RISK FACTORS FOR HUMAN AND ENVIRONMENTAL HEALTH RESULTING FROM THE USE OF PESTICIDES IN IRRIGATED RICE MONOCULTURE ON THE ISLAND OF MARAJÓ - PA

ORIGINAL ARTICLE

NAZARÉ, Mailson Lima[1], SOUZA, Keulle Oliveira da[2], MOREIRA, Elisângela Claudia de Medeiros[3], DIAS, Claudio Alberto Gellis de Mattos[4], PASCOAL, Rosana Moraes[5], MELO, Arlen Maia de[6], FECURY, Amanda Alves[7], DENDASCK, Carla Viana[8], BARBOSA, Roberta Sá Leitão[9], OLIVEIRA, Euzébio de[10]

NAZARÉ, Mailson Lima. *et al.* **Risk factors for human and environmental health resulting from the use of pesticides in irrigated rice monoculture on the island of Marajó - PA.** Revista Científica Multidisciplinar Núcleo do Conhecimento. Year. 07, Ed. 03, Vol. 04, pp. 114-132. March 2022. ISSN: 2448-0959, Access link: https://www.nucleodoconhecimento.com.br/health/risk-factors-for-human, DOI: 10.32749/nucleodoconhecimento.com.br/health/risk-factors-for-human

ABSTRACT

This study analyzes aspects of human and environmental health in the Campos region of the Marajó Archipelago in the State of Pará in relation to the use of pesticides in rice monoculture activities in the region. This article develops reflections on possible interferences in what has currently been called Global Health, or Single Health, which involve the territory of the Quilombola people of Gurupá in the municipality of Cachoeira do Arari. The data for this study were obtained through a bibliographical, documental and observational fieldwork research. It has a qualitative approach and content analysis. Therefore, an attempt was made to carry out a critical and dense analysis of extensive rice monoculture practices and the use of pesticides, seeking to collect historical and contextual elements and legal frameworks on the use of pesticides in crops in the region. Among the results, there were socio-environmental dilemmas involving the use of pesticides in the region, especially in the cultivation of rice, which was confirmed by complaints made by residents of the communities about possible changes in the natural environment, which have already caused problems in human health and

the environment. The study concluded that it is essential to carry out monitoring, inspection and studies on the abusive use of pesticides in rice cultivation, which has generated impacts on health and the environment in the region, as well as establishing legal regulations that guarantee of the territorial rights of local quilombola communities.

Keywords: Socio-environmental and Human Health, Developmentalism, Quilombola Community.

INTRODUCTION

The rice monoculture that has been installed in the region of the Marajó archipelago in the State of Pará since 2010 (ACEVEDO MARIN, 2015; CABRAL, 2017), has been following the logic of the advance of agribusiness over the territories of traditional communities in the Amazon.

This logic is based on the mode of production based on the destructive consumption of nature that degrades the planet and its own sustainability conditions (LEFF, 2018), therefore it follows a hegemonic perspective of development and the incessant search for progress based on a modern society of Eurocentric dominant model, based on the implementation of technologies imported from countries recognized as developed.

It is evident that this dominant model has been accentuated in recent decades, influenced by the changes that have occurred in society known as globalization and economic neoliberalism, which have intensified disputes over commercial borders and the pursuit of profits, causing various environmental problems and agrarian conflicts for traditional communities in the region. Amazon, such as quilombolas, indigenous people, riverside dwellers, cowboys, artisanal fishermen, babassu coconut breakers, among other communities (ACEVEDO MARIN, 2015, 2009; ALMEIDA, 2011, 2012; DIEGUES, 2000; PORTO GONÇALVES, 2011; ACSELRAD, 2013).

Thus, Amazonian regions such as the Marajó archipelago that have strong land concentrations originating from privileges granted to family groups since colonization through hereditary captaincies and sesmarias (ACEVEDO MARIN, 2009; SALLES, 2005; ALMEIDA, 2003; SANTOS and BARROS , 2016), continue to implement economic development policies based on monopolies that favor local dominant groups, which encouraged the entry of agribusiness in the region, making it difficult for traditional communities to use the natural environment, such as the Quilombolas from Gurupá.

Therefore, agribusiness practices such as monoculture activity and the use of pesticides can weaken the ways of life of traditional communities that have the natural environment as a means of subsistence.

It is also noteworthy that, according to Gasparini and Vieira (2010), the use of large amounts of pesticides in crops has become constant and produce destructive impacts on life support systems, implying in the ways of living in local communities.

It is in this scenario that this study is developed, initially from the analysis and reflections on the local environmental aspects that are related to the activities of rice monoculture.

Then we will analyze the possible consequences of the use of pesticides in rice monoculture in the region of the fields of the municipality of Cachoeira do Arari in the Marajó archipelago.

It should be noted that our perspective of analysis is directed to research on health and the environment that are related to the use of pesticides and their interference in the Gurupá Quilombo territory, and consequently in their daily practices that circulate socio-environmental knowledge and relations.

METHODOLOGICAL PATHS

Among the various existing traditional communities in the municipality of Cachoeira do Arari in the State of Pará, the Gurupá community is the only one that recognizes itself as a remnant of a quilombo and has a history of decades of conflicts involving local landowners, the judiciary and public security agencies.

