Citizen science and engaged visual anthropology for climate justice: a study of the Emergent Ecologies platform

Ciência cidadã e antropologia visual engajada para justiça climática: um estudo da plataforma Emergent Ecologies

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ABSTRACT

Despite advances in explaining the causes of climate change, greater attention is still needed to the unequal distribution of impacts and adaptation modes. This article argues that scientific platforms that integrate social science research, digital media, and socio-environmental activism create spaces for the co-production of knowledge and highlight solutions emerging from affected areas. Critical analyses of the political-epistemological, methodological, and ethical foundations of such initiatives remain scarce. To address this gap, we examine multimodal content from the Emergent Ecologies platform, with a particular focus on the Women in Artisanal Fishing section. Drawing on citizen science and engaged visual anthropology approaches, the analysis is organised around three axes: the visual as co-production; engagement as method; and guidelines and practices as an open field of possibilities. Findings suggest that integrating these approaches can strengthen transformative action toward sustainability and contribute to climate justice.

Keywords: Emergent Ecologies. Citizen science. Engaged research. Visual anthropology. Climate justice.

RESUMO

Apesar de avanços na compreensão das causas das mudanças climáticas, ainda é necessário dedicar maior atenção aos impactos, às formas de adaptação e à sua distribuição desigual. Este artigo argumenta que plataformas científicas que integram ciências sociais, mídias digitais e ativismo socioambiental possibilitam espaços para a coprodução de conhecimento e soluções oriundas dos territórios mais afetados. Análises críticas sobre fundamentos político-epistemológicos, metodológicos e éticos dessas iniciativas, contudo, permanecem escassas. Para preencher essa lacuna, realizamos uma análise dos fundamentos e conteúdos multimodais da plataforma Emergent Ecologies, com foco na linha Mulheres na Pesca Artesanal. Com base nas abordagens da ciência cidadã e da antropologia engajada e visual, a análise organiza-se em três eixos: o visual como coprodução; o engajamento como método; e diretrizes e práticas como campo aberto de possibilidades. Os resultados sugerem que a integração dessas abordagens pode fortalecer ações transformadoras rumo à sustentabilidade e contribuir para a justiça climática.

Palavras-chave: *Ecologias Emergentes. Ciência cidadã. Pesquisa engajada. Antropologia visual. Justiça climática.*

1 INTRODUCTION

Alliances between the environmental movement and grassroots communities whose livelihoods are intertwined with the ecosystems in which they live date back to the 1970s, that is, to the beginning of the process of establishing the epistemological and discursive foundations regarding the global ecological crisis and the need for sustainability. In the 1980s, Brazil played a pioneering role in these alliances, with a key milestone being the formation of the Alliance of Forest Peoples, which influenced other mobilisation efforts between environmentalists and local populations around the world (Cunha; Almeida, 2000). The process continued to gain steam in the 1990s with the holding of Eco-92 in Rio de Janeiro and, in 1998, with the ratification of the Convention on Biological Diversity, which legally[1] recognises indigenous peoples and local communities as an essential part of biodiversity conservation.

Brazil is currently an international leader in developing policies for biodiversity conservation and climate change mitigation and adaptation, as evidenced by its recent hosting of COP30 of the UNFCCC, as well as its stated commitment to multilateralism, climate justice, and the fight against environmental racism[2]. However, the effective implementation of policies and the generation of knowledge aligned with these commitments still face significant obstacles, not only in Brazil but worldwide, reflecting the complexity and magnitude of the task.

We live in a world marked by the worsening consequences of global environmental change, which threaten socio-biodiversity and climate stability. The deepening of the planetary crisis is accompanied by the rise of anti-scientific movements and authoritarian governments, which fuel climate denialism and jeopardise the foundations underpinning international collaboration and the collective development of solutions (Saito *et al.*, 2025).

In this scenario, collaboration between academic researchers and local communities can serve as a strategic and fruitful avenue for building bonds of trust, promoting horizontal sharing practices, and advancing common agendas, while challenging disciplinary, institutional, and even national boundaries, even amid international political tensions among states.

Although science has already made significant progress in understanding the causes of climate change, there is a growing recognition that more attention must be paid to its impacts and to ways to adapt to them, particularly given how these impacts disproportionately affect different populations[3]. In light of this, social sciences perspectives on community vulnerability, adaptation, and resilience are gaining relevance. Such studies can offer promising pathways for the formulation of policies and actions oriented toward sustainability and climate justice, complementing and, at times, contrasting with analyses that

have a predominantly technical and quantitative focus and are structured by vertical governance and decision-making arrangements.

Several authors have argued along these lines, noting that sustainability research has benefited from adopting more participatory, situated practices, ones capable of fostering engagement, and which are co-produced, and well-connected to the realities of social actors, linking notions of justice to people's everyday experiences and emotions (Jasanoff, 2004; 2021; O'brien, 2012; Scoones *et al*., 2020). This approach has gained ground internationally and is also present in the Brazilian socio-environmental agenda (Adams *et al*., 2022; Bursztyn; Távora, 2023; Fleury *et al*., 2019).

Similarly, digital scientific platforms have been serving as spaces for connecting, formulating, and expanding discourses on alternatives that originate directly from the communities most affected by climate change and environmental degradation. Added to this is the potential of these platforms as means of conducting research that values the active participation of diverse stakeholders, where networked digital technologies intertwine with the agendas of climate justice movements, directly influencing methodological choices, forms of engagement, and formats for disseminating knowledge (Temper *et al*., 2018).

However, despite this growing imbrication of digital media, socio-environmental activism, and social science research practices (Buscher, 2020), there remains a scarcity of critical analyses that address the conceptual and foundational principles guiding the implementation of such research.

Seeking to help bridge this gap, this article is guided by the following questions: How can research integrate digital tools and platforms, the co-production of situated knowledge, and the engagement of different stakeholders, especially vulnerable populations, into studies focused on sustainability and adaptation in the face of the current climate crisis? And what key considerations does this integration reveal for the socio-environmental agenda? To address these questions, we conducted an analysis of the digital platform Emergent Ecologies, a project of the Behner Stiefel Centre for Brazilian Studies at San Diego State University[4].

