowe-McConnell (1999), streams (igarapés) are water bodies with well-defined and generally sandy beds. With a vast territorial area that includes 95.01 km² of urbanised land (IBGE, 2019). Santarém is home to several streams, including the Irurá and Juá to the west and the Urumari to the east. Over the years, these water bodies have been subject to various anthropogenic pressures (Pimentel; Melo, 2014).

The Urumari stream is a first- and second-order water body located within Santarém's urban zone, extending across seven neighbourhoods (Santiago; Almeida; Novais, 2023). As such, it is directly influenced by diverse urban activities, which compromise local water supply and environmental balance. The continuous human pressure in the area since the mid-1980s has degraded native vegetation as well as the Urumari stream itself, without the local authorities proposing effective public policies to address this situation (Santiago; Almeida; Novais, 2023).

This study therefore asks: how do long-term residents perceive three decades of environmental change along the Urumari stream? The objective is to analyze their discourses for evidence of nostalgic valuations of past use and attributions of causality to human action versus state absence, thereby bridging environmental perception research and the study of collectively shared environmental meanings.

PERCEPTION OF THE ENVIRONMENT

Human experiences with the environment, shaped by individual and collective daily actions, correspond to what is termed environmental perception. Each person perceives their surroundings subjectively and, in this process, attributes value to them based on cultural influences (Abram, 1997; Peterson, 1999; Serrano, 2000). From a humanistic geography perspective, Tuan (2012) conceptualizes this bond as topophilia, the affective tie between people and place. Conversely, environmental degradation can trigger topophobia, or a sense of aversion to the altered place. Moreover, individuals can learn from or teach those they interact with about how the environment is affected by human actions and also undergoes natural adaptive processes. In this context, Macedo (2000) asserts that environmental

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perception acts as a precursor to a system that fosters individual awareness by capturing useful information, using environmental realities as a reference point.

From Naime and Spilki's (2012) perspective, environmental perception, combined with studies on environmental impacts, helps to comprehend the broader reality of the environment, promoting environmental awareness and, consequently, encouraging more individuals to become advocates for such practices. To understand environmental perception and its facets, it is essential to recognise its interdisciplinary nature, as it spans multiple fields of knowledge and can serve various purposes (Palma, 2005).

Perception itself is a basic psychological process through which individuals grasp internal and external realities. As an analytical category, however, environmental perception is more closely associated with understanding the external reality surrounding the individual, specifically their spatial environment (Cavalcante; Maciel, 2018).

The application of environmental perception can be significant for environmental management. Rodrigues et al. (2012), for instance, studied environmental perception in the municipality of Santo André, São Paulo, and concluded that incorporating community perception as a support tool in environmental management can facilitate a participatory process for shared management between public authorities and society.

Conceptually, environmental management encompasses:

> The intentional decision-making process structured from a pro-environmental perspective aimed at more sustainable development, which shapes and conditions the organisation's objectives (i.e., its "mission") and its "strategies" to achieve them (Pol; Moreno; Castrechini, 2010, p.379, our translation, emphasis in the original).

Thus, Cavalcante and Elali (2017) argue that public policy managers must understand how individuals perceive, value, and experience the environment, which supports the planning of social demands. This is especially crucial in areas where biological studies are scarce, and local ecological knowledge becomes the primary or sole source of information regarding regional ecology and environmental changes (Porcher et al., 2010).

Beyond understanding and describing how social actors perceive environmental changes and the problems attributed to them, studies on environmental perception also seek to grasp how these actors experience the environment and the extent to which verbalised perceptions truly reflect concrete or symbolic experiences in the environment. Thus, perceived environmental change is never purely biophysical; it is filtered through social representations, memory, and moral attributions of causality.

Moscovici's (2012) theory of social representations posits that shared knowledge and beliefs emerge from everyday communication and serve to make the unfamiliar familiar. Social representations are collectively constructed frameworks that guide how groups interpret environmental change, assign causality, and justify actions or inactions. In environmental contexts, social representations shape whether degradation is perceived as natural, anthropogenic, or inevitable, and who is held responsible. Thus, analyzing the central ideas that emerge from residents' testimonies is not simply a matter of aggregating individual perceptions; rather, it reveals the intersubjective structure of environmental meaning within the community.