Its certification has even been granted by the *Fundação Cultural Palmares* (FCP), since 2010, through Ordinance 82/2010, published in the *Diário Oficial da União* on July 6, 2010, however the definitive titling of the community is still pending at the *Instituto Nacional de Colonização e Reforma Agrária* (FCP, 2019).

It is noteworthy that the dilemma involving the territory of the Quilombola community of Gurupá has been the subject of several academic studies in recent years, highlighting their strategies of struggles and resistance for the defense of their territory.

In this perspective, works by Acevedo Marin and Eliana Teles (2008; 2015), Cleiton Cabral (2017), Edmir Celestino (2015) Ruver Meireles and Christian da Silva (2014) and Thiago Martins (2014) stand out, mostly these works highlight the land issue, identity, territory and some environmental aspects involving the region.

In this sense, we propose to carry out an interdisciplinary work that reflects on the perspective related to health and environment in the region and for this we carried out a bibliographical research (GIL, 1994) on authors who have been studying these aspects in the region, in addition to others such as Cornélio *et al.* (2004), Gasparini and Vieira (2010) who discuss the theme linked to the use of pesticides and rice production.

Among the sources of data collection are legal documents of court decisions filed by the Federal Public Ministry (2015) through community claims, environmental documents presented by rice monoculture producers, and the Ministry of

Agriculture, Livestock and Supply (MAPA)[11] on the use of pesticides in Brazil, as well as legislation on agriculture, the use of pesticides, social rights and health.

Field research was also carried out through experiences in the community (BRANDÃO, 2007; ALBUQUERQUE *et al.*, 2010), which we sought to identify ways of using the natural environment, initiated after prior contact established with leaders of the Associação de Remanescente de Quilombo of Gurupá, ARCHIG.

Our work approach had a qualitative character (FLICK, 2016) and content analysis (BARDIN, 2011), still guided by the discussions carried out through the discipline Health, Environment and Society of the Graduate Program in Anthropogenic Studies in the Amazon, attended at the Universidade Federal do Pará as a theoretical support on the subject.

THE USE OF PESTICIDES IN CAMPOS DO MARAJÓ

After a decision by the Federal Supreme Court in 2009, the rice farmers who occupied the Raposa Serra do Sol indigenous territory in the State of Roraima were completely removed, and they moved to the Quilombola region of Gurupá in the Marajó archipelago, starting to occupy a surrounding area of 12,580 ha, since 2010 (VIANNA, 2015; CABRAL, 2017).

However, after almost a decade of occupation of this area, its legitimacy is questioned by local communities, being materialized by lawsuits, including the recent one filed by the Public Ministry of the State of Pará (MPPA, 2019), with the opening of a civil inquiry and action public civil filed, where:

> A Justiça estadual julgou parcialmente procedente o pedido do Ministério Público do Estado, em ação civil pública ajuizada pelas promotoras de Justiça Eliane Cristina Pinto Moreira e Louise Rejane de Araújo Silva, e declarou a nulidade da matrícula do imóvel rural registrado no Cartório de Registro de Imóveis da comarca de Cachoeira do Arari, sob o nº 0757, do livro

RC: 135777
Available in: https://www.nucleodoconhecimento.com.br/health/risk-factors-for-human

> 2-A, às fls. 111, em nome de Renato de Almeida Quartieiro. (ASCOM/MPPA, 2019).

These rice producers, in order to start their activities in Marajoara soils, filed with the State Secretariat for the Environment in Pará (SEMAS)[12], on June 30, 2010, request for a License for Rural Activity (LAR)[13], then, on July 20, 2010, they requested the Grant of the Right to Use Water Resources from surface catchment of the Arari River, both instruments were granted by Government of the State of Pará (SEMAS, 2013). It is observed in the SEMAS Reports (2013), that the license and grant were granted in less than three months of the protocols and with little more than a year of the intense conflicts in the Raposa Serra do Sol indigenous territory, in which:

> Com 10 votos a favor da demarcação contínua da Terra Indígena (TI) Raposa Serra do Sol e apenas um contra, os Ministros do Supremo Tribunal Federal (STF) determinaram, em 19 de março de 2009, a definitiva retirada dos arrozeiros que ocupavam a área demarcada.3 Encerravam assim mais um episódio no impasse político e jurídico que vinha se arrastando desde a década de 1970, quando se iniciaram os primeiros procedimentos para a demarcação da TI Raposa Serra do Sol. (VIANNA, 2015, p.2).

Other instruments were granted to rice growers with Rural Environmental Registry (CAR)[14] and Rural Activity Operating Authorization (AFAR)[15], which made their presence in the region possible.

Where their presence is characterized by what Ruver Meireles and Christian da Silva (2014) identify as problems related to the use of natural resources and access to them by local communities, mainly because they develop their activities through irrigation and occupy extensive territorial areas, preventing common use in the region.

Regarding the irrigation activity carried out from the bed of the Arari River, under which water was granted, this has been questioned due to the fact that the river

borders the seat of the municipality of Cachoeira do Arari and the Quilombola territory of Gurupá, influencing several streams, holes, lakes, in addition to the Gurupá river itself (ACEVEDO MARIN; ELIANA TELES, 2015).