The platform is structured around how environmental changes affect traditional rural and urban communities in Brazil, as well as community responses to these changes. The platform constitutes an exercise in visual and engaged anthropology, influenced by the principles and practices of citizen science, aimed at generating knowledge about and for climate justice and the fight against environmental racism in Brazil.

We begin by briefly presenting the theoretical approaches that underpin the analysis proposed here, namely: citizen science and engaged and visual anthropology. Following this, we present the political-epistemological, methodological, and ethical foundations of the Emergent Ecologies platform. Using as our primary empirical corpus the multimodal content of the "Women in Artisanal Fishing" series, which focuses on shellfish gatherers and artisanal fisherwomen in southern Bahia, we develop a critical, qualitative, and documentary analysis structured in three parts: 1) Between platforms and territories: the visual as co-production; 2) Between research and governance: engagement as a method; and 3) Between guidelines and practices: an open field of possibilities. We hope that the analysis and elaboration of this initiative may serve as inspiration for new research theories and practices aimed at transformations toward sustainability and climate justice.

2 CITIZEN SCIENCE

Although there are differing conceptions of what citizen science is[5], according to European Citizen Science Association (2015), Haklay *et al*. (2021), and Hecker *et al*. (2018), its main tenets can be summarised as follows: the promotion of active, informed, and committed citizen participation in research; community engagement in all or multiple stages of the scientific process; the participation of

those involved in data collection, processing, and analysis, including through creative and collaborative communication practices; the public availability of data and results, whenever possible and ethically valid; the implementation of educational processes aimed at building social capacities; and the promotion of mutual benefits for scientists and other participants.

Citizen science places a particular emphasis on the inclusion and engagement of stakeholders beyond the scientific community in the production of knowledge, that is, people who do not possess the academic credentials typically associated with a specific field of science. It is worth noting that in the most established definitions of citizen science, such as those mentioned above, there is a predominant focus on the participation of "citizens" in a broad or generic sense, without necessarily an explicit emphasis on the inclusion and engagement of specific social groups, such as marginalised, local, and traditional communities and Indigenous peoples.

However, significant institutional efforts, including international reference documents and relevant scientific initiatives, have identified this issue as a limitation and a gap that needs to be addressed. Authors such as Paleco *et al*. (2021) and Tengö *et al*. (2021) emphasise that effective inclusion requires special attention to social and cultural diversity, including recognition of the barriers that limit the participation of historically marginalised groups, as well as the recognition and appreciation of the knowledge systems of Indigenous People and Local Communities (IPLCs), which is referred to in Brazil as *Povos e Comunidades Tradicionais* (PCTs), as legitimate and complementary to scientific knowledge.

In the same vein, the report by the United Nations Environment Programme (Unep, 2024), based on an analysis of a series of citizen science projects, highlights the benefits of initiatives that broaden ways of knowing by specifically including indigenous, traditional, and local knowledge. Meanwhile, the document Embedding Citizen Science into Research Policy, produced by the OECD (2025), highlights the need for citizen science research to reflect societal diversity or to focus on marginalised and underrepresented groups.

Another key point regarding public engagement is that, recently, the media and digital infrastructures have begun to substantially transform strategic aspects of the scientific research cycle (Da Silva Neto; Chiarini, 2023). According to Hecker *et al*. (2018, p. 8): "There is need for changing the reference frame that leads people's understanding from a passive knowledge transfer to active two-way knowledge exchange.".

In this regard, citizen science has been developing through methodologies that include the use of social media, open-source and free hardware and software, mobile apps, and even artistic and creative processes, all of which serve as important tools for facilitating the production and circulation of data, as well as for fostering collaboration and interaction among various stakeholders.

Another fundamental aspect, complementary to the points mentioned above, concerns efforts to promote social and scientific capabilities equitably. For example, initiatives focused on the environmental sustainability agenda, in particular, have been illustrative of how such efforts can be put into practice. Although this agenda is not a requirement or a specific focus of all citizen science initiatives, research on environmental topics accounts for a large proportion of existing activities (Van Noordwijk *et al*., 2021).

3 ENGAGED AND VISUAL ANTHROPOLOGY

A political-epistemological project that intersects with the field of citizen science is the branch of anthropology known as engaged anthropology. According to Eriksen (2006), engaged anthropology emerges from a critique of anthropology's isolation from contemporary debates. The author thus advocates for a more visible and socially meaningful role for anthropologists.

In this same vein, Low and Merry (2010) emphasise the role of communication and the strategic use of media as essential components of engagement processes in anthropological research. According to the authors, engaged anthropological practice requires the development of specific ways to translate research findings, whether for policymakers, educational materials, public exhibitions, or collaborations with journalistic media outlets and media platforms with a wide audience.

Engaged anthropology is thus a practice of engaged research oriented toward social justice, that is, a form of knowledge production guided by ethical commitment and the reframing of the terms of public social debates.

Among the different developments of this political-epistemological project, a particular branch stands out, referred to as engaged or applied visual anthropology or ethnography. Although this approach originated from traditional social science methods such as ethnography, systematic observation, and interaction with groups in their own contexts, it has evolved to incorporate digital technologies and collaborative engagement processes. More than a set of techniques, it is a methodology grounded in its own theoretical perspectives and ethical commitments, that is, it is not merely the instrumental use of images in social research (Pink, 2021).

This approach draws on a wide range of tools, including cell phones, tablets, social media, and other contemporary networked digital technologies. These tools form part of a procedural and epistemological framework designed to facilitate “learning with” participants in situated processes of knowledge co-production.

In this sense, engaged visual anthropology emerges as a methodological approach that integrates reflective and dialogical ways of both producing and communicating knowledge, involving ongoing negotiations between researchers and participants regarding the meanings of the images and the experiences they represent. The imaginary is not mobilised merely as a final product, but as a means to enable complex and situated readings of social and cultural phenomena, allowing forms of reflexivity that are not fully achievable through argumentative, linear writing.

It should be added that ethnographic visual data often do not fit within the conventional frameworks of archiving and academic research outputs, which are primarily focused on texts and numerical metadata. To address this issue, Rocha (2021) advocates adopting curatorial practices specific to audiovisual materials that account for their ethical, aesthetic, and relational dimensions, rather than simply making them available on standard scientific platforms.

