

**UNIVERSIDADE FEDERAL DE VIÇOSA**

**Certificação da Palma de Óleo: avaliando a sustentabilidade socioambiental e identificando limites e oportunidades**

Bianca Diniz da Rocha  
*Doctor Scientiae*

**VIÇOSA - MINAS GERAIS  
2025**

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Tese apresentada à Universidade Federal de Viçosa, como parte das exigências do Programa de Pós-Graduação em Extensão Rural, para obtenção do título de *Doctor Scientiae*.

Orientador: Jose A. Ferreira Neto

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## RESUMO

ROCHA, Bianca Diniz da, D.Sc., Universidade Federal de Viçosa, julho de 2025. **Certificação da Palma de Óleo: avaliando a sustentabilidade socioambiental e identificando limites e oportunidades.** Orientador: Jose Ambrosio Ferreira Neto.

A busca pelo desenvolvimento sustentável na produção de commodities agrícolas exige a adoção de padrões de sustentabilidade. Entre os mecanismos mais proeminentes, destacam-se as certificações, que têm se consolidado como instrumentos de mercado cada vez mais relevantes, acompanhando a expansão dos “mercados sustentáveis”. A palma de óleo, conhecida por sua alta produtividade e versatilidade, tem na certificação Roundtable on Sustainable Palm Oil (RSPO), criada em 2004, o principal padrão global, que, embora represente um avanço, adota o princípio do “compromisso progressivo”, permitindo melhorias graduais. Esta tese avalia como a certificação RSPO pode contribuir para a sustentabilidade socioambiental nos plantios de palma de óleo. A pesquisa está estruturada em quatro artigos científicos que abordam o contexto brasileiro e global, desenvolvidos através de uma abordagem metodológica integrada baseada em análise estatística e de conteúdo com dados secundários e pesquisa de campo, além do apoio do software NVivo (versão 12.2) para análise qualitativa. Os resultados indicam que a certificação RSPO promove práticas socioambientais mais responsáveis e impulsiona avanços regulatórios e operacionais significativos, embora persistam desafios relacionados à transparência, à qualidade das auditorias e ao engajamento das partes interessadas locais. No Brasil, especificamente no estado do Pará, observaram-se efeitos positivos na geração de emprego e renda, contrastados por desafios de regularização fundiária e participação social. No contexto global, as análises apontaram diferenças marcantes: unidades latino-americanas registraram mais “não conformidades”, sobretudo em direitos trabalhistas, enquanto na Ásia os principais problemas envolveram governança e transparência. Por fim, o estudo conclui que, além da adoção de padrões internacionais, é fundamental levar em conta os contextos territoriais e políticos que influenciam a aplicação desses padrões, por isso a efetividade das iniciativas de sustentabilidade depende diretamente de fatores institucionais e do alinhamento com políticas públicas regionais, que podem ampliar ou limitar seus impactos socioambientais.

Palavras-chave: governança territorial; Amazônia paraense; sustentabilidade; certificação RSPO; óleo de palma

## ABSTRACT

ROCHA, Bianca Diniz da, D.Sc., Universidade Federal de Viçosa, July, 2025. **Oil Palm Certification: evaluating socio-environmental sustainability and identifying limits and opportunities.** Adviser: Jose Ambrosio Ferreira Neto.

The pursuit of sustainable development in the production of agricultural commodities requires the adoption of sustainability standards. Among the most prominent mechanisms are certifications, which have established themselves as increasingly relevant market instruments, accompanying the expansion of "sustainable markets." Oil palm, known for its high productivity and versatility, has the Roundtable on Sustainable Palm Oil (RSPO) certification, created in 2004, as the main global standard. While representing progress, it adopts the principle of "progressive commitment," allowing for gradual improvements. This thesis evaluates how RSPO certification can contribute to socio-environmental sustainability in oil palm plantations. The research is structured around four scientific articles addressing the Brazilian and global context, developed through an integrated methodological approach based on statistical and content analysis with secondary data and field research, in addition to the support of NVivo software (version 12.2) for qualitative analysis. The results indicate that RSPO certification promotes more responsible socio-environmental practices and drives significant regulatory and operational advances, although challenges remain related to transparency, audit quality, and local stakeholder engagement. In Brazil, specifically in the state of Pará, positive effects on job and income generation were observed, contrasted by challenges in land regularization and social participation. In the global context, the analyses revealed striking differences: Latin American units recorded more "non-compliances," especially in labor rights, while in Asia, the main problems involved governance and transparency. Finally, the study concludes that, in addition to adopting international standards, it is essential to consider the territorial and political contexts that influence the application of these standards. Therefore, the effectiveness of sustainability initiatives depends directly on institutional factors and alignment with regional public policies, which can amplify or limit their socio-environmental impacts.