Therefore, the Arari River, which stands out for its significant importance for the maintenance of several ecosystems through which species of fauna and flora survive that make possible forms of survival and subsistence in the Quilombola territory of Gurupá, can be used as a circulation channel for the use pesticides from rice production to other environments in the region (RUVER MEIRELES; CHRISTIAN DA SILVA, 2014).

Pesticides have been constantly used in agricultural practices in Brazil and according to Lopes and Albuquerque (2018) their mass use in agriculture began in the 50s with the so-called green revolution, with the aim of modernizing and increasing productivity, for these authors:

> Na última década, o Brasil expandiu em 190% o mercado de agrotóxicos, o que colocou o País em primeiro lugar no ranking mundial de consumo desde 2008. Dez empresas controlam mais de 70% desse mercado no País. Somente na safra de 2010 e 2011, foram consumidas 936 mil toneladas de agrotóxicos (LOPES E ALBUQUERQUE, 2018, p. 519).

This intense consumption of pesticides in Brazil is quite evident when one observes the latest records of the Ministry of Agriculture, Livestock and Supply (MAPA), when it reported on December 27, 2019, that 474 registrations of agricultural pesticides were approved in 2019 alone, according to Act No. 91 published in the Official Gazette (PORTAL DO MAPA, 2019), thus making official a model of economic development that is based on what Leff (2019) points out to environmental degradation and the risk of ecological collapse.

For Leff (2007) this model of development of society intensified in the last decades of the twentieth century, configuring environmental issues, as a crisis of civilization,

since this development is based on a dominant economic and technological rationality that has as a consequence the pollution and degradation of the environment, the crisis of natural resources, energy and food.

In this developmental scenario, the use of pesticides in rice monoculture in the Marajó region is implemented, to the detriment of the well-being of local communities, which establish their ways of life in direct relationship with nature (ACEVEDO MARIN, 2009, 2014; ELIANA TELES, 2015).

The damage caused by the pesticide problem can have serious consequences for local communities such as quilombolas who have their ways of life based on symbiosis with nature, because:

> Os efeitos ecológicos do uso dos agrotóxicos são também os mais negativos. Após serem aplicados na lavoura eles penetram nos ciclos naturais da terra e das águas causando uma série de estragos. Começam matando não só a microfauna do solo como também insetos, peixes, aves e outros animais. Penetrando nas cadeias alimentares eles terminam por atingir o homem, atacando diretamente sua saúde (LAGO; PADUA, 1993, p.82).

However, the case of rice monoculture in the fields of Marajó deserves a lot of attention and due studies, since, since the beginning of activities, the use of pesticides has been recognized by producers, even indicating their methods of application in production, as recorded in the analysis SEMAS technique (2013), where it is reported that:

> O projeto de plantio de arroz (Oryza sativa) irrigado, cultivado em uma área de 2.000 ha, com solicitação para utilização de mais 1000 ha, e foi informado durante a ampliação que poderá chegar a 9.541,57 hectares, com utilização de grande quantidade de agrotóxicos (herbicidas, fungicidas e inseticidas). Esses produtos tóxicos, aplicados por via aérea (avião), caem nos canais de irrigação, com água captada no Rio Arari, que

> deságuam em outro recurso hídrico, que é o Rio Mauá, o que poderá provocar diversos impactos ambientais (SEMAS, 2013, p.6).

In addition to the application by air, producers inform in a Simplified Environmental Report (RAS, 2013), filed with SEMAS/PA, that the agricultural activity of rice uses the following pesticides:

> Fungicidas (Bin, flicur, priorin); Herbicidas- (clincher, gamit, ralder); Inseticidas – (arivo, mustang e talismã). As embalagens são armazenadas em locais próprios e posteriormente entregues em uma empresa especializada, localizada em Paragominas, para o dar o destino correto das embalagens (SEMAS/RAS, 2013, p. 45).

Thus, studies by Teles (2015) point out that several complaints from local riverside and quilombola communities concerned about their health issues led the Federal and State Public Prosecutor's Office to initiate civil inquiries and file civil actions against the enterprise.

Among the actions, the MPF civil inquiry stands out, which aimed to prevent the use of pesticides by air in rice crops, culminating in a precautionary sentence in April 2014 by the Federal Court in Pará, process 32727-30.2013.4.01.3900, in which the Federal Court of Justice decides:

> Almeja o MPF, em sede de antecipação dos efeitos da tutela: 1) que o requerido RENATO DE ALMEIDA QUARTIEIRO se abstenha de utilizar o lançamento aéreo de agrotóxicos na plantação de arroz situada na Fazenda Reunidas Espírito Santo até que estejam cumpridos os requisitos previstos na legislação [...] (JUSTIÇA FEDERAL NO PARÁ 9ª VARA, 2014, p. 01).
>
> Ante o exposto, defiro em parte o pedido de antecipação dos efeitos da tutela para determinar ao requerido RENATO DE ALMEIDA QUARTIEIRO que se abstenha de utilizar o lançamento aéreo de agrotóxicos na plantação de arroz situada na Fazenda Reunidas

> Espírito Santo até que estejam cumpridos os requisitos previstos na legislação {Decreto-Lei 917/69. Decreto 86.765/81 e IN MAPA 02/2008} (JUSTIÇA FEDERAL NO PARÁ 9ªVARA, 2014, p. 10).