Audiovisual production serves as a strategic medium for the public dissemination of knowledge. In other words, when used as narrative and pedagogical tools, images and sounds bring together local and academic knowledge, fostering forms of ethnographic feedback that engage directly with research participants and the broader public.

This argument is consistent with the perspective developed by Parguel (2021), who suggests that the results of anthropological research should be disseminated in accessible formats, particularly those tailored to the digital environment, such as blogs, social media, virtual museums, and other forms of communication that are less conventional by the dominant standards of scientific production.

The normative and conceptual frameworks discussed so far provide the critical basis for analysing the Emergent Ecologies platform in the following sections. In these sections, we highlight certain aspects that demonstrate the extent to which the platform embodies and/or challenges the political-epistemological projects of citizen science and its interfaces with engaged and visual anthropology.

4 EMERGENT ECOLOGIES

The digital platform 'Emergent Ecologies: Living with Environmental Change in Brazil'[6] is a project of the Behner Stiefel Centre for Brazilian Studies at San Diego State University in California[7]. The platform aims to investigate how environmental changes affect the lives of rural and urban communities in contemporary Brazil, examining their complex relationships and impacts.

Adopting a co-production approach, the platform uses ethnography not only as a research methodology but also as a means of engaging with IPLCs and vulnerable communities in urban peripheries. This is achieved primarily by addressing issues such as gentrification, real estate speculation, and communities' access to natural resources, as well as how large infrastructure projects, such as ports, are transforming landscapes and intensifying environmental changes.

The platform's content is grounded in the perspective that environmental changes disproportionately affect vulnerable communities, and that issues of race and gender shape their impacts; that is, it is based on the theoretical framework of recognising environmental racism and the pursuit of climate justice

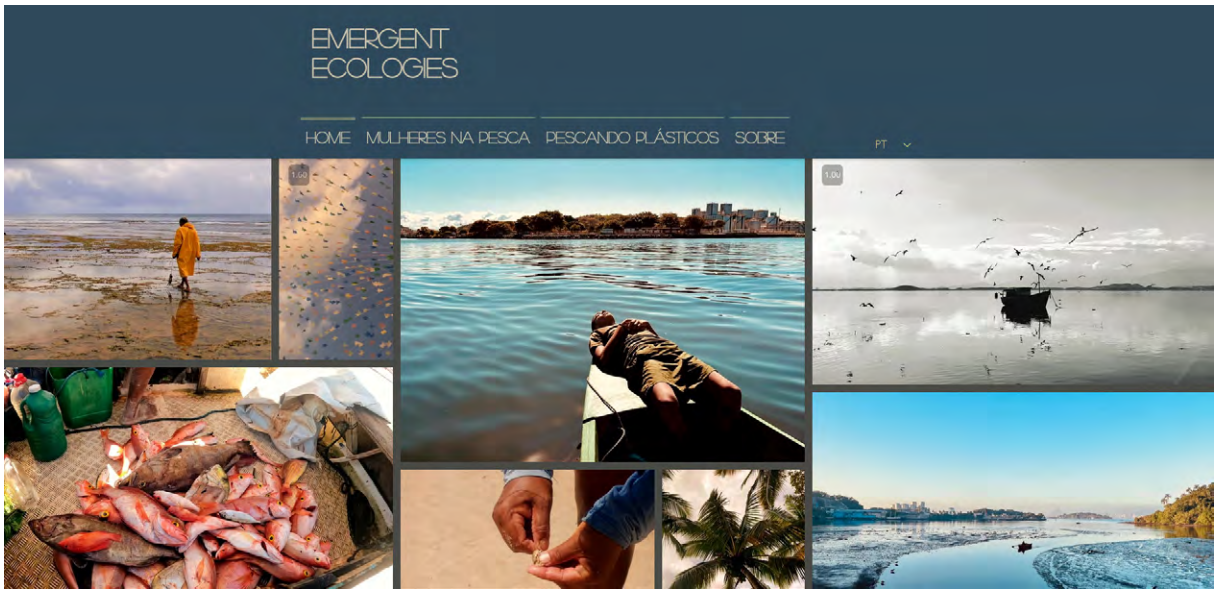

Figure 1 – 'Emergent Ecologies' homepage

Another focus of the platform is the solutions that vulnerable traditional rural and urban communities, drawing on their daily experiences and creativity, have been finding to adapt to, mitigate, and address environmental changes. The platform highlights that these communities possess deep knowledge of environmental patterns and have established specific relationships with fauna, flora, water, air, and spirituality. It asserts that through these ways of knowing and acting, these communities are fostering emerging ecologies.

According to the platform's description:

> Working equitably with them [local communities] not only gives us a concrete understanding of the impacts of environmental change but also elevates awareness of solutions devised by those most directly affected. (Emergent Ecologies, 2024)

There is a growing recognition that it is necessary to acknowledge and, moreover, value the emerging ecological perspectives of communities, as this not only enriches academia with new insights and data but also promotes the dissemination of practical solutions to pressing environmental challenges, while amplifying the voices of these communities in discussions about climate justice, access to rights, and public policy.

Figure 2 – Image of the 'Women in Artisanal Fishing' research line

'Emergent Ecologies' is divided into two lines of research, or projects, with distinct geographic focuses and social groups in Brazil, namely: a) Women in artisanal fishing; b) Fishing for plastics. Although there is a strong connection between the two projects that are part of the platform, for example, the research is united by issues surrounding artisanal fishing in Brazil, it is clear that there are also differences in methods and objectives.

For the purposes of this article, we will focus our descriptions and analyses on the "Women in Artisanal Fishing" initiative. This initiative was carried out in southern Bahia, in predominantly rural areas with strong ties to the cultural identity of traditional fishing communities (*Povos e Comunidades Tradicionais*) within Federal Marine Extractive Reserve Conservation Units (Resex Marinha).