Keywords: territorial governance; Amazon region of Pará; sustainability; RSPO certification; palm oil

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## 1 Introdução geral

A busca pelo desenvolvimento sustentável na produção de *commodities* agrícolas requer a implementação de padrões de sustentabilidade nas cadeias globais de suprimento, manifestando-se por meio de várias estratégias, entre elas os compromissos corporativos e a adoção de padrões de certificação socioambiental, que se destacam entre os mais avançados esforços de empresas de produtos, como a soja, óleo de palma<sup>1</sup> e o café (Statista, 2021; Bishop; Carlson, 2022; Thorning; Mark Herbert, 2022).

As certificações desempenham um papel fundamental na melhoria dos processos, produtos e serviços das organizações, permitindo sua consolidação e reconhecimento em níveis nacional e internacional. Essas normas incorporam princípios, critérios e indicadores com o objetivo principal de promover: a produção sustentável, sistemas de rastreabilidade, boas práticas agrícolas, o aprimoramento da gestão de recursos naturais, a redução dos impactos sociais e a conformidade com as regulamentações vigentes (Hutabarat et al., 2018; Sanquetta; Mildemberg; Dias, 2022)

Entre os sistemas de certificação com foco em gestão mais antigos temos a da *International Organization for Standardization* (ISO), publicado pela primeira vez em 1987, que estabelece normas abrangendo uma ampla gama de áreas, como gestão da qualidade, gestão ambiental, segurança da informação, entre outras. A certificação ISO demonstra o compromisso de uma organização com a excelência em práticas e processos, o que pode aumentar a confiança de clientes e parceiros comerciais (Kaur et al., 2021; Camilleri, 2022).

No setor florestal, o sistema de certificação globalmente reconhecido é o *Forest Stewardship Council* (FSC), fundado em 1993 por iniciativa de organizações não governamentais ambientais (ONGs), partes interessadas sociais e empresas do setor, em resposta à ausência de um acordo internacional para combater o desmatamento, evidenciada durante a Cúpula da Terra, realizada no Rio de Janeiro em 1992. O FSC é gerido por meio de um sistema tripartite baseado na participação voluntária das partes interessadas, onde as organizações-membro são divididas em câmaras ambientais, sociais e econômicas, que têm igual poder de decisão (Lehtonen et al., 2021; FSC, 2023).

Embora a certificação seja apenas uma das diversas medidas para assegurar e demonstrar a sustentabilidade no processo de produção, ela continua sendo um dos mecanismos mais proeminentes e internacionalmente reconhecidos. Nesse contexto, este mecanismo voltado para o mercado tem sido cada vez mais aplicado no âmbito do setor agrícola, acompanhado de

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<sup>1</sup> Nesta tese, adota-se o termo “óleo de palma” para se referir ao produto extraído da planta, enquanto “palma de óleo” é utilizado para designar a cultura oleaginosa (*Elaeis guineensis* e variedades).

um constante crescimento dos "mercados sustentáveis" nos últimos anos (Schleifer; Sun, 2020; Pacheco et al., 2020).

O cultivo da palma de óleo apresenta uma dinâmica importante, em decorrência do seu valor, facilidade no cultivo e versatilidade de uso, desde produtos alimentícios, como o pão e a manteiga até a indústria de cosméticos, shampoos e cremes dentais, sendo o óleo vegetal mais consumido do mundo (WWF, 2022). Desde o ano 2000, a produção de óleo de palma aumentou em mais de três vezes, e estima-se que serão necessários mais 36 milhões de hectares de terra, até o ano de 2050, para suprir a demanda projetada (Pye, 2019; Meijaard et al., 2020; Majid et al., 2021).

A *Roundtable on Sustainable Palm Oil* (RSPO) destaca-se como uma das iniciativas de certificação mais proeminentes na cadeia produtiva do óleo de palma, representando um padrão global de sustentabilidade abrangendo óleos comestíveis, com o propósito de fomentar o crescimento e a utilização de produtos sustentáveis de óleo de palma por meio de padrões internacionais. Os membros certificados pela RSPO aderem a um conjunto de "princípios e critérios" que abordam de maneira explícita os impactos ambientais e sociais associados à produção (RSPO, 2020; Pacheco et al., 2020; Majid et al., 2021).

