AMBIENTE & SOCIEDADE 25 anos 25 años 25 years

SciELO

Conflicts and socioenvironmental injustice in the Acaú-Goiana Extractive Reserve

Aline de Souza Souto [I]
Virgínia Carmem da Rocha Bezerra [II]
Glaciene Mary da Silva Gonçalves [III]
Mariana Olívia Santana dos Santos [IV]
Aline do Monte Gurgel [V]

Abstract: The article analyzed the sugarcane-derived socioenvironmental conflicts and injustice in the Acaú-Goiana Extractive Reserve, Pernambuco, Brazil. A descriptive case study was conducted with rural workers based on social cartography and documents, analyzed under the EJAtlas categories. The Global Atlas of Environmental Justice (EJAtlas) is a web inventory that gathers environmental conflicts and injustice, serving as a basis for reporting affected territories. Even with the creation of the Reserve to protect natural assets and ecosystem life, new conflicts emerged from the installation of enterprises that put pressure on the territory and added to centuries-old problems such as sugarcane cultivation. Other impacts include air pollution, contamination of soil and water resources, biodiversity loss, food and nutritional insecurity, increased violence, human rights violations, and mental health problems.

Keywords: Socio-environmental Conflicts; Environmental Injustice; Health and Environment; Rural Workers' Health; Extractive Reserve.

[I] *Universidade Federal de Pernambuco (UFPE)/Programa de Pós-graduação em Serviço Social, Recife, PE, Brasil.*

[II] *Fundação Oswaldo Cruz/Instituto Aggeu Magalhães (Fiocruz/IAM), Recife, PE, Brasil.*

[III] *Fundação Oswaldo Cruz/Instituto Aggeu Magalhães (Fiocruz/IAM), Recife, PE, Brasil.*

[IV] *Fundação Oswaldo Cruz/Instituto Aggeu Magalhães (Fiocruz/IAM) e UFPE/CAA/NCV, Recife, PE, Brasil.*

[V] *Fundação Oswaldo Cruz/Instituto Aggeu Magalhães (Fiocruz/IAM), Recife, PE, Brasil.*

São Paulo. Vol. 27, 2024

Original Article

DOI: http://dx.doi.org/10.1590/1809-4422asoc0225r3vu27L1OA

Introduction

The hegemonic economic development model is based on the exploitation of workers and the environment. The continuity of an economic production model aimed at the external market was decisive in destroying nature and expelling people and communities from traditional territories in Latin America. In the current situation of global geopolitics, the logic centered on the agro-export model is guided by capital globalization (Bunde, 2020). On a local scale, globalization expands socioenvironmental injustice and conflicts in territories to guarantee the financial capital's hegemony and increase the capital's organic composition.

The recent biofuels market incentive through the Growth Acceleration Program (PAC), promoted: a) acquisition of plants by transnational companies, and the growing monopolies in the Center-South of Brazil; and b) In the Northeast, and particularly in Pernambuco, industrial projects, escalating conflicts and disputes over land and territories, revealing intense state activism to guarantee the accumulation of capital, and the tendency to remain inert in the face of expropriations (Silva; Silva, 2019).

These conflicts involve social groups with different ways of appropriating, using, and signifying the territory. They start when at least one of these groups' continuous social forms of appropriation of the environment are threatened by undesirable effects from the activities of other groups (Acselrad, 2004).

Conflicts materialize in disputes between the interests of traditional communities, organizations, and social movements against social agents (business groups and the State itself) favored by economic and productive activities, such as agribusiness, unequally affecting the populations involved (Porto; Rocha; Finamore, 2014). People of traditional communities suffer continuous expropriation, exploitation, and threats to their lands, resources, and lives – Indigenous people, quilombola, riverside dwellers, small-scale fishermen, and peasants. Several Latin American countries have observed accelerated destruction of peasant agriculture and simultaneous expansion of export agribusiness-linked monocultures in recent decades (Gurgel, Guedes, Friedrich, 2021).

These clashes reveal contradictions in which the victims are excluded from this so-called "development" and assume all the resulting burden. Situations of environmental injustice are evident, typical of unequal societies that adopt sociopolitical mechanisms to allocate the most significant burden of environmental damage from this development to vulnerable populations, such as workers, low-income populations, discriminated racial segments, and other marginalized portions – less endowed with financial, political, and informational resources (Acselrad; Herculano; Pádua, 2004).

Investigations into socioenvironmental disputes help us understand the various contradictions in the current development model. Complaints and publications about environmental injustice on platforms with international reach comprise, among others, a strategy to produce and systematize data denouncing environmental injustice in development territories. The Global Atlas of Environmental Justice (EJAtlas) is a global web inventory of socioenvironmental conflict cases built through a collaborative process between academics and activist groups. This tool gathers environmental conflicts and

injustice worldwide on one platform, giving visibility to socioenvironmental vulnerabilities in different territories. It serves as a basis for complaints, defending global environmental justice and common goods (Temper et al., 2014).

In Brazil, the historical relationship between economic agents and government stakeholders makes socioenvironmental conflicts a challenging and complex object of study. With the advancement of the neoliberal agenda, the model promoted by the heralds of globalized capitalism, which is centered on extractivism and the exploitation of workers, escalates with severe societal consequences. The Brazilian economy's reprimarization and measures to make environmental, labor, and social security legislation more flexible, which reduce or even eliminate social, health, and environmental protection measures, increase risk situations and weaken individual and collective protection mechanisms (Gurgel et al., 2017; Gurgel; Guedes; Friedrich, 2021).

In this setting, we observe an increased production of agricultural commodities, such as sugarcane, placing Brazil as the world's largest producer of this crop, dedicating a total area of 9,953.2 hectares and producing 665,105 tons in the 2020/2021 harvest, which indicates a 3.5% increased production against the previous period. The Northeast is the region of the country with the second-highest increase in sugarcane planted area, with a 0.8% increase in area and 2.8% in average productivity in the 2020/2021 harvest, resulting in a 3.6% greater production than the former harvest. Pernambuco is the second largest producer in this region, with crops concentrated in the Zona da Mata region (Companhia Nacional de Abastecimento, 2020). Socioenvironmental clashes have been identified (Gurgel et al., 2021) in this part of the country, and this article aims to identify injustice, vulnerabilities, and impacts on political subjects in the territory, analyzing the categorization of aspects of these conflicts based on the Global Atlas of Environmental Justice.

Methodological strategies

This qualitative case-study research was conducted through social cartography and document analysis to collect data. The study territory refers to the Acaú-Goiana Extractive Reserve in the Tejucupapo district, Goiana, in the Zona da Mata Norte of Pernambuco, Brazil, bordering the state of Paraíba. Goiana is one of the municipalities with the largest planted sugarcane area in Pernambuco (Brazilian Institute of Geography and Statistics, 2018), and the district of Tejucupapo has sugarcane crops in its territory, which have been advancing into the reserve area forestry and justifies our selection.