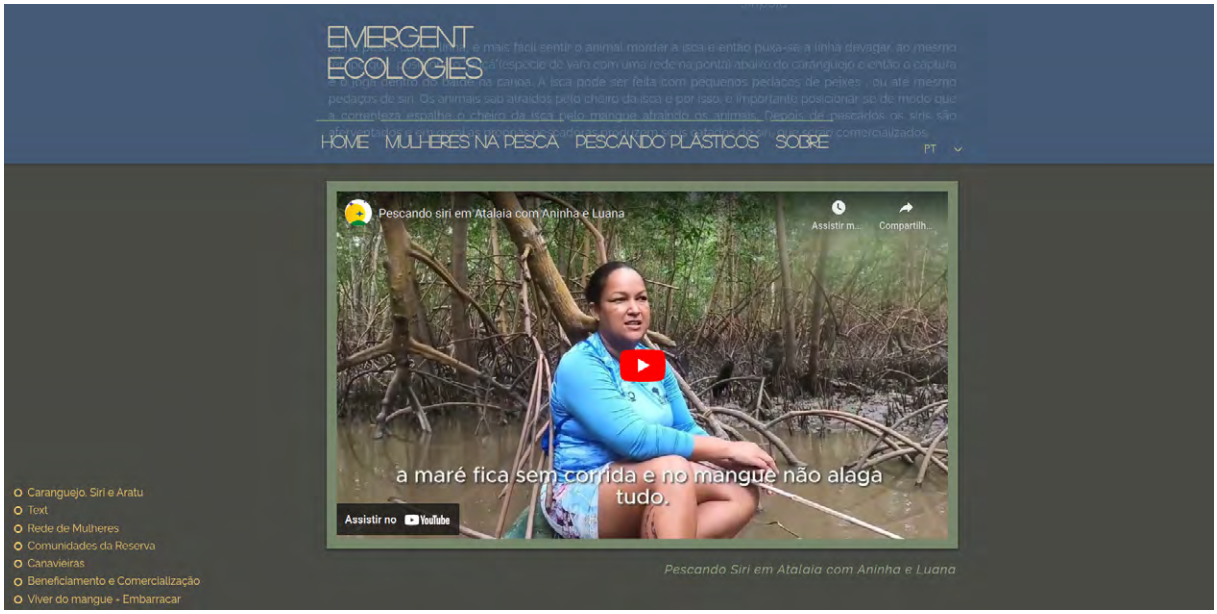

Figure 3 – Video of a 'marisqueira' catching crab

Through collaboration with women shellfish gatherers and artisanal fisherwomen, specifically in the communities of Serra Grande, Barra Grande, Canavieiras, and Baía do Iguape, this series highlights the complex world of small-scale artisanal fishing in Brazil through the lens and perspectives of the women members of the IPLCs.

The study focuses on the use of small boats, the emphasis on household consumption and the sale of produce in local markets, and the oral transmission of traditional knowledge, which is essential for maintaining sustainable subsistence practices in these communities. It highlights the harsh reality faced by these women who, despite their vital techniques and contributions to the fishing, processing, and sale of octopus, small fish, and shellfish, often see their work and ways of life undervalued and rendered invisible. A key aspect of the research is the focus on the challenges women face in maintaining their connection to artisanal fishing and shellfish gathering (mariscagem), highlighting how essential this connection is to their cultural identities and communities.

Figure 4 – Image of an artisanal fisherwoman in 'Emergent Ecologies'

Another key point is that women have adapted artisanal fishing and shellfish gathering techniques due to restrictions imposed by tourism and real estate development in the region, as well as environmental changes from climate change that limit access to natural resources. These adaptations serve to mitigate and address the daily challenges imposed on their way of life, with practical and innovative solutions developed that reflect a deep understanding of local marine ecosystems, environmental policies at various scales, and strategies for conserving biodiversity.

Examples of fishing techniques adapted to current conditions include adjusting fishing seasons and selecting new, less-fished locations. Other examples include sustainable resource management, such as refraining from catching species during their reproductive seasons and using equipment that minimises environmental impact.

It is also worth noting, in this same vein, how women have been pioneers in creating community support networks that strengthen local capacities to address socio-environmental challenges and adapt to new environmental realities. This occurs through the creation and maintenance of community associations that promote, among other things, training and the exchange of knowledge on fishing techniques and resource management, in addition to fighting for their rights and bringing the issue of sustainability to

the negotiating table with authorities and tourists alike. The platform portrays these and other aspects of these women's interaction with their environment, their work, and their community.

4.1 BETWEEN PLATFORMS AND TERRITORIES: THE VISUAL AS CO-PRODUCTION

The central role that digital and networked communication technologies play in shaping contemporary ways of life has been reshaping not only market and governance structures, but also the methodological and ethical processes involved in cultural, artistic, and scientific production (Van Dijck *et al*., 2018). The growing access to and adoption of these technologies by broad segments of the population, including socio-environmental movements, indigenous peoples, and local and traditional communities, have significantly expanded the possibilities for collaboration and interaction among these underrepresented groups in scientific knowledge production processes. Barriers previously imposed by geographic distance, time constraints, resource inequalities, or linguistic differences are becoming increasingly easy to overcome.

The Emergent Ecologies platform fits into this context and bridges the gap between socio-environmentalism and digital media. Added to this is a strong artistic presence, particularly in the visual arts, which broadens modes of expression and extends beyond academic circles and the conventional spaces of production and circulation in the social sciences. By making extensive use of audiovisual resources, such as photographs and videos, produced with and by the participants themselves, 'Emergent Ecologies' exemplifies a research practice oriented toward the co-production of knowledge.

It is worth noting that the platform seeks to value diverse forms of knowledge, shifting away from the exclusive centrality of academic institutions as both producers and recipients of knowledge (Polk; Knutsson, 2008). This methodological reconfiguration paves the way for critical reflection on new dynamics of participation, engagement, and collaborative knowledge production.

This approach implies not only new forms of interaction between researchers and communities but also a transformation in how the knowledge generated is collected, analysed, disseminated, and integrated into social and institutional contexts. The potential of visual and engaged anthropology stands out as a tool for jointly formulating research agendas on climate adaptation and sustainability, due to its ability to articulate sensitive dimensions of communities' lived experiences and to produce situated, politically relevant knowledge that is communicable to multiple audiences.

Audiovisual mediation, combined with engagement methods, broadens the scope of collaboration in the research and deepens the collective understanding of how to confront environmental racism and adapt to climate change. As Luciane Cruz, a quilombola woman (maroon), a community field collaborator (interlocutor) for Bacia e Vale do Iguape fieldwork, explained it:

> "[…] this project has been giving a lot of strength, giving a lot of support to the marisqueiras, where they recorded several videos, where they spoke and were able to express themselves, I mean, express themselves in their own way, talking about how much they like shellfish gathering, how much they love to go to the tide, the suffering too, the impacts too, they put it very well, talking about the impacts here in the communities, you know"[8] (our translation).