The spraying of pesticides by air is allowed in Brazil as long as the requirements of the legislation in force are met, such as those contained in Decree-Law 917/69 and Decree 86.765/81 and Law 9605, therefore its use is the subject of controversy and controversies in the context of agricultural practices.

The reporter Machado (2008), in the book "*Um avião contorna o pé de jatobá e a nuvem de agrotóxico pousa na cidade: história da reportagem*", tells us about an accident that involved the use of aerial spraying in soybean plantations that reached the entire city of Lucas do Rio Verde in Mato Grosso in 2006, for the journalist:

> O "acidente" em Lucas está longe de ser um fato isolado. Nele encontrei ingredientes que atingem indistintamente do pequeno agricultor, que planta para a sobrevivência familiar, ao consumidor dos grandes centros urbanos, que se abastece nas prateleiras das grandes redes de supermercados, passando pela degradação do meio ambiente e pela degeneração da saúde humana provocadas pelo uso intensivo de tecnologias patrocinadas por megacorporações do setor de insumos agrícolas (MACHADO, 2008, p.16).

The author continues:

> Todos sabíamos que o uso indiscriminado de agrotóxicos por nossa agricultura é um fato. Mas pela primeira vez estávamos diante de um acidente de grandes proporções causado pelo veneno, afinal, toda uma cidade havia sido atingida. Aparentemente não havia morrido ninguém, mas o ocorrido poderia trazer à tona o debate que por muitos anos esteve escamoteado pelos lucros aferidos pelo agronegócio (MACHADO, 2008, p. 20).

Pignati *et al.* (2007) points out that what happened in Lucas do Rio Verde became known as an “extended rural accident” of an occupational and environmental nature, and that the risks of contamination went beyond the limits of the rural area, possibly having contaminated the air, water sources of water, soil, plants and the population of the city in which:

> Além de o agrotóxico ter colocado a comunidade em situação de risco à saúde no momento do acidente, supôs-se também que outros efeitos conhecidos e/ou imprevisíveis poderiam aparecer tardiamente, ultrapassando os limites temporais (PIGNATI *et al*., 2007, p. 106).

The issue of the temporal aspect of the consequences related to contact with pesticides is worrisome and may cause disease situations in humans in the short and long term and in their environments, as a means of social interactions, with changes in ecosystems and, consequently, in practices cultural livelihoods of traditional communities (LAGO, PÁDUA, 1993; TAMBELLINI, CÂMARA, 1998; AGUIAR, RIGOTTO, 2016).

Therefore, the quilombolas of the territory of Gurupá, which have the Arari River as an environment for their survival, question the irrigation of the river for rice monoculture crops, as they understand that the use of pesticides that have persisted for around a decade in the region , may be harming their lives, because, according to Barrigossi (2004), pesticides vary in terms of their presence in the environment, in which:

> Alguns se decompõem imediatamente após a sua aplicação e outros podem persistir por muito tempo no ambiente. Desta forma, os compostos que persistem por muito mais tempo no solo são mais prováveis de atingirem o reservatório subterrâneo do que os que se degradam mais rapidamente (BARRIGOSSI, 2004, p.6).

In this sense, these pesticide residues that remain longer in the soil, in addition to contaminating the drinking water of rivers, lakes and streams, are a threat to

aquatic organisms and wild animals, and mainly can contaminate the water table in the region (BARRIGOSSI, 2004; GASPARINI and VIEIRA, 2010).

The natural environment of the region is full of ecosystems that involve islands, floodplains, dense forests, nature fields, areas of upland land, swiddens, backyards and an immensity of wild animals (MIRANDA NETO, 2005, ACEVEDO MARIN and TELES, 2015; CABRAL , 2017), in these environments, the quilombola community develops its hunting, fishing, plant extraction and fruit gathering activities as a daily cultural practice.

Thus, alterations in tiny ecosystems, such as those that can fit in our hands, means messing with all the others, because there are no ecosystems isolated from each other (KLOETZEL, 2002; AMADOR artigo ecossistema, 2000; LAGO and PÁDUA, 1993).

It is also noteworthy that the Marajó archipelago has a seasonal climate of heavy rains with floods in the natural fields and severe droughts (MIRANDA NETO, 2005; CRUZ, 1987; IPEA, 2015), which can lead to the dispersion of pesticides to various water resources, mainly in periods of flooding of the natural grasslands.

> As chuvas e a irrigação também influenciam o movimento dos agrotóxicos. Movimentos de agrotóxicos são mais intensos quando a chuva ocorre logo após a sua aplicação. Tanto a água da chuva como a da irrigação removem os produtos da superfície das plantas para o solo, reduzindo a eficiência da aplicação e dificultando a decomposição do produto pela luz solar. Desta forma, em ambientes de alta pluviosidade, os agrotóxicos podem contaminar mais facilmente as fontes de água (BARRIGOSSI, 2004, p. 7).