Social cartography, a technique where political subjects and maps produce graphic representations that can be complemented by statements and discussions about the reproduced elements (Acselrad, 2013), was performed to identify disputes. We held meetings with the community, where participants mapped risk situations and socioenvironmental vulnerabilities.

We staged four fortnightly meetings from July to November 2019, with people over 18 of both sexes, with an average of 15 participants per meeting. The meetings were

guided by the question, "What are the conflict situations and impacts related to sugarcane cultivation on health and the environment?" The identified problems were charted on base maps and A3 paper, using a marker pen and colored pencils. Each group activity lasted approximately an hour and was followed by presenting the mapped elements in a conversation circle. The meetings were photographed and audio-recorded. A previously published article detailed the socioenvironmental and health impacts of sugarcane monoculture in the territory (Gurgel et al., 2021).

The documentary analysis of articles, dissertations, theses, and reports allowed us to characterize the territory and the socio-historical determinations of socioenvironmental conflicts and community relationships. The documents were selected and analyzed from February 2019 to June 2020.

The social cartography recordings were transcribed and formed into a database organized in Excel 2016, together with the documents collected. All material was systematized and analyzed based on the categories provided in the Global Atlas of Environmental Justice (EJAtlas) (Table 1). Finally, the data was organized and fed into the platform from December 2020 to February 2021 for validation and publication by the University of Barcelona, responsible for the website.

The Human Research Ethics Committee approved the study nested in the Participatory Diagnosis of Environmental Contamination in Sugarcane Cultivation and Indicators of Early Effects on Health Research, submitted and approved under CAAE N° 29404020.2.0000.5190. All participants signed the consent form for using images and voice and an Informed Consent Form.

Table 1: EJAtlas analysis categories for environmental conflicts

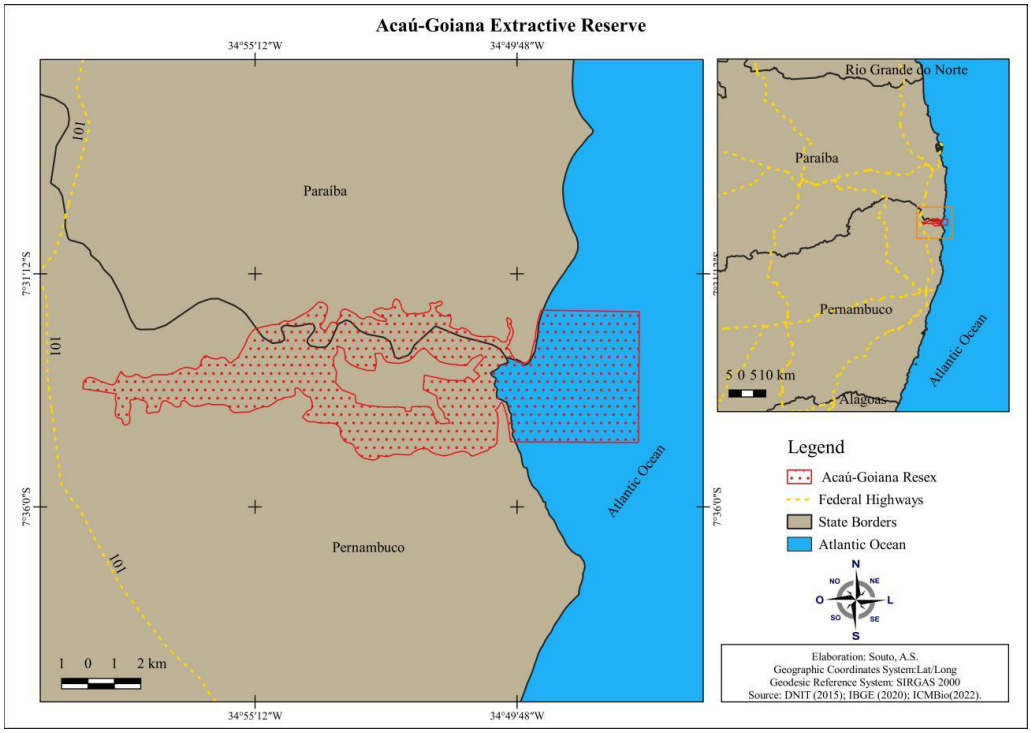
Category	Description
Basic data	Conflict name; country; conflict location; location accuracy; project area; population type.
Conflict source	Conflict type: first level (leading cause of the conflict) and second level (underlying causes within the conflict); specific product; conflict description.
Project details	Project details; investment level; affected population (quantitative); company names; international and financial institutions; relevant government actors; environmental justice organizations (and other supporters).
Conflict and mobilization	Start of conflict; end of conflict; conflict intensity; when the mobilization began; relationship of the conflict with other socioenvironmental conflicts mapped in the EJAtlas; groups involved in the mobilization; mobilization types.
Impacts	Visible and potential environmental health and socioeconomic impacts.
Conflict responses	Current status of project development; conflict result/response; space to determine whether or not there was environmental justice regarding the conflict.
Sources and material	Pictures, videos, and scientific references.

Source: Santos et al., 2022.

RESULTS AND DISCUSSION

Characterization of socioenvironmental conflicts

Tejucupapo is a district of Goiana, a municipality located in Zona da Mata Norte, Pernambuco, on the border with Paraíba. In this region, at the center of disputes over



land, water, territory, and rights is the Acaú-Goiana Extractive Reserve (Resex) (Figure 1).