In this sense, visual and engaged anthropology emerges as a particularly effective approach within 'Emergent Ecologies', as it strengthens communities' expressive capacities, enabling them to represent and reframe their challenges and solutions through images, videos, and other sensory forms of communication. In the case of the Brazilian artisanal fisherwomen and shellfish gatherers who participated in 'Emergent Ecologies', this process allowed them not only to highlight the transformations

underway in their territories but also to imagine possible futures based on their own experiences and innovations, bringing to light positive stories of adaptation crafted by the communities themselves.

A concrete example of this can be seen in how shellfish gatherers link the practice of gathering to family and community memory, recounting lessons passed down by mothers and grandmothers. In Janete Barbosa from the Guaí Community's words: "I come from a lineage of people who were enslaved and had to fight for their survival, fight for their freedom. I come from a humble family, a poor family, like all Black people and fishermen, and so I carry on my family's legacy [...] My mother was a shellfish gatherer, and I learned to gather Sururu, Lambreta, and Mapê with her […]" (our translation).

This recognition of the relationship between ancestral tradition and ways of living and producing is accompanied by an emphasis on the enduring and time-tested nature of their knowledge and techniques, as well as a critique of the devaluation of their knowledge. As can be seen in the words of a shellfish gatherer from Ponta de Souza:

> "Preserving the mangrove is essential, but to what extent does this preservation preserve the fisherman's livelihood? We know how to cut it down and let the mangrove grow back; the Paraguaçu shipyard cut down the equivalent of 20 soccer fields of mangrove, where is the oversight? Then the fisherman takes a mangrove branch to cook the fish and is accused of going against nature. What does it mean to go against nature? Is it our ancestral knowledge? Alternatively, is it these companies that take everything?"[9].

From this perspective, the platform can be seen as a way to strengthen local perspectives, while also contributing to enriching, complementing, and diversifying the horizons of political imagination and scientific research regarding sustainability. After all, the narratives and solutions that emerge from communities are shared through the platform, which offers open access and wide international dissemination.

It is also worth noting that the choice of multimedia, interactive formats that are sensitive to the sociocultural context of the communities contributes to an innovative practice of ethnographic feedback. There is a shift away from the notion that research comes first and feedback later, as the images and sounds created by the research participants themselves enhance their control over the research process and contribute to greater contextual precision and relevance of the data generated and analysed (Liebenberg, 2009).

It should further be emphasised that the platform is free of charge and easily accessible, combining content in lay and academic language, in contrast to the traditional format of ethnographies, normally long monographs, whose circulation is restricted to academic circuits and behind paywalls. Such orientations build on the recommendations on data governance in anthropology made by Parguel (2021) and Rocha (2021), by recognising that research results should not be limited to technical archiving or the traditional documentary formats, but should instead assume accessible, dialogical, and politically situated forms that allow for a wider circulation of information.

By adopting this perspective, the platform also reinforces the idea of active, multidirectional knowledge exchange and, in the specific case we are analysing, integration between IPLCs and the agendas of social and environmental justice movements in the development of scientific knowledge.

4.2 BETWEEN RESEARCH AND GOVERNANCE: ENGAGEMENT AS METHOD

The emphasis on engagement as a scientific method in 'Emergent Ecologies' is evident in the way the research was conducted. Notable aspects include the transparency of objectives and methods related to local socio-environmental movements, collaboration with stakeholders throughout the research, the embrace of multiple forms of knowledge and practice, and active participation in associations and

Figure 5 – Marisqueira removing oysters from mangrove roots

The explicit orientation toward promoting epistemic diversity and fostering inclusive dialogue among distinct systems of knowledge seeks to create spaces for interlocution that transcend their original contexts. It is a matter of fostering arenas where multiple perspectives can coexist and interact, contributing to reducing historical power asymmetries and confronting hierarchies that frequently mark interactions between researchers and the "researched."

This process, in turn, has the potential to reconfigure not only the methods and practices of scientific production but also the very discursive and theoretical frameworks traditionally dominant in the academic field, especially by incorporating social and epistemological critiques anchored in different cultures and socio-environmental experiences. The protagonism of IPLCs in the representation and dissemination of their everyday lives, perspectives, and environmental practices thus constitutes a counterpoint to a possible reification and calcification of their traditional ecological knowledge (Ingold; Kurttila, 2000).

Figure 6 – Sururu, oyster, and crab stew depicted by a research interlocutor

This approach echoes perspectives in anthropology, engaged research, and citizen science that emphasise the active and conscious participation of the "researched" in all stages of the scientific process. This includes everything from formulating research questions to collecting, processing, and analysing data, as well as disseminating results (Lassiter, 2005). Such an emphasis brings into view the

tension between expert actors, in this case, researchers holding doctoral degrees, and those often considered lay actors, the "researched."

From the perspectives of citizen science and engaged anthropology, the tension between these two poles is not viewed as an obstacle, but rather as a productive dimension and an integral part of the research practice itself, from which opportunities arise to adequately include the viewpoints of vulnerable or marginalised groups in the public sphere. The aim is to strike a balance between scientific rigour and objectives that generate benefits for all participants, not just scientists.

This perspective is deepened by Lozano (2022), who criticises approaches that reduce collaboration in ethnographic production to a simple division of tasks between researchers and interlocutors, limited to operational phases of the research. For the author, collaboration should be conceived as a dialogical and recursive process in which the researcher adopts a posture of decentering, acting as a kind of facilitator rather than as the final authority in knowledge production.

This posture requires from researchers a degree of reflexivity that makes it possible to avoid the risk that, in the face of divergent views, research will be conducted in ways that privilege academic relevance to the detriment of practical usefulness for non-academic interlocutors.

Figure 7 – Noca performing the thermal opening of oysters shells (blanching)

In the same vein, another equally significant aspect when analysing 'Emergent Ecologies' is its explicit effort to address environmental racism, defined in the platform as follows: "Environmental racism refers to the way in which ethnic and racial minorities are disproportionately affected by environmental problems due to discriminatory practices and social and economic inequalities." (Emergent Ecologies, 2024).