In contexts of rapid urban change, Devine-Wright (2013) argues that place attachment[1] is not static; disruption can lead to place-protective actions. However, when the disruption is perceived as chronic and government inaction is evident, these protective actions may manifest as discourse (complaint, nostalgia, blame attribution) rather than direct intervention.

The self-reported perceptions in discourses surrounding the so-called ecological crisis and its associated environmental issues often overlook the fact that these concerns are, in reality, problems of humanity rather than generic environmental problems. Consequently, we face issues that are caused and consciously aggravated by human behaviours within the environment (Corraliza, 1997). Similarly, these problems demand behavioural solutions, which should (or ought to) be considered during the formulation of environmental public policies across different levels of governance (Cone; Hayes, 1980). Consistent with this view, environmental psychology addresses not only the perception of environmental

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problems but also the environmental consciousness that translates awareness into action, and the psychological barriers that block this process (Gifford, 2011). The gap between recognizing degradation and acting to reverse it often involves attribution of responsibility, a point this study revisits in the discussion of public policy absence.

METHOD

STUDY AREA

The study area encompasses the Urumari stream (igarapé). located in the eastern part of the city of Santarém, Pará. Flanked by urban properties on both sides, the stream stretches approximately 7.5 km, traversing seven neighbourhoods. From upstream to downstream, these are the neighbourhoods of Santo André, Vigia, Urumari, Jutaí, São José Operário, Área Verde, and Uruará, with its mouth situated in the mixing zone of the Amazon and Tapajós rivers (Pimentel; Melo, 2014) (Figure 1).

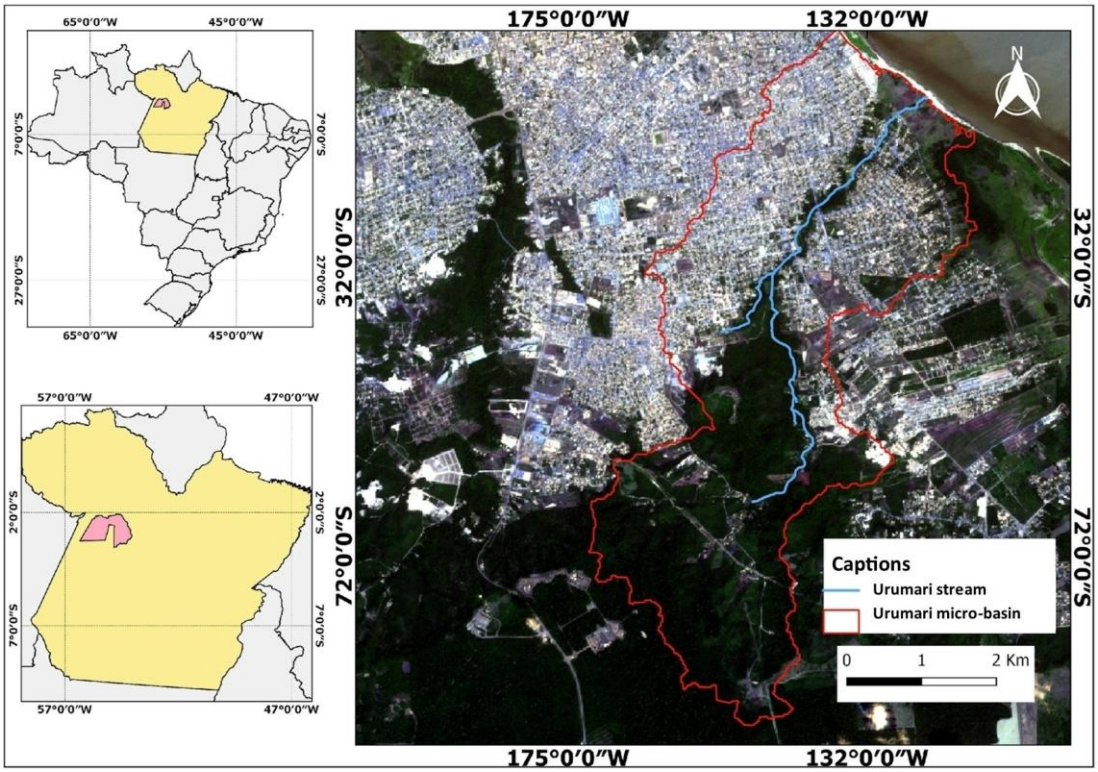


Figure 1 – Location of the Urumari stream micro-basin within the urban perimeter of Santarém, Pará, Brazilian Amazon. The stream traverses seven neighborhoods from upstream to downstream, with its mouth at the confluence of the Amazon and Tapajós rivers. Source: Adapted from Santiago, Almeida, and Novais (2023, p.23).