In this sense, the practice of spraying pesticides by air in Marajó and the irrigation of the Arari River, may be responsible for changes in the local fauna and flora, as local communities have been denouncing, which would require constant monitoring by public agencies, so that care is taken as Alencar (2010) points out, avoid

spraying in the hottest hours of the day, against the wind and on days with strong winds and rainy days, mainly because the boundaries of the agricultural property are close to the urban expansion area and surrounded by other rural properties and traditional communities.

Aguiar and Rigotto (2016), draw attention to what has been happening in society where different segments of the national population, such as workers, rural and urban communities and food consumers, are, in different contexts, increasingly exposed to the risk of contamination by pesticides, thus:

> [...] estudos toxicológicos, clínicos e epidemiológicos apontam associações entre exposição a agrotóxicos e diferentes efeitos crônicos desses biocidas, como distúrbios endócrinos; efeitos sobre a reprodução; alterações imunológicas, que repercutem em cânceres; malformações congênitas; doenças neurológicas, hepáticas, renais; etc. (AGUIAR; RIGOTTO, 2016, p.50).

However, even with this scenario involving the use of pesticides, in 2018 the Federal Court in Pará suspended the precautionary measure that had embargoed since 2014 the practice of aerial spraying of rice monoculture in the fields of the municipality of Cachoeira do Arari, which according to residents of the region, the measure was no longer being violated by producers. The new decision, then from the Federal Court of Justice in the State of Pará, informs that the producers would be in compliance with the legal norms of aerial use.

> Às fls. 1.774 o requerido RENATO DE ALMEIDA QUARTIEIRO postulou a revogação da liminar deferida, uma vez que logrou obter registro perante o Ministério da Agricultura para o uso de defensivos agrícolas.
>
> Instado a se manifestar, o MPF opinou favoravelmente ao pleito, razão pela qual às fls. 1.820 este juízo houve por bem revogar a tutela anteriormente deferida (JUSTIÇA FEDERAL NO PARÁ 9ªVARA, 2018, p. 05).

Thus, the dilemma of the Quilombola community of Gurupá in living with the use of pesticides remains, which can cause subsequent health problems, from this perspective it cannot be said that the Quilombolas live in a perfect state of physical, mental and emotional well-being social, as the condition of being healthy is conceptualized by the World Health Organization (SEGRE; FERRAZ, 1997).

FINAL CONSIDERATIONS

The different definitions of health and the social situations of quilombola communities in the Amazon, which are mostly involved in agrarian and socio-environmental conflicts, such as Gurupá in Cachoeira do Arari, make us reflect on the different cultural, economic and social contexts that involve these communities.

In this way, reflecting on health and environment in quilombola communities affected by developmental projects that use pesticides in their activities, the need for their territorial rights to be guaranteed becomes more evident, in view of the historical fragility built since the slavery periods.

Therefore, quilombola communities that have in their environmental aspects, the direct relationship of the use of nature's resources as a way of survival, interferences in these environments by pesticides can cause several short and long term health damages.

In this sense, understanding that health does not mean the same thing for all people, we point out that the Quilombola community of Gurupá is immersed in a toxic socio-environmental health environment, which can influence their ways of life in their ancestral cultural practices, being necessary to public health monitoring policies in the region, as well as studies of environmental impacts.

REFERENCES

ACEVEDO MARIN, Rosa Elizabeth. ***"Terra de Gurupá e direitos territoriais de quilombolas do rio Gurupá e Arari".*** ANPUH: XXV Simpósio Nacional de História. Fortaleza, 2009. Disponível em: <http://www.snh2009.anpuh.org/simposio/public>. Acesso em: 10 jul. 2019.

ACEVEDO MARIN, Rosa Elizabeth. ***Quilombolas na ilha de Marajó: Território e organização política.*** In: DE GODOI, Emilia Pietrafesa; MENEZES, Marilda Aparecida de; ACEVEDO MARIN, Rosa Elizabeth (Orgs.) volume 1. SÃO PAULO: UNESP, 2009.

ACEVEDO MARIN, Rosa Elizabeth; RODRIGUES, Eliana Teles. ***Violências praticadas por autoridades civis e militares contra os quilombolas do rio Gurupá e Arari - município de Cachoeira do Arari 2008-2013***. Belém: UFPA, 2014.

ACEVEDO MARIN, Rosa Elizabeth [*et al.*]. ***Povos tradicionais no arquipélago do Marajó e políticas de ordenamento territorial e ambiental*.** Rio de Janeiro. Casa 8, 2015.

ALBUQUERQUE, Ulysses Paulino; PAIVA, Reinaldo F. de.; ALENCAR, Nélson L. ***Métodos e técnicas para coleta de dados etnobiológicos.*** ALBUQUERQUE, UP; LUCENA. RFP; CUNHA, LVFC Métodos na pesquisa etnobiológica e etnoecológica. Recife:NUPEEA, 2010, 559 p.

ALENCAR, José Adalberto de**. Normas gerais sobre o uso de agrotóxicos.** Sistemas de Produção, 1 – 2a. edição ISSN 1807-0027 Versão Eletrônica Agosto/2010. Disponível em: http://www.cpatsa.embrapa.br:8080/sistema_producao/spuva/agrotoxicos.html. Acesso em: 02 jan. 2020.