The platform emphasises the fact that the communities participating in the research have historically been and continue to be racialised, and thus suffer the harmful consequences of this specific form of racism. It is also noted that the platform explicitly aims to address concrete socio-environmental themes and issues that truly resonate with the material needs and concerns of the IPLCs who participated in the research. That is, the platform focuses its efforts on emphasising the ethics and aesthetics of artisanal fisherwomen and shellfish gatherers, on the impact of knowledge through its translation into accessible languages capable of reaching diverse audiences, on promoting and participating in

community organising and mobilisation, and on strengthening debates surrounding traditional rural cultures within the academic sphere.

4.3 BETWEEN GUIDELINES AND PRACTICES: AN OPEN FIELD OF POSSIBILITIES

Another aspect that merits reflection concerns the platform's predominant focus on social and ethnographic research. Although we recognise that this orientation constitutes one of the main strengths of 'Emergent Ecologies', we note the research impact could be expanded if it were to incorporate, in an even deeper, more systematic, and more evident way, approaches and tools typical of citizen science as an epistemological approach, capable of integrating the natural and environmental sciences with the social sciences and humanities. After all, this element could contribute significantly to the research's greater success and impact, and provide local communities with additional data to inform their work (Albert *et al*., 2021; Hecker *et al*., 2018).

Considering the platform's objective of understanding the impacts of environmental changes on Indigenous peoples and local communities, as well as their capacities for adaptation, there is significant potential for strengthening more robust interdisciplinary partnerships, integrating research fields such as agroecology, conservation biology, geography, and applied environmental studies, including those oriented toward sustainable development and participatory territorial management. Particularly noteworthy are possibilities for incorporating agroecological indicators, geospatial/climate data, and territorial management and monitoring procedures.

In dialogue with the works of Tsing *et al*. (2024), the articulation between anthropology and technical biophysical measurements may be understood not as a loss of the research social dimension but, rather, as the cultivation of situated knowledges and a deepening of the arts of attention grounded in fieldwork. In this direction, sensors, metrics, indicators, and databases do not necessarily render the investigation technocratic. On the contrary, they open space for ethnographic attunement (Tsing, 2022) and for the material-ecological dynamics of territories to express themselves and enter the political arena (Latour, 2004).

It is in this sense that we understand that the expansion of the epistemological and methodological bases of 'Emergent Ecologies' could contribute to more integrated readings of the interrelations that affect the territories researched, favouring the construction of a plurality of empirical evidence and theoretical inferences about emergent ecological dynamics and the ongoing processes of socio-environmental transformation. This expanded focus, based on multiple types of empiricism, could potentiate the public legitimacy and the strategic use of research results in processes of environmental and territorial planning and management, public policies oriented toward sustainable development, and struggles for the guarantee of rights on the part of climate justice movements.

A central reference in this regard is the work of Gabrys (2019, 2022), which, through the notion of 'citizen sensing,' explores the intersection of environmental data and the social sciences, connecting environments, low-cost technologies, collective organisational forms, and situated practices.

We also highlight another aspect of 'Emergent Ecologies' in relation to citizen science: the intense cooperation and capacity-building among research teams in the United States and Brazil, as well as the adoption of the bilingual format (English and Portuguese). There is also promotion of exchanges and training among researchers at universities and research centres in the Global North and South. These characteristics reinforce a commitment to decentralised, multicultural, and interinstitutional scientific production that seeks to reduce historical asymmetries in the production and circulation of knowledge.

At this point, we would like to reflect on how the various guidelines on what citizen science is or should be encompass an overly broad spectrum of actions and recommendations. In this context, not all research can or should fully comply with the extensive recommendations and guidelines that define

citizen science. For example, the Emergent Ecologies platform is not specifically dedicated to producing large datasets through crowdsourcing techniques or to creating and providing infrastructure such as open data repositories or physical research facilities accessible to the general public, elements that are highly relevant and characteristic of citizen science.

Nevertheless, it is important to emphasise that, although we recognise that the pillars, values, and principles of citizen science, and likewise of engaged research, are interdependent and that a focus on this aspect potentiates their practices, the guidelines do not need to be fully met for a platform or research project to be recognised as, as well as to contribute to, these approaches. Instead, these guidelines may be seen as a set of adjustable possibilities that should be considered and welcomed on a case-by-case basis, as well as references for inspiring new developments in research.

Finally, following Kythreotis *et al*. (2019), we emphasise that contemporary climate policies predominantly based on technocratic-managerial and "top-down" languages, that is, hierarchical languages, have failed to achieve legitimacy and the necessary ambitious targets to confront the climate crisis. Scientific research that operates in a different key, for example, through the co-production of knowledge, can reposition citizens as co-learners and co-decision-makers, capable of challenging institutional structures and expanding the repertoire of knowledges, and may be an effective way of addressing these issues.

It is further necessary to emphasise that methodologies of co-producing knowledge need to incorporate a reflexive character in order to deal with prior inequalities, such as time, resources, and epistemic status that favor "elite actors" (State, large NGOs, renowned scientists), who not infrequently define scopes and criteria of relevance, reinforcing hierarchies between scientific knowledge and other systems of knowing. Added to this is the fact that, in North–South contexts, as is the case of 'Emergent Ecologies', the high degree of inequality in technical, institutional, and budgetary capacities further aggravates these asymmetries. A reflexive approach requires that research not suppress conflicts; on the contrary, it should accept contestation and dissensus around divergent interests and visions and, with a posture of humility, strengthen pluralism as a creative driver (Turnhout *et al*., 2020).

5 FINAL CONSIDERATIONS

The Emergent Ecologies platform, analysed in this article, seeks to generate knowledge about emerging ecologies in regions of Brazil inhabited by local and traditional rural communities and rich in biodiversity, regions that are heavily impacted by the climate crisis and serve as sites of profound uncertainty and rapid change. That is, it addresses the capacity of communities to create innovative solutions and adapt in the face of the negative impacts of environmental and social changes, as well as the unique cultural, social, political, and, of course, ecological relationships they establish with their respective local environments.

In other words, the platform examines the creative and context-specific responses of communities to external pressures, such as public policies, markets, and climate change, as well as internal dynamics, such as sociopolitical conflicts, institutional reorganisations, and cultural transformations. Far from representing predetermined responses or spontaneous reactions, these configurations highlight continuous processes of creation, negotiation, adaptation, and also conflict that unfold within the collective and concrete dynamics of these communities' everyday socio-environmental lives.