TECHNIQUE AND INSTRUMENT

We adopted problem-centred interviews (Witzel, 2000) as the data collection technique. In this approach, the interviewer uses a questionnaire as a guide and starting point to gather information related to the research problem. Using this method, we interviewed 31 long-term residents living in neighbourhoods adjacent to the Urumari stream within the urban area of Santarém.

The interview script aimed to investigate whether residents observed environmental changes regarding vegetation, the stream, and urbanisation over the three decades they had lived in the area

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(1988–2018). Additionally. respondents were asked to express their opinions about the possible causes of environmental changes in the region. Socioeconomic data were also collected, including gender, age, education level, and household income.

PARTICIPANTS AND PROCEDURES

We considered each of the seven neighbourhoods through which the Urumari stream passes as a sub-group for the study. Between three and six participants were selected from each sub-group, totalling 31 interviewees (15 men and 16 women). Participants were required to be at least 40 years old and to have lived in one of the designated neighbourhoods — Santo André, Urumari, Jutaí, São José Operário, Área Verde, Uruará, or Vigia — for at least a decade. These criteria ensured the inclusion of long-term residents who could provide insights into the area's history and environmental changes. The sample is non-probabilistic and based on convenience and snowballing, which may limit generalizability. The unequal number of participants per neighborhood (3 to 6) reflects differential accessibility and population density, rather than analytical weighting; nevertheless, central ideas were saturated across neighborhoods, suggesting no systematic bias.

Initially, six individuals with similar profiles to the 31 target participants were interviewed to test the semantic clarity and effectiveness of the interview script. Following the pilot testing, we examined the Urumari stream's route using Google Earth Pro to identify streets and residences closest to the riparian forest and within the target neighbourhoods. A researcher (RSS) visited each residence between October 2017 and March 2018 to identify elderly residents who met the inclusion criteria. If eligible, the interview was conducted immediately or scheduled for a later, more convenient time, with the resident's consent.

At the end of each interview, the researcher inquired whether the participant knew other residents in the area who met the study criteria, allowing for the inclusion of additional participants. Residences where no one responded at the time of the visit were excluded due to logistical limitations. Interviews were recorded using a digital audio recorder, with prior authorisation from the interviewees.

ETHICAL ASPECTS

All interviews began with a detailed explanation of the study, followed by the reading and signing of the Free and Informed Consent Form. This ensured participants were aware of the study's objectives and agreed to take part voluntarily. The research received approval from the Ethics Committee of the Universidade do Estado do Pará (UEPA), Campus XII – Tapajós (CAAE no. 03466618.7.0000.5168).

DATA ANALYSIS

The methodological strategy of the Discourse of the Collective Subject (DCS) was employed to analyse the interview transcriptions. According to Lefèvre and Lefèvre (2005, p.18). the DCS is: "[...] a synthesised discourse written in the first person singular. composed of key expressions [E-Ch] sharing the same central idea [IC] or anchoring [AC]" (Lefèvre; Lefèvre, 2005, p.18, our translation).

This technique is grounded in the theory of social representations (Moscovici, 2012), creating a new conceptual framework derived from collective information. The verbal content collected from participants' testimonies served as the basis for identifying central ideas, which were then synthesised into several discourses written in the first person singular. referred to as DCS (Brito; Lauer-Leite; Novais, 2021).

The verbal material recorded during the interviews was fully transcribed into digital text files in ".docx" format. Subsequently, using the QualiQuantiSoft® software (version 1.3c build 2), we organised the large volume of verbal data from the interviews and followed these steps to create the DCSs:

1. Highlight Key Expressions (E-Ch): Expressions were identified in the Instrument of Discourse Analysis 1 (IDA 1).

2. Identify Central Ideas (CI) or Anchorings[2] (AC): Key expressions were linked to corresponding central ideas or anchorings.