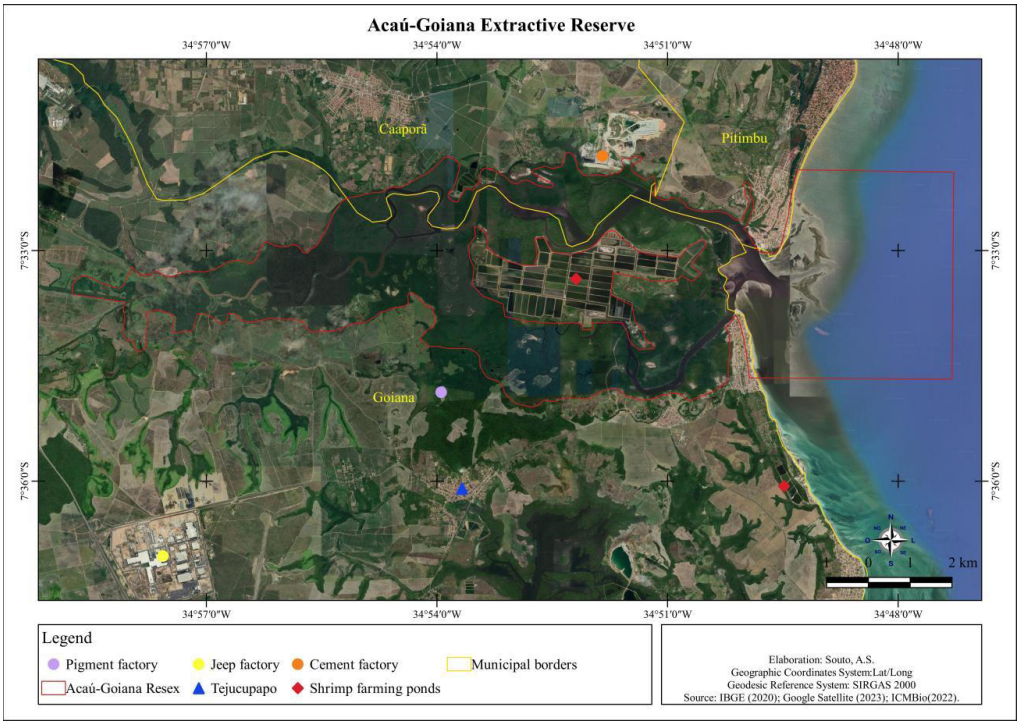
Figure 1: Location of the Acaú-Goiana Resex

Source: DNIT (2015); IBGE (2020); ICMbio (2022).

The Acaú-Goiana Resex was established by enacting the September 26, 2007 Decree. It has a total area of 6,678.30 hectares and comprises the Municipalities of Pitimbu and Caaporã in Paraíba and Goiana in Pernambuco (Figure 2). According to the legislation, the Acaú-Goiana Resex aims to "protect livelihoods and guarantee the use and preservation of renewable natural resources traditionally used by the communities' extractive population", involving the regions of Carne de Vaca, Povoação de São Lourenço, Tejucupapo, Baldo do Rio Goiana and Acaú, and other communities in the area

covered. In this sense, Resex was declared an area of social interest, with 1,504 families settled in its territory (Brasil, 2007). Through the delimitation of the Resex area by the State, the community now formally owns the land. It has unrestricted freedom to fish and collect estuarine and marine species.

Figure 2: Acaú-Goiana Resex



Source: IBGE (2020); ICMbio (2022); Google Satellite (2022).

Since before its creation, the Resex area has been permeated by territorial claims, which put the existing resources in the region into dispute. Historically, Goiana was marked by the exploitation of nature for the sugarcane monoculture, involving the exploitation of Black people, trafficked from the African continent, and Indigenous people, whose labor force was used to cultivate crops and implement mills in previous centuries. Fishing activity differed from work in sugar mills due to free access to the sea and food (Silva, 2013).

Besides sugarcane cultivation, projects with great polluting potential are expanded in the Resex surrounding area, driven by land exploitation by Pernambuco's sugar and ethanol sector, threatening traditional ways of life and communities. Shrimp farming, a cement factory, an iron oxide pigment production factory, and the expansion of gated communities drive real estate speculation and pressure the removal of families from the territory (Figures 2 and 3), also adversely affect biomes and, consequently, human health,

competing for territory, according to community reports:

> A factory has also made many people sick and deforested mangroves and everything that existed. There are many things here that I say we are forgotten because this happens, and no one acts (participant 1).

> This mangrove was invaded more or less in 2008. They planted sugarcane, put poison in it, and killed everything. They called the IBAMA. Do you know what they did? Nothing! The kids at school protested, and a teacher went there to see if he could prohibit it or if it would stop. So, IBAMA came and didn't solve anything. There, where the Obelisk stands, and over here was a beautiful forest. They cut it all down (participant 2).

> They use a product such as limestone in the shrimping process, meta sulfite [Sodium Metabisulfite]. If they don't have a place to dispose of it, it all ends up in the mangroves. They don't do it right because the expense is more significant. They have to put an aerator in the water to give oxygen to the shrimp. What will they do when they don't have that, and there's low oxygen to the shrimps? The shrimp culture operators will open the drainage and the water supply to circulate. The water containing the product goes to the shrimp. So, the shrimp culture operators grab the plastic boxes. They take the plastic boxes with ice and add the metabisulfite (participant 3).

Figure 3: Enterprises in the study area

a) Shrimp farming ponds; b) Oxinor Factory; c) Residential condominiums; d) Sugarcane cultivation. Sources: a) Jornal Outras Palavras, 2019; b) Oxinor, 2003; c) Mar Sem Fim, 2015 - https://marsemfim.com.br/reserva-extrativista-acau-goiana-pernambuco/; d) Gurgel, 2019 (Research collection).

Economic agents linked to shrimp farming and the sugar and ethanol sector interfere with the capacity for social and cultural identification and political participation with social mobilization. Both run their activities irregularly in this territory, resulting in the loss of fishing areas and the collection of crabs and oysters in the project areas (Silveira, 2011). Using nature for sugarcane cultivation around the Conservation Unit area is also identified in Alagoas. Agribusiness activity is advancing near the Lagoa do Jequiá Marine Extractive Reserve, reshaping the landscape and threatening biodiversity and waters (Lopes, 2020).

Among the relevant government players in environmental conflicts and injustice in the Resex, we underscore state and municipal governments, Universities, Research Centers from different areas, the Ministry of the Environment, the Ministry of Health, the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA), the Chico Mendes Institute for Biodiversity Conservation (ICMBio), the National Institute for Colonization and Agrarian Reform (INCRA), the Public Prosecutor's Office, and the Labor Public Prosecutor's Office.

In the description of the conflict, according to the EJAtlas categories, the population involved was classified as semi-urban due to the expanded public infrastructure of roads and public spaces, typical of urban expansion in the Tejucupapo district, residing in self-built houses, close to water courses. However, a rural-urban transition was identified in the terms described by Miranda (p. 27): "The occupation of space becomes generalized without clear delimitations" (Miranda, 2009).

In short, as a fence is erected, a wall or a new tank is opened, a part of the territory is privately appropriated, extirpating species from the coastal marine system and everyday experiences of fishing and collecting. It is a low-intensity conflict over land and biomass. However, it has mobilized groups of farmers, informal workers, fishermen, and shellfish gatherers involved in artistic and recreational actions, participatory research, creation of reports, legal actions/suits, and occupation of land and public spaces in the search for environmental justice and deprived rights.

Mapping the impacts of socioenvironmental conflicts and injustice

In the conflict recorded in this study, environmental, socioeconomic, and health impacts were observed on the population residing in the district of Tejucupapo (Table 2).