Citizen science and engaged visual anthropology, as mobilised by the Emergent Ecologies platform, provide access to layers of emerging ecologies and meanings that might not initially be visible, or sufficiently considered, by academic actors, and that often elude strictly technical and scientific languages. The aim is thus to produce knowledge through the mediation of different rationalities,

fostering a mode of collective deliberation and negotiation of alternatives, particularly useful in contexts of profound uncertainty and rapid change.

Given that the challenge of addressing the climate crisis is global, even though its impacts are locally contextualised, and that the urgency of action requires prioritising a wide range of approaches, including those considered "unconventional" from the perspective of mainstream science, we believe that scientific platforms such as 'Emergent Ecologies' represent a promising avenue for addressing this challenge. By avoiding excessive technocracy, articulating scientific, social, and environmental objectives, and valuing methodologies and languages that are not strictly scientific, based on digital and networked technologies, this type of platform can help overcome the tendency to treat society as a mere "end user" of information produced by scientific institutions and projects, building a repertoire of successful adaptations and solutions that can contribute to broadening the horizons of political and scientific imagination and fostering social engagement.

'Emergent Ecologies', while not a predetermined solution, offers a reconfigurable sociotechnical infrastructure applicable to other territories, environmental issues, and forms of collective mobilisation. This architecture incorporates ethical commitment as a constitutive dimension of research practice, conceived as a process of becoming and a fundamental element ensuring that the co-production of knowledge connects mechanisms of historical reparation and power redistribution to transformative actions for sustainability and climate justice.

STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE

The authors used ChatGPT, version 5.4 by OpenAI, for language editing and stylistic polishing only. All scientific content, analysis, and intellectual input were developed and verified by the authors; we take full responsibility for the accuracy and integrity of the manuscript.

NOTES

1 | See: Brazilian Federal Decree No. 2.519/1998.

2 | See: < https://agenciagov.ebc.com.br/noticias/202309/oficina-reune-demandas-para-adaptacao-as-mudancas-climaticas >.

3 | The concepts of climate justice and environmental racism are crucial to understanding this debate (Acselrad, 2010; Alier, 2007; Bullard, 1993; Schlosberg; Collins, 2014).

4 | The authors of this article are researchers involved in the production of the platform. We recognise that this positionality, while expanding the possibilities for investigation, access to its contents, and insight into the processes of its development, requires reflexivity, in the sense of strong objectivity (Harding, 1993), both in relation to the scope and to the limits of the analyses developed.

5 | At the end of 2021, during Unesco's General Conference, 193 countries adopted the first international standard-setting instrument on open science (Unesco, 2021). A specific development within this broader framework is citizen science, widely recognised as a fundamental pillar (OECD, 2025). It is worth noting that citizen science, since its earliest formulations (Irwin, 1995), has been crossed by an important debate between perspectives more oriented toward the participation of non-academics in data collection for scientific projects and other perspectives oriented toward the democratisation of knowledge production and the expansion of possibilities for constructive relations between science and society. In this article, we develop our arguments from this second perspectives. See: < https://www.emergentecologies.net/en >.

6 | Founded in 2014, the Centre promotes research and collaboration networks with Brazil in the areas of Sustainability, Arts and Culture, Human Rights, and Health, with cross-cutting attention to Politics and Governance. 'Emergent Ecologies' is developed around the Centre, which provides infrastructure, resources, and academic support.

7 | See: < https://www.emergentecologies.net/en/conselho-quilombola >.

8 | See: < https://www.emergentecologies.net/en/pontadesouzacoqueirosenaje >.

REFERENCES

ACSELRAD, H. Ambientalização das lutas sociais: o caso do movimento por justiça ambiental. **Estudos Avançados**, São Paulo: Instituto de Estudos Avançados/USP, v. 24, n. 68, p. 103-119, 2010.

ADAMS, C.; ARAUJO, L. G.; CORDEIRO-BEDUSCHI, L. Governança florestal: três décadas de avanços. **Estudos avançados**, v. 36, n. 106, 2022.

ALBERT, A. *et al.* Citizen Social Science: new and established approaches to participation in social research. In: VOHLAND, K. *et al.* (Eds.). **The Science of Citizen Science**. Cham: Springer, 2021.

ALIER, J. M. **O ecologismo dos pobres:** *conflitos ambientais e linguagens de valoração*. São Paulo: Contexto, 2007.

BULLARD, R. **Confronting Environmental Racism:** *voices from the grassroots*. Boston: South End Press, 1993.

BURSZTYN, M.; TÁVORA, R. Sustentabilidade e redução das vulnerabilidades: a necessária construção de pontes entre as ciências e a sociedade. **Ciência e Cultura**, v. 75, n. 2, 2023.

BUSCHER, B. **The truth about nature:** *environmentalism in the era of post-truth and platform capitalism*. Oakland: University of California Press, 2020.

CUNHA, M.; ALMEIDA, M. Indigenous people, traditional people, and conservation in the Amazon. **Daedalus**, v. 129, n. 2, p. 315, 2000.

DA SILVA NETO, V. J.; CHIARINI, T. The Platformization of Science: towards a scientific digital platform taxonomy. **Minerva**, v. 61, p. 1-29, 2023.

ECSA – European Citizen Science Association. **Ten Principles of Citizen Science**. Berlin, 2015. Available at: http://doi.org/10.17605/OSF.IO/XPR2N. Accessed on: 5 Jul. 2025.

EMERGENT ECOLOGIES. **Living with Environmental Change in Brazil**. San Diego State University, 2024. Available at: https://www.emergentecologies.net/en. Accessed on: 5 Jul. 2025.

ERIKSEN, T. H. Engaged Anthropology: the Norwegian case. **Anthropology Today**, v. 22, n. 2, p. 12-16, 2006.

FLEURY, L.; MIGUEL, J.; TADDEI, R. Mudanças climáticas, ciência e sociedade. **Sociologias**, Porto Alegre, v. 21, n. 51, p. 18–42, May/Aug. 2019.

HAKLAY, M. *et al.* Contours of Citizen Science: a vignette study. **Royal Society Open Science**, v. 8, 2021.