AMADOR, Denise Bittencourt. **Restauração de ecossistemas com sistemas agroflorestais. *Restauração de ecossistemas naturais***. Fundação de Estudos e Pesquisas Agrícolas e Florestais–FEPAF. São Paulo. Botucatu, 2003.

ALMEIDA, Roberto Moreira de. ***Sesmarias e terras devolutas***. *id/496890*, 2003. Disponível em: https://www2.senado.leg.br/bdsf/item/id/865. Acesso em: 31 dez. 2019.

ALMEIDA, Alfredo Wagner Berno de. ***Quilombolas e novas etnias***. *Manaus: UEA Edições*, 2011.

ALMEIDA, Alfredo Wagner Berno de. ***Territórios e territorialidades específicas na Amazônia: entre a "proteção" e o "protecionismo***". *Caderno CRH*, 2012, 25.64: 63-71.

BARDIN, Laurence. ***Análise de conteúdo***. São Paulo: Almeida Brasil, 2011.

BARRIGOSSI, José Alexandre Freitas; LANNA, Anna Cristina; FERREIRA, Evane. ***Agrotóxicos no cultivo do arroz no Brasil: análise do consumo e medidas para reduzir o impacto ambiental negativo***. *Embrapa Arroz e Feijão. Circular técnica*, 2004. Disponível em: <https://www.embrapa.br/documents/1344498/2767889/agrotoxicos-no-cultivo-do-arroz-no-brasil-analise-do-consumo-e-medidas-para-reduzir-o-impacto-ambiental-negativo.pdf/1d6c613a-41de-4795-880b-92c00118c1ba>. Acesso em: 05 jan. 2020.

BRASIL. Justiça Federal Seção Judiciária no Pará, 9ª Vara. ***Decisão Liminar 2014, Processo 32727-30.2013.4.01.3900.*** Disponível em: http://www.prpa.mpf.mp.br/news/2014/arquivos/Decisao_liminar_caso_Quartiero_Marajo.pdf. Acesso em: 29 abr. de 2019.

BRASIL. ***Justiça Federal Seção Judiciária no Pará, 9ª Vara. Sentença Judicial 2018, Processo 32727-30.2013.4.01.3900***. Disponível em: https://www.universojus.com.br/sentenca-determina-estudos-de-impacto-HYPERLINK "https://www.universojus.com.br/sentenca-determina-estudos-de-impacto-ambiental-pa. Acesso em: 10 jun. 2019.

BRASIL. ***Lei nº 7.802, de 11 de JULHO DE 1989***. Disponível em: https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra;jsessionid=614EC16F7D8D7AE269B05055528F1B7D.proposicoesWebExterno1?codteor=356265. Acesso em: 02 jan.2020.

BRASIL. ***Decreto, nº 4.074, DE 4 DE JANEIRO DE 2002***.Disponível em: http://www.agricultura.gov.br/assuntos/insumos-agropecuarios/insumos-agricolas/agrotoxicos/legislacao/arquivos-de-legislacao/decreto-4074-2002-decreto-dos-agrotoxicos. Acesso em: 02 jan. 2020.

BRASIL. ***Fundação cultural Palmares:Certificação Quilombola.*** Braslia, DF, 2019. Disponível em: http://www.palmares.gov.br/?page_id=37551. Acesso em: 16 jan. 2020.

BRANDÃO, Carlos Rodrigues. ***Reflexões sobre como fazer trabalho de campo.*** *Sociedade e cultura*, 2007, 10.1: 11-27.

CABRAL, Cleiton Lopes. ***Conflitos territoriais na comunidade quilombola de Gurupá – APA Arquipélago do Marajó/PA***, 277 p., 297 mm, (UnB-Departamento

de Geografia, Doutorado, Geografia, 2017). Tese de Doutorado – Universidade de Brasília. Departamento de Geografia. Disponível em: <http://catalogodeteses.capes.gov.br/catalogo-teses/#!/> Acesso em: 22 de out de 2018.

CELESTINO, Edmir Amanajás. ***Etnografia do Conflito Falado: O discurso de agentes sociais sobre o conflito vivido e falado em Cachoeira do Arari, arquipélago do Marajó, PA.*** Dissertação de Mestrado. Belém, PA. 2015**.** Orientadora: Profª. Drª. Rosa Elizabeth Acevedo Marin. Mestre em Antropologia pelo Programa de Pós-Graduação em Antropologia da Universidade Federal do Pará.

CORNÉLIO, Vanda Maria de.; CARVALHO, Vicente Luiz de.; PRABHU, Anne Sitarama. ***Doenças do arroz.*** Revista ALICE, 2004. Belo Horizonte, v. 25, n. 222, p. 84-92, 2004. Disponível em: https://www.alice.cnptia.embrapa.br/handle/doc/212773. Acesso em: 26 mai. 2019.

CRUZ, Miguel Evangelista Miranda da. ***Marajó Essa Imensidão de Ilha.*** São Paulo: M.E.M. Cruz, 1987.