Table 2: Environmental, health, and socioeconomic impacts observed in the territory of the Acaú-Goiana Extractive Reserve

Environmental Impacts	Air pollution, loss of biodiversity (wildlife and agrodiversity), desertification/drought, fires, food insecurity (crop damage), global warming, loss of landscape/aesthetic degradation, soil contamination, soil erosion, deforestation and loss of vegetation cover, pollution of surface waters/water quality deterioration (physical-chemical and biological). Pollution or depletion of groundwater, large-scale disruption of hydro and geological systems, reduced ecological/hydrological connectivity.
Socioeconomic Impacts	Displacement, increased violence and crime, lack of job security, work absenteeism, layoffs, unemployment, and loss of livelihood. Loss of traditional knowledge/practices/cultures, social problems (alcohol abuse and prostitution), human rights violations, land expropriation, loss of landscape/sense of place. Other socioeconomic impacts include land use and occupation conflicts, with loss, expropriation, and destruction of objects and historical symbols of the community, reflecting the loss of cultural identity.
Health Impacts	Accidents, exposure to unknown or uncertain complex risks (such as radiation), malnutrition, mental problems including stress, depression, and suicide, health impacts related to violence (homicide and rape), health problems related to alcohol abuse, prostitution, occupational diseases, and accidents, and deaths. Other health impacts: Serious respiratory problems were reported due to burning sugarcane and pesticide poisoning.

Source: Authors, 2023.

All productive business activities in the Resex and its surroundings are associated with potentially severe environmental damage, which can cause short-, medium-, and long-term impacts. The destructive processes in the territory have reshaped the landscape. They are identifiable by the change in the area covered by Atlantic Forest vegetation and mangroves, currently reduced to fragments of biomes, between stretches of sugarcane fields and shrimp farming ponds. Thus, such activities threaten traditional ways of life and the local economy. The extensive loss of vegetation cover, with total suppression of some areas of vegetation in the Acaú-Goiana Resex, mainly since 2015, has been caused by agricultural activity around the region (Silva et al., 2020).

Sugarcane cultivation advancing over the Resex is associated with intense environmental contamination and harm to health, mainly due to the use of pesticides and straw burning. The community also reported that fires cause the dispersion of particulate matter, called "powder" or *malunguinho*, into the atmosphere in the territory. Besides dirt, families associated soot with respiratory diseases.

Atmospheric pollution caused by burning increases levels of toxic gases such as carbon monoxide and dioxide, methane, polycyclic aromatic hydrocarbons and dioxins, and heavy metals (Oliveira; Ignotti; Hacon, 2011). Fires reduce animal biodiversity through habitat loss or species death (Ribeiro; Pesquero, 2010). Smoke and particulate matter disperse over long distances, causing oxidative stress and the accumulation of free radicals in the body, allergies, and particularly affecting the cardiovascular and respiratory systems, especially in children, older adults, and sugarcane workers. They are also associated with the incidence of mutations and cancers (Cançado et al., 2006; Gurgel et al., 2021; Pestana et al., 2017; Prado et al., 2012).

Pesticides used on sugarcane can contaminate water, soil, and air, affect animals and other plant species, cause biodiversity loss, and contaminate other crops, threatening Food and Nutritional Sovereignty and Security (FNSS) (Gurgel et al., 2018). Environmental contamination drives the decline of aquatic species previously abundant in the region, such as crabs and *guaiamum* (blue land crab), an essential source of income for local fishermen (Gurgel et al., 2021). In the population, pesticides can cause acute and chronic poisoning and are associated with the emergence of cancer, genetic material harm, congenital malformations, hormonal dysregulation, neurotoxicity, immunotoxicity, and other important human health-related outcomes (Gurgel et al., 2018; Kim; Kabir; Jahan, 2017).

The production of synthetic iron oxides can also harm the territory's population. These substances cause skin and eye irritation. Inhaling iron oxides can damage the lung epithelium and induce coughing, sneezing, respiratory problems, and siderosis. Due to concerns about the potential genotoxicity of these compounds, any route of exposure must be considered dangerous. Iron oxide pigments may contain silica, causing pneumoconiosis under chronic exposure (Aquilina et al., 2016).

The cement industry has a high polluting potential due to exposure to cement and the raw materials used for its production. Cement manufacturing plants are among the largest sources of emissions of dangerous air pollutants such as dioxins, furans, and

polychlorinated biphenyls. Gases and dust are also released resulting from chemical reactions such as nitrogen oxides, sulfur dioxide, carbon monoxide and dioxide, toxic metals such as arsenic, lead, cadmium, chromium, mercury, and zinc, and lower levels of volatile organic compounds, ammonia, chlorine, and hydrogen chloride. Cement factories are often associated with respiratory diseases such as emphysema, and human studies also indicate an increased risk of cancer prevalence and mortality in children and adults, especially in the respiratory tract. High levels of heavy metals and biomarkers of renal toxicity have been identified in blood and urine samples from exposed populations (Raffetti, Treccani, Donato, 2019). Besides inhaling them, these compounds can contaminate water, soil, and food sources, highlighting the diverse human exposure types.

In shrimp farming, several chemical agents are used to treat water and sediment in tanks, such as active ingredients of pesticides (e.g., algaecides and herbicides), heavy metals, organic fertilizers, antibiotics, disinfectants, food additives, and other agents used to regulate water's pH, for example (Graslund; Bengtsson, 2001). These products can contaminate soil and water, affect other species, and cause biodiversity loss. Cultivation in nurseries can destroy mangroves and cause erosion, lower soil fertility, eutrophication, flooding, siltation, and salinization of aquifers. They can also pollute adjacent areas with farm effluents, causing biodiversity loss and escape of exotic species into the natural environment.

Nurseries occupy areas of permanent preservation, escalate conflicts over the use of water, increase diseases among workers due to the handling of chemical products during cultivation, and compromise food security for the population in the affected territories and consumers (Figueirêdo et al. al., 2006; Graslund; Bengtsson, 2001).

The territory's private appropriation violated the right to fish and collect estuarine species, such as the areas fenced off for shrimp farming, guarded by armed personnel, who keep fishermen away, hindering people's access to their ancestral territory. Exceeding the limits of this surveillance implies a risk of physical violence, using firearms against fishermen and shellfish gatherers. Depriving access to Resex areas also reveals the intense socioeconomic impacts, specifically the loss of livelihoods, knowledge, practices, traditional cultures, and landscape/sense of place. These socioeconomic impacts are grounded on colonizing practices, the destruction of collective signs, and the imposed individual private appropriation in the exploitation and destruction of nature.