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3. Group Similar Central Ideas or Anchorings: Ideas with similar, equivalent, or complementary meanings were grouped together.

4. Create Synthesised Central Ideas or Anchorings: A summarised central idea or anchoring was assigned to each group.

5. Compile Key Expressions into DCSs: Key expressions from each group were organised into synthesised discourses using the Instrument of Discourse Analysis 2 (IDA 2). During this process, the order of expressions was maintained based on their level of importance; expressions contributing most to the discourse preceded those with less impact (Brito; Lauer-Leite; Novais, 2021; Lefèvre; Lefèvre, 2005). Connectors were used to link parts or paragraphs of the discourses, ensuring text cohesion.

RESULTS AND DISCUSSION

SOCIOECONOMIC PROFILE OF INTERVIEWEES

The age range of participants varied between 46 and 95 years. with the majority falling within the 56–65 age group (35.48%). The length of residence near the stream ranged from 20 to 62 years (M = 32.35; SD = 8.57; Md = 31; Mo = 30). Regarding household income, 70.97% of respondents reported earning up to one minimum wage at the time of the survey (2018). Concerning education levels, 35.48% had not completed primary education, while 29.03% had completed secondary education. Only two individuals (6.45%) had attained higher education and reported household incomes exceeding four minimum wages (Table 1).

PERCEPTIONS OF THE URUMARI

Responses to each question included in the interview guide generated between four and seven central ideas (Table 2). These ranged from central ideas expressed by only one participant to those shared by 23 individuals (M = 7.81; SD = 6.40; Md = 4; Mo = 4), with frequencies varying between 3.23% and 74.19% (Table 2). In Tables 2 and 3, the number of participants (N) may exceed 31, as each interviewee could contribute key expressions to more than one central idea in the construction of the DCSs.

Thus, it becomes evident that most central ideas were shared by more than one participant, indicating that they indeed reflect collective thoughts. This is a characteristic feature of the DCS.

Several central ideas highlight the role of humans in environmental changes over the decades. Changes in native vegetation exemplify this, as the respondents reported in the most prominent central idea for question 1 – “Vegetation was suppressed by humans” (Table 2) – and the following excerpt from the respective DCS: “[...] They kept cutting down the native forest, and with that, it changed the protection that used to exist for the stream.” (Table 3).

This perception among local residents regarding the suppression of vegetation due to anthropogenic actions is corroborated by Santiago, Almeida, and Novais (2023), who, in studying satellite images of the Urumari stream region from the period between 1987 and 2018, pointed to a sharp decline in local vegetation cover. In the 1980s, the vegetation was dense and preserved, estimated at 76.93%.

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Variable/Category	N	%
Gender		
Male	15	48.39
Female	16	51.61
Age Range		
46–55	6	19.35
56–65	11	35.48
66–75	6	19.35
76–85	6	19.35
86–95	2	6.45
Length of Residence in the Region		
20–29	10	32.26
30–39	16	51.61
40–49	4	12.90
50–59	–	–
60–69	1	3.23
Educational Level		
No formal education	3	9.68
Incomplete primary education	11	35.48
Complete primary education	6	19.35
Complete secondary education	9	29.03
Higher education completed	2	6.45
Household Income Range		
Up to 1 minimum wage[3]	22	70.97
2–3 minimum wages	7	22.58
4–5 minimum wage	1	3.23
Above 5 minimum wage	1	3.23

Table 1 – Socioeconomic profile of long-term resident participants (N = 31) living along the Urumari stream, Santarém, Pará, Brazil (2018). Source: Research data (2018).