HARDING, S. Rethinking Standpoint Epistemology: what is strong objectivity? *In*: ALCOFF, L.; POTTER, E. (Eds.). **Feminist Epistemologies**. London: Routledge, 1993.

HECKER, S. *et al.* Innovation in Citizen Science – Perspectives on Science-Policy Advances. **Citizen Science:** theory and practice, v. 3, n. 1, p. 1-14, 2018.

HENKE, J. Can Citizen Science in the Humanities and Social Sciences Deliver on the Sustainability Goals? **Sustainability**, v. 14, n. 3, p. 1234-1247, 2022.

INGOLD, T.; KURTTILA, T. Perceiving the Environment in Finnish Lapland. **Body & Society**, v. 6, n. 3-4, p. 183-196, 2000.

IRWIN, A. **Citizen Science:** a study of people, expertise and sustainable development. London: Routledge, 1995.

JASANOFF, S. Ordering knowledge, ordering society. *In*: JASANOFF, S. (Ed.). **States of knowledge:** the co-production of science and the social order. London: Routledge, 2004.

JASANOFF, S. Knowledge for justice: a framework for social-epistemic research. **Climatic Change**, v. 169, n. 36, 2021.

KYTHREOTIS, A. P.; MANTYKA-PRINGLE, C.; MERCER, T. G.; WHITMARSH, L. E.; CORNER, A.; PAAVOLA, J.; CHAMBERS, C.; MILLER, B. A.; CASTREE, N. Citizen Social Science for More Integrative and Effective Climate Action: a science-policy perspective. **Frontiers in Environmental Science**, v. 7, art. 10, 2019.

LASSITER, L. E. Collaborative Ethnography and Public Anthropology. **Current Anthropology**, v. 46, n. 1, p. 83-106, 2005.

LATOUR, B. **Politics of Nature:** how to bring the sciences into democracy. Cambridge, MA: Harvard University Press, 2004.

LIEBENBERG, L. The visual image as discussion point: increasing validity in boundary crossing research. **Qualitative Research**, v. 9, n. 4, p. 441–467, 2009.

LOZANO, A. L. Colaboração e autoria na etnografia: um olhar crítico. **Revista Brasileira de Antropologia**, v. 65, n. 1, p. 1-19, 2022.

LOW, S. M.; MERRY, S. E. Engaged Anthropology: diversity and dilemmas. **Current Anthropology**, v. 51, S2, p. S203-S226, 2010.

O'BRIEN, K. Global environmental change II: from adaptation to deliberate transformation. **Progress in Human Geography**, v. 36, n. 5, p. 667-676, 2012.

OECD. **Embedding Citizen Science into Research Policy and Practice**. Paris: OECD Publishing, 2025.

PALECO, M. *et al.* Addressing Diversity and Inclusion in Citizen Science: lessons learned. **Citizen Science:** theory and practice, v. 6, n. 1, p. 1-10, 2021.

PARGUEL, B. Data Governance in Anthropology: co-negotiated plans for open science. **Journal of Anthropological Research**, v. 77, n. 4, p. 582-600, 2021.

PINK, S. **Doing visual ethnography**. London: SAGE Publications Ltd, 2021.

PINK, S.; ABRAM, S. (Eds.). **Media, anthropology and public engagement**. New York; Oxford: Berghahn Books, 2015.

POLK, M.; KNUTSSON, P. Participation, Value Rationality and Mutual Learning in Transdisciplinary Knowledge Production for Sustainable Development. **Environmental Education Research**, v. 14, n. 6, p. 643-653, 2008.

ROCHA, L. Visual Data and Open Science in Anthropology: challenges and possibilities. **Visual Anthropology Review**, v. 37, n. 1, p. 56-71, 2021.

SAITO, C. H.; BURSZTYN, M.; MERTENS, F.; MESQUITA, P.; DOBRE, C. Denialism as a political force and sustainability setbacks. **Sustainability in Debate**, [S. l.], v. 16, n. 2, p. 6–11, 2025.

SCHLOSBERG, D.; COLLINS, L. B. From Environmental to Climate Justice: climate change and the discourse of environmental justice. **Wiley Interdisciplinary Reviews:** climate change, v. 5, p. 359-374, 2014.

SCOONES, I.; STIRLING, A.; ABROL, D.; ATELA, J.; CHARLI-JOSEPH, L.; EAKIN, H.; ELY, A.; OLSSON, P.; PEREIRA, L.; PRIYA, R.; VAN ZWANENBERG, P.; YANG, L. Transformations to sustainability: combining structural, systemic and enabling approaches. **Current Opinion in Environmental Sustainability**, v. 42, p. 65-75, 2020.

TEMPER, L. *et al.* The Global Environmental Justice Atlas (EJAtlas): ecological distribution conflicts as forces for sustainability. **Sustainability Science**, v. 13, p. 573–584, 2018.

TENGÖ, M. *et al.* Co-production of Knowledge for Sustainability: lessons from local and indigenous knowledge. **Current Opinion in Environmental Sustainability**, v. 49, p. 10-20, 2021.

TSING, A. L. *et al.* **Field Guide to the Patchy Anthropocene:** the new nature. Stanford: Stanford University Press, 2024.

TSING, A. L. Attunement: form in motion. *In*: JONES, C.; BELL, A. M.; NIMROD, S. (Eds.). **Symbionts:** contemporary artists and the biosphere. Cambridge, MA: MIT Press, 2022. pp. 86–95.

TURNHOUT, E.; METZE, T.; WYBORN, C.; KLENK, N.; LOUDER, E. The Politics of Co-Production: participation, power, and transformation. **Current Opinion in Environmental Sustainability**, v. 42, p. 15-21, 2020.

UNEP – United Nations Environment Programme. **Enhancing Citizen Science Contributions to Environmental Policy**. Nairobi: UNEP, 2024.

UNESCO. **Recommendation on Open Science**. Paris: UNESCO Publishing, 2021.

VAN DIJCK, J.; POELL, T.; WAAL, M. **The Platform Society**. New York: Oxford University Press, 2018.

VAN NOORDWIJK, T. *et al.* Creating Positive Environmental Impact Through Citizen Science. *In*: VOHLAND, K. *et al.* (Eds.). **The Science of Citizen Science**. Cham: Springer, 2021.