Landscape and biodiversity losses are intertwined with reduced ecological/hydrological connectivity. The community reports that, with the removal of vegetation and the expanded sugarcane fields and other projects, the sliding of slopes interferes with water courses and the quality of water available for human supply and affects their very territorial identity. When referring to the Tracunhaém River, the relationship between the community, waters, and pollution was elucidated by mapping the territory:

> It may seem to those who see it, "what a stupid or small river". However, this river is historic. How many older adults here have so many stories? They used to wash their clothes in this river, and this water was even used for drinking: this river was used for everything... It is

> dying now, and people are contributing to this (participant 4).

> I also work with pesticides in sugarcane. We need health, right? This health thing... I live there next to a sugarcane field and there's a river nearby. Every time you apply the pesticide, it ultimately leaks into the pods. Our river here needs treatment. (participant 5).

Besides water pollution from industrial and agribusiness waste, the release of domestic effluents, which accumulate in a septic tank in the center of the community, was also recorded. Given the high rainfall in the region and the presence of shallow groundwater, water contamination caused by domestic, industrial, and agribusiness effluents, mapped by the population in social cartography, raises doubts about the quality of fish and, consequently, threatens FNSS and the local economy, as reported:

> The pit, the [pigment factory] is already customary. We gave an example with the red water, which appeared on television and was stifled: it looked like blood. We also have a central septic tank that dumps sewage directly into the river, so much so that no one buys fish from here anymore for fear of contamination (participant 6).

In social cartography, the disappearance of animal species collected in periods preceding the installation of tanks and other projects was reported:

> This is shellfish, where the shrimp farm killed this mangrove area with its products. The mangrove is also significantly affected by chemicals (participant 7).

The community also associates the release of effluents from shrimp tanks with the mortality of species of economic interest. These effluents are dumped into estuaries, which leads to the mortality of fish, shellfish, and crustaceans, causing conflicts (Silveira, 2011). The fish quality and amount in the Acaú-Goiana Resex areas are uncertain, and the risk of not accessing the mangroves and forest for fishing and collecting fruits for food is constant. The literature points out that small-scale fishing, responsible for reducing poverty and food insecurity, is impacted, among other externalities, by pesticides in monocultures, real estate speculation, pollution, and aquaculture, which generate socioenvironmental conflicts (Pedrosa, 2016).

Additionally, the advancement of these activities over the territory compromises the water potential of the local watershed due to the destruction of native forests, particularly riparian forests, and the consumption of large volumes of surface and underground water used in commodity irrigation. This results in the migration of springs, the interruption of river flows, and the reduction of aquifer volumes, escalating conflicts (Egger et al., 2021). In a setting where water resources are increasingly scarce and disputed, the threats are potentially severe for the entire society, and their damage far exceeds the conflict area presented here.

The relationship between land expropriations, and unemployment and substandard

working conditions underpins the framework for the expanded reproduction of capital, a concrete and permanent social relationship (Pedrosa, 2016). Prohibiting traditional communities' ways of being and living in the Resex area compels workers to sell their labor power. However, recently expropriated from the land, these workers now make up, along with thousands of others, the unemployed people in the Zona da Mata of Pernambuco, waiting for a new urban development or the advancing invasion of historic sugar and ethanol activity. As a result, the exclusion of these groups and the inequalities increase, and poor living and substandard working conditions intensify (Porto, 2011).

The rupture of family and community ties, and the escalating violence, the abuse of alcohol and other drugs, and the action of extermination groups in the community were reported and represented in the cartography as expressions of the public authorities' disregard for the territory. For the Tejucupapo community, the lack of state actions to protect the environment and people occurs in the same proportion. Although the state is not the primary agent of removal and promotion of violence in the territory, its "inertia" agrees with land expropriation, displacement, and violence and affects the health of populations. Government entities act as political and institutional support for the hegemonic economic model, which, in turn, does not consider the rights and health of populations (Porto, 2011).

In parallel to the impacts from agribusiness and manufacturing industry sectors registered through the analysis of social cartography and systematized in EJAtlas, we identified another expanding sector in the study area: the real estate sector, with the installation of condominiums for housing. Land exploitation by real estate companies in Goiana modifies how housing is provided in the territory based on the future demand for residential condominiums for medium- and high-income families. The expansion of this sector depends on the removal/deterritorialization of the communities that historically occupy the territory of Tejucupapo. This form of urbanization expands socio-spatial inequalities and reflects the relationship between the exploitation of nature and private property in land in areas marked by environmental injustice.

In recent decades, the Brazilian State continued to implement and deepen development policies subordinated to financial capital and accumulation through spoliation by large corporations. Different territories have been invaded by the expansion of agribusiness, resulting in conflicts and the extermination of traditional ways of life (Egger et al., 2021), as is the case in Tejucupapo.

Environmental conflicts and injustice underpin socioenvironmental vulnerabilities and reflect on the social determination of health, as processes of vulnerability occur due to the burdens and risks facing affected populations and the non-recognition of fundamental rights such as health, land, adequate and healthy food, a balanced environment and culture, which should be guaranteed by the State (Porto, 2011).

Considering that the communities on which the analyzed impacts fall are made up of Black and poor people, we identified the relationship between health disparities and environmental racism. This finding corroborates the recommendations of Payne-Sturges, Gee, and Cory-Slechta (2021) about the need to understand how racism explains envi-

ronmental exposure and its impacts on certain racial groups.

We should underscore that the concealment or invisibilization of such populations is intentional, given that including specific interests or values in the political arena can hinder achieving other hegemonic interests (Porto, 2011).

EJAtlas aims to include and describe the underlying environmental conflicts and injustice, placing living territories at the core of the debate. By highlighting that sides are in dispute and that people's way of living and reproducing themselves are potential targets of developmental logic, mapping conflicts transcends great distances and unites diverse political stakeholders in the fight for dignity and rights (Temper et al., 2014).

Conclusions

Conflicts that threaten the environment, human health, economic aspects, and the history and identity of the populations living in the territory have been identified around the Tejucupapo district. These conflicts arise from the private appropriation of the territory to expand sugarcane monoculture, produce shrimp, and implement other economic enterprises in the region, which generates disputes. Far from ending conflicts as old as violent, the State's creation of the Acaú-Goiana Extractive Reserve was followed by socio-environmental injustice, crystallized in the violation of rights. The process of economic growth observed in Goiana reproduces a development model to benefit the few, which is authoritarian, undemocratic, and perverse, producing conflicts and socio-environmental injustice.

It became evident that the impacts of this model are not distributed equitably across the territory, focusing on rural workers and traditional peoples and communities, such as quilombola shellfish gatherers and small-scale fishermen, who try to resist systematic rights violations associated with economic projects, generally endorsed by State actions.

The Extractive Reserve, as a territory for collective use, challenges the capitalist logic of land ownership and reveals the resistance of traditional peoples and communities and the ability to coexist with biomes and be a constituent part of them. Living and being rights' holders for the working class and traditional communities in the sugarcane zone of Northeast Brazil is admittedly resisting the attack on the collective way of producing and reproducing themselves.