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Category	Main Idea	N	%*
Q1 – Over the time you have lived near the stream, have you observed any changes in the environment regarding the native vegetation? Please tell us a bit about it.			
A	Vegetation was preserved	15	48.39
B	Vegetation was suppressed by humans	23	74.19
C	Vegetation remains preserved	2	6.45
D	Vegetation suppressed due to silting	4	12.90
Q2 – Over the time you have lived near the stream, have you observed any changes in the environment concerning the stream itself? Please tell us a bit about it.			
A	Stream was preserved	14	45.16
B	Stream not preserved, unsuitable for use	13	41.94
C	Stream was good for use	15	48.39
D	Stream being silted	10	32.26
E	Erosion in the streambed	3	9.68
Q3 – Over the time you have lived near the stream, have you observed any changes in the environment concerning urbanised areas? Please tell us a bit about it.			
A	More houses being built	18	58.06
B	No invasions	4	12.90
C	Emergence of invasions	21	67.74
D	Buying and/or selling of land	4	12.90
E	Migration of people	2	6.45
F	Thermal comfort	1	3.23
G	There were fewer houses	2	6.45
Q4 – In your opinion, what caused these changes?			
A	Humans	11	35.48
B	Natural phenomena	3	9.68
C	Urbanisation	8	25.81
D	Invasions	5	16.13
E	Deforestation	4	12.90
F	Silting	4	12.90
Q5 – For you, can these changes be considered problems? Please tell us a bit about it.			
A	Yes, due to the degradation of the stream	11	35.48
B	Yes, due to the lack of public policies	6	19.35
C	Yes, due to silting	3	9.68
D	Yes, due to invasions	4	12.90
E	Yes, due to urbanisation	1	3.23

* Percentages may sum to more than 100% because individual participants could contribute key expressions to more than one central idea in the Discourse of the Collective Subject (DCS) construction.

Table 2 – Central ideas identified from problem-centered interviews (N = 31), organized by guiding question (Q1–Q5), with absolute (N) and relative (%) frequencies. Source: Research data (2018).

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Notably, while 74% cite human suppression of vegetation (Idea B), only 35% explicitly name "humans" as the cause (Q4, Idea A), and even fewer (19%) mention lack of public policies. This discrepancy suggests that residents perceive proximate human action but hesitate to structuralize causation, a common finding in environmental perception studies where blame is individualized rather than systemic.

The interviewees highlight the alteration of native vegetation, including fruit trees, with only small trees remaining at the time of this study. As the vegetation declined, the animals whose habitat was tied to the stream were affected, as they are no longer seen by the residents. Conversely, some interviewees observe little change in the environment regarding vegetation. They claim that there were fewer trees in the past compared to today, and for this reason, the environment is supposedly conserved. However, these reports contradict the study by Santiago, Almeida, and Novais (2023), which indicates that, by 2018, only about 29.84% of dense vegetation remained in the region. This apparent contradiction between perceived stability and measured vegetation loss can be interpreted through environmental psychology as "shifting baseline syndrome" (Pauly, 1995; Papworth et al., 2009), where each generation accepts the environment of their early adulthood as the reference. Alternatively, it may reflect a defensive discourse, since residents who remain in degraded areas sometimes minimize change to reduce cognitive dissonance or to avoid implicating themselves.

The relationship of the residents with the stream appears in several central ideas and respective DCSs, ranging from when they considered that the "stream was good for use" or the "stream was preserved" – central ideas A and C in question 2 (Table 2) – to when the discourses depict the stream as a space for leisure and domestic utility, as in the following excerpt from the DCS of central idea C: "[...] It was a place of leisure, because there was no pollution at all, women would go down to wash their clothes and bathe their children, [...] this stream was better than any beach here in Santarém. [...]." (Table 3).

For long-term residents, the memory of the stream represents not only a biophysical baseline but an emotional attachment to a lost landscape (Tuan, 2013). The narratives of leisure, clean water, and white sand evoke a sensory and emotional pleasure derived from the environment. The sharp contrast between "better than any beach" and "today I wouldn't even dare to take a bath" illustrates a rupture in place attachment. This loss of sensory quality (smell, sight, safety) transforms the Urumari from a space of dwelling into a space of risk, eroding the residents' topophilic bond.

In the past, the Urumari stream had clean water with no signs of pollution; however, at the time of this study, it exhibited murky and turbid waters. Pimentel and Melo (2014) had already discussed this degradation process of the Urumari stream, corroborating the present study by highlighting the main local anthropogenic actions. These include the disposal of untreated solid waste and effluents into the stream, as well as siltation caused by the construction of public works. These issues are addressed, for instance, in central ideas such as "Stream not preserved, unsuitable for use" and "Stream being silted" (Table 2).