DIEGUES, Antônio Carlos; ARRUDA, Rinaldo Sérgio Vieira (Orgs.). **Os saberes tradicionais e a Biodiversidade no Brasil*.*** São Paulo: NUPAUB-USP: MMA, 2000.

BRASIL. ***Decreto, nº 4.074, DE 4 DE JANEIRO DE 2002***.Disponível em: http://www.agricultura.gov.br/assuntos/insumos-agropecuarios/insumos-agricolas/agrotoxicos/legislacao/arquivos-de-legislacao/decreto-4074-2002-decreto-dos-agrotoxicos. Acesso em: 02 jan. 2020.

FLICK, U**. Introdução a pesquisa qualitativa.** Tradução Joice Elias Costa. 3ª ed. dados eletrônicos. Porto Alegre. Artmed. 2016.

GASPARINI, Marina Favrim; VIEIRA, Paulo Freire. ***A (in) visibilidade social da poluição por agrotóxicos nas práticas de rizicultura irrigada: síntese de um estudo de percepção de risco em comunidades sediadas na zona costeira de Santa Catarina***. Desenvolvimento e Meio Ambiente, v. 21, p.115-127. Editora UFPR, 2010. Disponível em: https://revistas.ufpr.br/made/article/view/15424. Acesso em 13 jun. 2019.

GONÇALVES, Carlos Walter Porto. ***Os (des)caminhos do meio ambiente.*** Editora Contexto, 2011.

GIL, Antônio Carlos. **Métodos e técnicas de pesquisa social** (p. 113). São Paulo: Atlas, 1994.

GUEDES, André Dumans. ***Lutas por terra e lutas por território nas ciências sociais brasileiras: fronteiras, conflitos e movimentos*.** In: ACSELRAD, Henri (org.). ***Cartografia Social.*** Rio de Janeiro: IPPUR/UFRJ, 2013.

MEIRELLES, Ruver Seabra; Da Silva, Christian Nunes. ***Ordenamento territorial e os reflexos da rizicultura em Cachoeira do Arari*** (Marajó-Brasil). Belém: *Geografares*, 2014, 21: 219- 255.

KLOETZEL, Kurt. ***O que é meio ambiente***. São Paulo. Brasiliense, 2002.

LAGO, Antônio; PÁDUA, José Augusto. ***O que é ecologia***. Brasiliense, 1993.

LEFF, Enrique. ***Epistemologia Ambiental***. 4. ed. São Paulo: Cortez, 2007.

LEFF, Enrique. ***Ecologia, capital e cultura: a territorialização da racionalidade ambiental***. Petrópolis: Editora Vozes, 2018.

LOPES, Carla Vanessa Alves; ALBUQUERQUE, Guilherme Souza Cavalcanti de. ***Agrotóxicos e seus impactos na saúde humana e ambiental: uma revisão sistemática.*** *Saúde em Debate*, 2018, 42: 518-534.

MACHADO, Paulo. ***Um avião contorna o pé de jatobá e a nuvem de agrotóxico pousa na cidade: história da reportagem***. Brasília: Anvisa, 2008. 278p. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/aviao_jatoba_agrotoxico_cidade_reportagem.pdf. Acesso em: 02 jan. 2020.

MARTINS, Tiago F. R. de Oliveira. ***TERRITORIALIZAÇÃO ÉTNICA: SUSTENTABILIDADE, DESENVOLVIMENTO E A EFETIVAÇÃO DA CIDADANIA PLURAL DOS QUILOMBOLAS.*** Pós-Graduação em Direito do Centro Universitário do Pará (CESUPA)**.** Mestre em Direito, Políticas Públicas e Desenvolvimento Regional. Orientadora: Profa. Dra. Eliane Cristina Pinto Moreira. BELÉM-PA, 2014.

MEIRELLES, Ruver Seabra; Da Silva, Christian Nunes. ***Ordenamento territorial e os reflexos da rizicultura em Cachoeira do Arari*** (Marajó-Brasil). Belém: *Geografares*, 2014, 21: 219- 255.

MIRANDA NETO, Manoel José de. ***Marajó: desafio da Amazônia.*** Belém: EDUFPA, 2005.

NAZARE, Mailson Lima; DO NASCIMENTO, Paula Mayara Rodrigues; PENHA, Rafael Santos. ***GRANDES PROJETOS EM BARCARENA-PA: IMPACTOS SOCIOAMBIENTAIS CAUSADOS PELAS ATIVIDADES DA HYDRO ALUNORTE.*** *Revista do Instituto Histórico e Geográfico do Pará*, v. 5, n. 02, 2018

PARÁ***. Após ação do MPPA, justiça anula matrícula de imóvel: Promotoria Agrária apurou que não há comprovação de propriedade da área pelo suposto dono Renato Quartieiro Texto***: Ascom MPPA, agosto 2019. Cachoeira do Arari 07/08/19 16:16. Disponível em: https://www2.mppa.mp.br/noticias/apos-acao-do-mppa-justica-anula-matricula-de-imovel-rural.htm. Acesso em: 01 jan. 2020.