The many illnesses, losses, violence, and insecurities from conflicts are in themselves the very image of socioenvironmental injustice and the advancement of colonial strategies over ways of life in the territory. To counter these centuries-old strategies, the mobilization of the community and groups to repair and recoup the Atlantic Forest and mangroves is urgent. The environmental, socioeconomic, and health impacts analyzed indicate an inseparable combination of predatory capitalism strategies, which affect society.

While any environmental injustice remains invisible due to the annihilating force of political and economic power, coupled with the difficulties in mobilizing affected communities and populations, conflicts arise due to the emergence of organized forms of resistance and affirmation of other development and society projects. Therefore, conflicts

are mediated by variables other than political power, such as income and symbolic capital, and are traversed by often non-negotiable and incommensurable values, including culture and dimensions of living and dying that expand the notion of health as a component of life policies.

The strategy of recording conflicts arising from this development model in tools such as EJAtlas gives visibility to identified problems. It is an essential strategy for the affected territories' inclusion, mobilization, and struggle. In this sense, the need for community organization and mobilizing political movements led by the affected populations is central.

Acknowledgments

This work was carried out with funding from CNPq and FACEPE and support from the Coordination for the Improvement of Higher Education Personnel – Brazil (CAPES) – Financing Code 001.

We are grateful to Clenio Azevedo Guedes, Geovanna Hachyra Facundo Guedes, João Antonio dos Santos Pereira, and Girlan Cândido da Silva, who contributed to the collection and systematization of social cartography data and theoretical discussions. Dona Luzia Maria da Silva, community leader, mobilized the community to participate in social cartography meetings.

References

ACSELRAD, H. As práticas espaciais e o campo dos conflitos ambientais. **Conflitos ambientais no Brasil**. Rio de Janeiro: Relume Dumará, p. 13-35, 2004.

ACSELRAD, H; HERCULANO, S.; PÁDUA, J. A justiça ambiental e a dinâmica das lutas socioambientais no Brasil: uma introdução. **Justiça ambiental e cidadania**. Rio de Janeiro: Relume Dumará, v. 2, p. 14, 2004.

AQUILINA, G.; AZIMONTI, G.; BAMPIDIS, V.; BASTOS, M. L.; BORIES, G.; CHESSON, A.; COCCONCELLI, P. S.; FLACHOWSKY, G.; URGEN GROPP, J. ; KOLAR, B.; KOUBA, M.; L OPEZ PUENTE, S.; L OPEZ-ALONSO, M.; MANTOVANI, A.; MAYO, B.; RAMOS, F.; RYCHEN, G.; SAARELA, M.; WESTER, P. Safety and efficacy of iron oxide black, red and yellow for all animal species: EFSA Panel on Additives and Products or Substances used in Animal Feed (FEEDAP) Panel members. **EFSA Journal**, vol. 14, n. 6, p. 4482, 2016. Disponível em: https://efsa.onlinelibrary.wiley.com/doi/full/10.2903/j.efsa.2016.4482. Acesso em: 01 nov. 2021.

BRASIL. Decreto s/n, de 26 de setembro de 2007, que cria a Reserva Extrativista Acaú Goiana, nos Municípios de Pitimbú e Caaporã, no Estado da Paraíba, e Goiana, no Estado de Pernambuco, e dá outras providências. **Diário Oficial da União**, 27 de set, 2007. BRASIL. Disponível em: https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/dnn/dnn11351.htm.

BUNDE, A. Mundialização do Capital, Desregulamentação e Investimento Externo Direto (IED): O Setor Sucroenergético no Brasil. **Revista Tocantinense de Geografia**, v. 9, n. 18, p. 55-74, 2020. Disponível em: https://sistemas.uft.edu.br/periodicos/index.php/geografia/article/view/8957/16825. Acesso em: 28 out. 2021.

CANÇADO, J. E. D.; SALDIVA, P. H. N.; PEREIRA, L. A. A.; LARA, L. B. L. S.; ARTAXO, P.; MARTINELLI, L. A.; ARBEX, M. A.; ZANOBETTI, A.; BRAGA, A. L. F. The impact of sugar cane-burning emissions on the respiratory system of children and the elderly. **Environmental Health Perspectives,** vol. 114, n. 5, p. 725–729, 2006. Disponível em: https://doi.org/10.1289/ehp.8485. Acesso em: 01 nov. 2021.

COMPANHIA NACIONAL DE ABASTECIMENTO. Acompanhamento da safra brasileira de cana-de-açúcar. V. 7 - Safra 2020/21, n.3 - Terceiro levantamento, dezembro de 2020. Brasília: [s. n.], 2020. Disponível em: https://www.conab.gov.br/info-agro/safras/cana. Acesso em: 01 nov. 2021.

DNIT. Visualizador de dados do DNITGeo. Brasília: [s. n.], 2015. Disponível em: https://servicos.dnit.gov.br/vgeo/. Acesso em: 01 nov. 2021.

EGGER, S.; RIGOTTO, R. M.; ANTONIO, F.; SOUZA, N. De; COSTA, M.; CRISTINA, A.; AGUIAR, P. Ecocídio nos Cerrados: agronegócio, espoliação das águas e contaminação por agrotóxicos. **Desenvolvimento e Meio Ambiente**, Paraná, vol. 57, p. 16–54, 2021. Disponível em: https://doi.org/10.5380/dma.v56i0.76212. Acesso em: 01 nov. 2021.

FIGUEIRÊDO, M. C. B. de; ARAÚJO, L. de F. P.; ROSA, M. de F.; MORAIS, L. de F. S. de; PAULINO, W. D.; GOMES, R. B. Impactos ambientais da carcinicultura de águas interiores. Impactos ambientais da carcinicultura de águas interiores. **Engenharia Sanitária e Ambiental,** v. 11, p. 231-240, 2006. Disponível em: https://doi.org/10.1590/S1413-41522006000300006. Acesso em: 16 Aug. 2021.

GOOGLE. **Google Earth website**. Disponível em: https://earth.google.com/web/. Acesso em: 25 nov. 2022.

GRASLUND, S. BENGTSSON, B. E. Chemicals and biological products used in south-east Asian shrimp farming, and their potential impact on the environment - a review. **Science of the Total Environment**, 2001. v. 280, n. 1-3, p. 93-131, 2001.

GURGEL, A. M.; BÚRIGO, A. C.; FRIEDRICH, K.; AUGUSTO, L. G. S. **Agrotóxicos e Saúde**. 1st ed. Rio de Janeiro: Fiocruz, 2018.