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Central Idea	Discourses of the Collective Subject
B – Vegetation was suppressed by humans (Question 1)	Nowadays everything has changed, everything is cut down, even the stream has been cleared. There used to be a lot of trees, there were a lot of trees. The forest was vast, but now everything has been devastated, the Buriti trees, the large trees, they were all felled, now only small trees remain. Every day they cut down the Buriti trees. It was very beautiful, and today we see something different; all the fruit trees have disappeared, where the stream used to be, which had fruits like the açaí tree, the Buriti, and other fruits like the pororoca. All of that was here, but today it's all gone. There was an invasion here, and they cut down a lot of Buriti trees, then they poisoned the Buriti trees, cutting pieces off and putting poison in and covering it up. The animals we used to see here, we don't see them anymore; everything was destroyed, and those that survived left, including the birds. They kept cutting down the native forest, and with that, it changed the protection that used to exist for the stream.
C – Stream was good for use (Question 2)	We used to drink water without any problem because it was the best water we had, clean water, water that we were brave enough to drink, to take a bath in, to wash clothes. It was a place of leisure, because there was no pollution at all, women would go down to wash their clothes and bathe their children, it was just that very white sand at the bottom of the stream. Everyone who came here thought this stream was better than any beach here in Santarém. But today, I wouldn't even dare to take a bath; now it's muddy and dirty, you can't do anything anymore. That stream was very beautiful.
C – Emergence of invasions (Question 3)	There were few people, there wasn't much aggression. The biggest aggression came with the irregular occupation, where there are no criteria, and also with the increasing population. It's impossible not to have aggression towards the environment. There have been many invasions, people came and kept destroying, so now there are a lot of houses, places where there were none before, and today people live practically on the flooded areas of the stream, where they filled it in, but when it rains, especially in the winter, the houses get flooded. So people live in precarious conditions. Many have nowhere to go, but they come looking for a place to settle because it's an invasion. They don't seek ways to move elsewhere, they stay on the banks of the stream, cleaning it out to live, and even the animals they encounter, they end up killing. We still fight a lot because of the invasions.
A – Humans (Question 4)	It's the human being himself, who seems to not have any awareness of the harm they are doing to nature itself, not knowing how to preserve the stream. People throw trash around, they didn't know how to take care of it, and even today they don't care. The people don't know how to treat what they have. The arrival of people we don't know the reason for, we don't know why they came to occupy, they brought tractors and destroyed all the plants. There are businesspeople who came here saying they owned everything. The population growth, the ambition of man, and the lack of awareness of the population are what happened, and part of this, I refer to the public authorities as well.
A – Yes, due to the degradation of the stream (Question 5)	It's possible, because as they say, they've destroyed the stream. We had a stream that, before it was contaminated, we used it, but after it was contaminated, we couldn't use it anymore, starting with the water quality. The water quality became bad, terrible. We should have a stream with more depth, cleaner, so that you can see, the population isn't serving any purpose anymore because it has harmed our water, our environment. The forest evolves, but the water decreases. In a few years, we're going to feel it; many people are aware, they know the laws, but they don't do what they should do. For sure, if things continue like this, without taking action, the stream will dry up. I don't know the situation of the stream's source, because it's further upstream, but the stream will dry up. So this causes a huge loss to the residents, they don't take care of it, and it keeps getting destroyed more and more.

Table 3 – Discourses of the Collective Subject (DCS) corresponding to the most frequent central idea for each of the five guiding questions (Q1–Q5). Each DCS is a synthesized, first-person singular discourse composed of key expressions shared by multiple participants, following Lefèvre and Lefèvre (2005). Source: Research data (2018).

Respondents noted that the water, width, and depth of the stream have undergone alterations. While part of the stream is being filled in due to siltation, another part is suffering from erosion in the smaller channel, which has a depth of 5 to 6 metres. This process is also highlighted in the central idea "Erosion in the streambed".

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Concerns about local urban expansion, sometimes disorderly, are also evident in the analysed discourses. Residents highlight that the region along the Urumari stream was once sparsely populated, with no invasions or irregular occupations. However, the number of inhabitants has increased significantly in recent decades, due to invasions and the construction of housing along the larger channel of the stream.

Tucci (2008) points out that the central problems regarding infrastructure and urbanisation in developing countries, such as those in Latin America, include the large concentration of the population in small areas, the expansion of urban peripheries, and spontaneous urbanisation. In invasions, occupation often occurs in risk-prone areas. According to the author, the impact of this on urban water systems is generally associated with uneven urban planning, which often exists only for the "formal city", areas occupied by the middle and high-income population.