PIGNATI, Wanderlei Antonio; MACHADO, Jorge MH; CABRAL, James F. ***Acidente rural ampliado: o caso das" chuvas" de agrotóxicos sobre a cidade de Lucas do Rio Verde-MT.*** *Ciência & Saúde Coletiva*, 2007, 12: 105-114. Disponível em: https://www.scielosp.org/pdf/csc/2007.v12n1/105-114/pt. Acesso em: 02 jan. 2020.

Pará. ***Processo: 0000403-42.2018.8.14.0011***. Disponível em: https://consultas.tjpa.jus.br/consultaprocessoportal/consulta/principal. Acesso em: 05 jan.2020.

Pará. ***Processo: 0000403-42.2018.8.14.0011***. Disponível em: https://consultas.tjpa.jus.br/consultaprocessoportal/consulta/principal. Acesso em: 05 jan.2020.

PARÁ. SEMAS. ***Relatório Ambiental Simplificado, RAS.*** Norte Geo 2013. (OLIVEIRA, Cleber de Souza, responsável técnico): In Processo Punitivo nº16951, SEMA/PA. p.43-51 ano 2013. Disponível em: http://monitoramento.semas.pa.gov.br/simlam/index.htm. Acesso: em 05 de jun. de 2019.

RIGOTTO, Raquel Maria; AGUIAR, Ada Cristina Pontes***. Invisibilidade ou invisibilização dos efeitos crônicos dos agrotóxicos à saúde? Desafios à ciência e às políticas públicas:*** IPT, 2016.

SALLES, Vicente. ***O negro no Pará sob o regime da escravidão*****.** Belém: Instituto de Artes do Pará; Programa Raízes, 2005.

SANTOS, Thaís Aparecida Coelho; BARROS, Flávio Bezerra***. "O povo está esparramado...": o processo de desterritorialização vivenciado pelos quilombolas da Bocaina, Mato Grosso***. *Estudos Sociedade e Agricultura*, 2016.

SEGRE, Marco; FERRAZ, Flávio Carvalho. ***O conceito de saúde.*** 1997.

TAMBELLINI, Anamaria Testa; CÂMARA, Volney de Magalhães. ***A temática saúde e ambiente no processo de desenvolvimento do campo da saúde coletiva: aspectos históricos, conceituais e metodológicos***. *Ciência & Saúde Coletiva*, 1998, 3: 47-59.

VIANNA, Catarina Morawska. Seguindo as trilhas do gado e do arroz na Raposa Serra do Sol: conexões transnacionais no embate entre a pecuária indígena e a rizicultura corporativa. *In*: V Reunião de Antropologia da Ciência e Tecnologia - ReACT, 2015, Porto Alegre. ***Anais de Trabalhos Completos.*** Campinas: Unicamp, v. 2, n. 2, 2015. Disponível em: https://ocs.ige.unicamp.br/ojs/react/issue/view/70. Acesso em: 08 dez. 2019.

APPENDIX - FOOTNOTE

11. Ministério da Agricultura, Pecuária e Abastecimento (MAPA).

12. Secretaria de Estado de Meio Ambiente no Pará (SEMAS).

13. Licença para Atividade Rural (LAR).

14. Cadastro Ambiental Rural (CAR).

15. Autorização de Funcionamento da Atividade Rural (AFAR).

Submitted: March, 2022.

Approved: March, 2022.

[1] Master in Anthropic Studies in the Amazon – PPGEAA/UFPA.
[2] Master in Anthropogenic Studies in the Amazon – (PPGEAA/UFPA) and Researcher – Grupo de Pesquisa em Saúde, Sociedade e Ambiente (GPSSA/UFPA).
[3] PhD in Tropical Diseases. Professor at the Universidade do Estado do Pará. (PA), Brazil.
[4] PhD in Theory and Research of Behavior. Professor and Researcher at the Federal Institute of Amapá – IFAP.
[5] Master's student in Anthropic Studies in the Amazon - PPGEAA/UFPA.
[6] Master in Anthropic Studies in the Amazon – PPGEAA/UFPA.
[7] PhD in Tropical Diseases. Professor and Researcher at the Universidade Federal do Amapá, AP. Collaborating Researcher at the Nucleus of Tropical Medicine at UFPA (NMT-UFPA).
[8] PhD in Psychology and Clinical Psychoanalysis. Ongoing PhD in Communication and Semiotics at the Pontifícia Universidade Católica de São Paulo (PUC/SP) . Master's Degree in Religious Sciences from Universidade Presbiteriana Mackenzie. Master in Clinical Psychoanalysis. Degree in Biological Sciences. Degree in Theology. He has been working with Scientific Methodology (Research Method) for more than 15 years in the Guidance of Scientific Production of Master's and Doctoral Students. Specialist in Market Research and Health Research. ORCID: 0000-0003-2952-4337.
[9] PhD in Aquatic Ecology and Fisheries by UFPA. Lecturer and Researcher at the Universidade Federal do Pará – UFPA.

[10] PhD in Medicine/Tropical Diseases. Lecturer and Researcher at the Universidade Federal do Pará – UFPA. Collaborating Researcher at the Núcleo de Medicina Tropical – NMT/UFPA, Belém (PA), Brazil.