GURGEL, A. M.; GUEDES, C. A.; FRIEDRICH, K. Flexibilização da regulação de agrotóxicos enquanto oportunidade para a (necro)política brasileira: avanços do agronegócio e retrocessos para a saúde e o ambiente. **Desenvolvimento e Meio Ambiente**, vol. 57, p. 135–159, 2021. Disponível em: https://doi.org/10.5380/dma.v57i0.79158. Acesso em: 02 dez. 2021.

GURGEL, A. M.; GUEDES, C. A.; GURGEL, I. G. D.; AGUSTO, L. G. da S. Reflexos da perda do controle estatal sobre os agrotóxicos no Brasil e sua regulação pelo mercado. **Reciis**, vol. 11, n. 3, p. 1–16, 2017.

GURGEL, A. M.; SOUTO, A. S.; GUEDES, C. A.; GUEDES, G. H. F.; PEREIRA, J. A. S.; BEZERRA, V. C. R. Espelho sem reflexos: conflitos e vulnerabilidades socioambientais em uma região produtora de cana-de-açúcar. 2021. **Ciência & Saúde Coletiva**. Disponível em: https://www.cienciaesaudecoletiva.com.br/artigos/espelho-sem-reflexos-conflitos-e-vulnerabilidades--socioambientais-em-uma-regiao-produtora-de-canadeacucar/17968?id=17968&id=17968&id=17968. Acesso em: 14 ago. 2021.

ICMBIO. **Dados geoespaciais de referência da Cartografia Nacional e dados temáticos produzidos no ICMBio**. Disponível em: https://www.gov.br/icmbio/pt-br/assuntos/dados_geoespaciais/mapa-tematico-e-dados-geoestatisticos-das-unidades-de-conservacao-federais. Acesso em: 25 nov. 2022.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. **Produção Agrícola** - Lavoura Temporária. Brasília: [s. n.], 2018. Disponível em: https://cidades.ibge.gov.br/brasil/pe/pesquisa/14/10212. Acesso em: 28 out. 2021.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. Estrutura territorial do território brasileiro. Brasília: [s. n.], 2020. Disponível em: https://geoftp.ibge.gov.br/organizacao_do_territorio/estrutura_territorial/divisao_territorial/.

KIM, K. H.; KABIR, E.; JAHAN, S. A. Exposure to pesticides and the associated human health effects. Science of the Total Environment, vol. 575, p. 525–535, 2017. Disponível em: http://dx.doi.org/10.1016/j.scitotenv.2016.09.009. Acesso em: 10 nov. 2022.

LOPES, D. V. S. Avaliação do impacto ambiental e associação entre a exposição à água contaminada e o risco de desenvolvimento de doenças de veiculação hídrica em uma reserva extrativista. 2020. 108 f. UNIT, Alagoas, 2020. Disponível em: https://openrit.grupotiradentes.com/xmlui/handle/set/3977. Acesso em: 10 nov. 2022.

MIRANDA, L. I. B. Planejamento em áreas de transição rural-urbana: velhas novidades em novos territórios. **Revista Brasileira de Estudos Urbanos e Regionais**, vol. 11, n. 1, p. 25–25, 31 May 2009. Disponível em: https://rbeur.anpur.org.br/rbeur/article/view/208. Acesso em: 15 ago. 2021.

OLIVEIRA, B. F. A. de; IGNOTTI, E.; HACON, S. S. A systematic review of the physical and chemical characteristics of pollutants from biomass burning and combustion of fossil fuels and health effects in Brazil. **Cadernos de Saúde Pública,** vol. 27, n. 9, p. 1678–1698, set. 2011. Disponível em: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-311X2011000900003&lng=en&tlng=en. Acesso em: 17 set. 2018.

PAYNE-STURGES, D. C.; GEE, G. C.; CORY-SLECHTA, D. A. Confronting Racism in Environmental Health Sciences: Moving the Science Forward for Eliminating Racial Inequities. **Environmental Health Perspectives**, vol. 129, n. 5, 1 maio 2021. Disponível em: https://ehp.niehs.nih.gov/doi/10.1289/EHP8186. Acesso em: 18 ago. 2021.

PEDROSA, B. M. J. PEDROSA, Beatriz Mesquita Jardim. **Pesca artesanal e áreas marinhas protegidas em Pernambuco**: uma abordagem multidimensional e institucional. 2016. 190 f. Tese (Programa de Pós-Graduação em Recursos Pesqueiros e Aquicultura) - Universidade Federal

Rural de Pernambuco, Recife, 2016.

PESTANA, P. R. S.; BRAGA, A. L. F.; RAMOS, E. M. C.; OLIVEIRA, A. F.; OSADNIK, C. R.; FERREIRA, A. D.; RAMOS, D.; PESTANA, P. R. S.; BRAGA, A. L. F.; RAMOS, E. M. C.; OLIVEIRA, A. F.; OSADNIK, C. R.; FERREIRA, A. D.; RAMOS, D. Effects of air pollution caused by sugarcane burning in Western São Paulo on the cardiovascular system. **Revista de Saúde Pública**, vol. 51, n. 0, 2017. DOI 10.1590/s1518-8787.2017051006495. Disponível em: https://tinyurl.com/y7hv8x6r. Acesso em: 17 set. 2018.

PORTO, M. F. S. Complexidade, processos de vulnerabilização e justiça ambiental: um ensaio de epistemologia política. http://journals.openedition.org/rccs, vol. 93, p. 31–58, 1 jun. 2011. Disponível em: http://journals.openedition.org/rccs/133. Acesso em: 18 ago. 2021.

PORTO, M. F. S.; ROCHA, D. F.; FINAMORE, R. Saúde coletiva, território e conflitos ambientais: bases para um enfoque socioambiental crítico. Ciência & Saúde Coletiva, vol. 19, n. 10, p. 4071–4080, 1 out. 2014. Disponível em: http://www.scielo.br/j/csc/a/Xw4CkyySPvNVHzbD93vKrwC/?lang=pt. Acesso em: 11 ago. 2021.

PRADO, G. F.; ZANETTA, D. M. T.; ARBEX, M. A.; BRAGA, A. L.; PEREIRA, L. A. A.; DE MARCHI, M. R. R.; DE MELO LOUREIRO, A. P.; MARCOURAKIS, T.; SUGAUARA, L. E.; GATTÁS, G. J. F.; GONÇALVES, F. T.; SALGE, J. M.; TERRA-FILHO, M.; DE PAULA SANTOS, U. Burnt sugarcane harvesting: Particulate matter exposure and the effects on lung function, oxidative stress, and urinary 1-hydroxypyrene. **Science of the Total Environment**, vol. 437, p. 200–208, 2012. Disponível em: http://dx.doi.org/10.1016/j.scitotenv.2012.07.069. Acesso em: 11 ago. 2021.