An analysis of built-up areas/exposed land in the Urumari stream region revealed that, in 1987, the percentage of inhabited area within the seven neighbourhoods along the stream was 16.14%; by 2018, this percentage had increased to 61.98% (Santiago; Almeida; Novais, 2023). For the majority of interviewees, the changes in the environment are caused by human activity. especially urbanisation (Table 2). A statement from the DCS reads: "[...] the human being himself, who seems to not have any awareness of the harm they are doing to nature itself, not knowing how to preserve the stream. [...]" (Table 3). This view is recurring in dialogues with local residents when referring to changes brought about by vegetation clearance, disorganised land occupation. ambition, and the lack of government intervention in situations that harm the environment.

In response to the local environmental degradation, a segment of the population is dedicated to improving the environment. This led to the founding of the Urumari Defence Committee, which aims to eventually become a basin committee, and the Urumari Vivo Project. Both initiatives promote actions in defence of the water source, working to raise environmental awareness within the community and drawing the attention of public authorities for increased monitoring, as well as promoting actions to mitigate the environmental impacts in the region. The emergence of collective action occurs probably among residents who articulate a coherent causal chain linking deforestation to stream degradation. Conversely, residents who attribute change solely to abstract "ambition" or "lack of awareness" tend to exhibit passive mourning. This distinction is crucial for intervention, since policy must first strengthen residents' perceived efficacy to move them from nostalgic discourse to place-protective action (Devine-Wright, 2013).

Most of the residents also considered the environmental changes affecting the Urumari stream as problems, explained by the central ideas "due to the degradation of the stream" and "due to the lack of public policies" (Table 2). The interviewees understand that these changes should be regarded as problems, as they once benefited from the stream and no longer do, due to the quality and volume of water being far below what was observed in previous years.

The city of Santarém made an important step when it created the Serra Saubal Environmental Preservation Area (EPA). This EPA covers 1,538 square metres and spans 156 hectares of native forest, thus protecting the main springs of the Urumari water source.

The degradation of the stream occurs throughout its entire length, as observed in the field and through discussions with interviewees, due to the disregard for environmental laws. In this regard, the lack of public policies is cited as the second most significant cause of problems related to the stream (Table 2). Concern for the Urumari is often confined to the local population, who organise to promote conservation and environmental education activities (e.g.. Bechara; Guerreiro; Mota, 2018).

CONCLUSION

Since the 1980s, Santarém has experienced continuous environmental change. Using the Discourse of the Collective Subject (DCS), this study captured how long-term residents along the Urumari stream perceive those changes between 1988 and 2018. The DCS revealed coherent social representations: native vegetation suppression, water source degradation, land invasions, and perceived government inaction. These residents' discourses align with remote-sensing data, confirming that local ecological knowledge can reliably mirror biophysical trends.

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Theoretically, residents systematically contrast a past “good stream for use” with a degraded present. While most attribute change to “humans”, fewer explicitly name lack of public policies, a dual-blame structure that surveys rarely captures. The apparent contradiction between some residents who claim the environment is “still preserved” and measured vegetation loss is interpretable as shifting baseline syndrome. Thus, collective environmental perception is not a mirror of biophysical change but a filtered, nostalgic, morally charged narrative.

For local authorities and the Urumari Vivo Project, interventions must address residents’ causal attribution: people perceive both unregulated behavior and state absence as co-producers of degradation. This DCS-based framework is replicable for other Amazonian urban streams and rapidly urbanizing tropics where biological data are scarce but long-term residents hold decades of environmental memory. Future research should examine whether environmental education that recovers historical baselines can reverse shifting baseline effects.

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DATA AVAILABILITY

Not applicable.

NOTES

1 - Place attachment refers to the emotional and cultural bond between people and a place, the latter conceived as an environmental context that may be tangible or symbolic (Low; Altman, 1992).

2 - An anchoring corresponds to “[...] a given discursive content present in a specific statement, which is the explicit linguistic manifestation of a particular theory, ideology, belief, or value professed by the author of the discourse and which, as a generic assertion, is being used by the speaker to "frame" a specific situation (Lefèvre et al., 2002, p.37, our translation, emphasis in the original).

3 - In 2018, the minimum wage in Brazil was R$ 954.00.

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