RAFFETTI, E.; TRECCANI, M.; DONATO, F. Cement plant emissions and health effects in the general population: a systematic review. **Chemosphere**, vol. 218, p. 211–222, 2019. Disponível em: https://doi.org/10.1016/j.chemosphere.2018.11.088. Acesso em: 20 ago. 2021.

RIBEIRO, H.; PESQUERO, C. Queimadas de cana-de-açúcar: avaliação de efeitos na qualidade do ar e na saúde respiratória de crianças. **Estudos Avançados**, vol. 24, no. 68, p. 255–271, 2010.

SANTOS, M. O. S. D., SANTOS, C. P. S., ALVES, M. J. C. F., GONÇALVES, J. E., GURGEL, I. G. D. Oil in Northeast Brazil: mapping conflicts and impacts of the largest disaster on the country's coast. **Anais da Academia Brasileira de Ciências,** 94, e20220014. Disponível em: https://doi.org/10.1590/0001-3765202220220014. Acesso em: 11 nov. 2022.

SILVA, I. C. R. "**Marisqueira e quilombola é tudo a mesma coisa**": um estudo sobre as formas de mobilização política – o caso de Povoação de São Lourenço - Goiana - Pernambuco. 2013. 115 f. Universidade Federal de Pernambuco, Recife, 2013. Disponível em: https://repositorio.ufpe.br/handle/123456789/29238. Acesso em: 14 ago. 2021.

SILVA, J. F.; GOMES, M. B.; CANDEIAS, A. L. B.; RODRIGUES, G. G. Análise das dinâmicas vegetacionais e impactos na zona de borda da reserva extrativista marinha Acaú-Goiana (Pernambuco/Paraíba - Brasil) e sua área de entorno. Geonordeste, São Cristóvão, vol. 31, no. 1, p. 188–207, 2020. Disponível em: https://seer.ufs.br/index.php/geonordeste/article/view/6784. Acesso em: 10 Nov. 2022.

SILVA, R. G. O.; SILVA, M. das G. O papel do Estado nas expropriações: os impactos do Complexo de Suape (PE). **Argumentum,** vol. 11, n. 2, p. 122–137, 31 ago. 2019. Disponível em: https://periodicos.ufes.br/argumentum/article/view/24087. Acesso em: 28 out. 2021.

SILVEIRA, P. C. B. **Reservas extrativistas e pesca artesanal**: etnografia do campo socioambiental em Pernambuco - Relatório Final de Pesquisa. Recife: [s. n.], 2011. Disponível em: https://www.fundaj.gov.br/images/stories/pesquisas_concluidas/2010_Atualmente/relatorio_final_resex_pernambuco.pdf. Acesso em: 28 out. 2021.

TEMPER, L.; BENE, D. del; ARGÜELLES, L.; ÇETINKAYA, Y. EJATLAS, mapeo colaborativo como herramienta para el monitoreo de la (in) justicia ambiental. **Ecología Política**, n. 48, p. 10-13, 2014. Disponível em: https://www.jstor.org/stable/43526929. Acesso em: 14 ago. 2021.

Aline de Souza Souto

✉ aline.s.souto@hotmail.com

ORCiD: https://orcid.org/0000-0003-3821-1084

Virgínia Carmem da Rocha Bezerra

✉ virginiarochaa@gmail.com

ORCiD: https://orcid.org/0000-0003-2267-9512

Glaciene Mary da Silva Gonçalves

✉ glaciene.goncalves@fiocruz.br

ORCiD: https://orcid.org/0000-0002-7792-4610

Mariana Olívia Santana dos Santos

✉ marianaxolivia@gmail.com

ORCiD: https://orcid.org/0000-0002-2129-2335

Aline do Monte Gurgel

✉ aline.gurgel@fiocruz.br

ORCiD: https://orcid.org/0000-0002-5981-3597

Submetido em: 31/01/2022
Aceito em: 17/09/2023
2024;27:e02253

AMBIENTE & SOCIEDADE 25 anos 25 años 25 years

SciELO

Conflictos e injusticias socioambientales en la Reserva Extractiva de Acaú-Goiana

Aline de Souza Souto
Virgínia Carmem da Rocha Bezerra
Glaciene Mary da Silva Gonçalves
Mariana Olívia Santana dos Santos
Aline do Monte Gurgel

Resumo: Los conflictos socioambientales son la clave para entender contradicciones e injusticias del actual modelo de desarrollo. El Atlas Global de Justicia Ambiental (EJAtlas) es un inventario en Internet de los conflictos e injusticias ambientales, que sirve para las denuncias de los territorios afectados. El artículo analiza los conflictos e injusticias socioambientales derivados de la caña de azúcar en la Reserva Extractiva de Acaú-Goiana, Pernambuco, Brasil. Se realizó un estudio de caso descriptivo con trabajadores rurales basado en cartografía social y documentos, analizados según las categorías del EJAtlas. En la Reserva, creada para la protección de los bienes naturales han surgido nuevos conflictos debido a la instalación de granjas camaroneras y condominios privados que presionan el territorio. Entre otros impactos, destacan la contaminación del aire, del suelo y de los recursos hídricos, la inseguridad alimentaria y nutricional, las violaciones de los derechos humanos y los problemas de salud mental.

Palavras-chave: Conflictos socioambientales; Injusticia ambiental; Salud y medio ambiente; Salud de los trabajadores rurales; Reserva extractiva.

São Paulo. Vol. 27, 2024

Artigo Original

AMBIENTE & SOCIEDADE 25 anos 25 años 25 years

SciELO

Socio-environmental conflicts and injustices in the Acaú-Goiana Extractive Reserve

Aline de Souza Souto
Virgínia Carmem da Rocha Bezerra
Glaciene Mary da Silva Gonçalves
Mariana Olívia Santana dos Santos
Aline do Monte Gurgel

Resumen: The article analyzed the conflicts and socio-environmental injustices arising from sugarcane in the Acaú-Goiana Extractive Reserve, Pernambuco, Brazil. The Global Atlas of Environmental Justice (EJAtlas) is a web inventory that brings together environmental conflicts and injustices, serving as the basis for complaints from affected territories. A descriptive case study was carried out with rural workers based on social cartography and documents, analyzed according to the categories of the EJAtlas. Even with the creation of the Reserve to protect natural assets and ecosystem life, new conflicts have emerged due to the installation of shrimp farms and private condominiums that put pressure on the territory, which adds to secular problems such as sugarcane crops. Among other impacts are air pollution, soil and water contamination, loss of biodiversity, food and nutrition insecurity, increased violence, human rights violations, and mental health problems.

Palabras-clave: Socio-environmental conflicts; Environmental Injustice; Health and Environment; Rural Worker Health; Extractive Reserve.

São Paulo. Vol. 27, 2024

Artículo Original