Embora a RSPO tenha representado um marco significativo na indústria, é necessário reconhecer que se trata de uma certificação baseada no princípio do "compromisso progressivo", ou seja, que admite a adoção gradual de melhorias. Em contraste, outras certificações, como a *Fair Trade* ou as certificações orgânicas, frequentemente impõem critérios mais rigorosos e adotam uma abordagem mais abrangente em relação à sustentabilidade, contemplando não apenas as práticas agrícolas, mas também aspectos sociais e ambientais de forma mais integrada (Heilmayr; Carlson; Benedict, 2021; Aziz; Chamhuri; Batt, 2021).

Este amplo debate sobre certificação orienta a construção desta tese, trazendo como questão a ser respondida: "*como os sistemas de certificação contribuem para promover a sustentabilidade socioambiental nos plantios da palma de óleo?*". Essa pergunta central guiará a pesquisa e a análise, buscando entender o impacto, os desafios e as oportunidades que os sistemas de certificação oferecem no contexto específico do cultivo da palma de óleo, tanto no Brasil como globalmente, sendo um tema que desempenha um papel fundamental na interseção entre o desenvolvimento econômico e a sustentabilidade.

## 2 Objetivos

Avaliar como o sistema de certificação *Roundtable on Sustainable Palm Oil* (RSPO) pode contribuir para promover a sustentabilidade socioambiental nos plantios da espécie da palma de óleo. Assim, o estudo está setorizado com o delineamento de cinco objetivos específicos:

- (i) Analisar a contribuição da certificação RSPO para a promoção da sustentabilidade socioambiental em plantios de palma de óleo, com foco em indicadores como conservação da biodiversidade, adoção de boas práticas agrícolas e mitigação dos impactos sociais e ambientais;
- (ii) Analisar a evolução do setor de óleo de palma no Estado do Pará e diagnosticar suas possíveis contribuições, com ênfase nos impactos socioeconômicos para a região;
- (iii) Analisar as relações entre as empresas produtoras de palma de óleo e os moradores dos principais municípios produtores no Estado do Pará, considerando aspectos sociais, econômicos, eventuais conflitos e os mecanismos de diálogo;
- (iv) Identificar limites e possibilidades na implementação de sistemas de certificação em plantios da palma de óleo no Estado do Pará; e
- (v) Realizar uma análise comparativa dos processos de certificação RSPO em países selecionados da América Latina e da Ásia, com foco em suas particularidades regionais, desafios e padrões de conformidade.

## 3 Contextualização

A seguir, aborda-se de forma abrangente a implantação e expansão da palma de óleo, enfatizando os diversos aspectos socioambientais que permeiam seu cultivo em larga escala. Inicialmente, será apresentado as principais características botânicas e morfológicas da espécie, fundamentais para a compreensão de sua adaptação e manejo agrônomo. Em seguida, será traçado um panorama histórico da disseminação global da palma de óleo, desde suas origens na África Ocidental até sua introdução e consolidação como uma das principais culturas oleaginosas tropicais, com destaque para o processo de inserção e expansão na região da Amazônia Paraense.

Neste contexto, serão analisados os vetores econômicos, políticos e institucionais que impulsionaram a instalação de grandes projetos agroindustriais, bem como os impactos territoriais associados à dinâmica de uso e ocupação do solo. A discussão se aprofundará nas implicações sociais e ambientais dessa expansão, abordando questões como o acesso à terra, o

deslocamento de populações locais, os efeitos sobre os modos de vida tradicionais, a pressão sobre ecossistemas nativos e a biodiversidade, além das condições de trabalho nas áreas produtivas.

Por fim, será discutido o papel dos sistemas de certificação socioambiental, como a RSPO, e sua capacidade de mitigar os impactos negativos e promover práticas sustentáveis no setor. Serão avaliados como esses mecanismos têm sido efetivos na indução de melhorias socioambientais nos territórios de expansão da palma de óleo, especialmente no contexto amazônico, e quais são seus limites e potencialidades para garantir um modelo de desenvolvimento rural mais justo socialmente, economicamente e ambientalmente.

### 3.1 Caracterização botânica-morfológica da palma de óleo

A palma de óleo ou dendezeiro é uma espécie de palmeira pertencente ao grupo das monocotiledôneas, da família botânica Arecaceae e subfamília Arecoideae. Esse gênero, chamado *Elaeis*, compreende duas espécies proeminentes: *Elaeis guineensis*, natural da África, e *Elaeis oleífera*, que encontra suas raízes no continente americano (Barcelos et al., 2015; Corley; Tinker, 2016). Atualmente esse gênero emerge como o óleo vegetal mais produzido, consumido e comercializado no mundo (BRASIL, 2013; Statista, 2021).

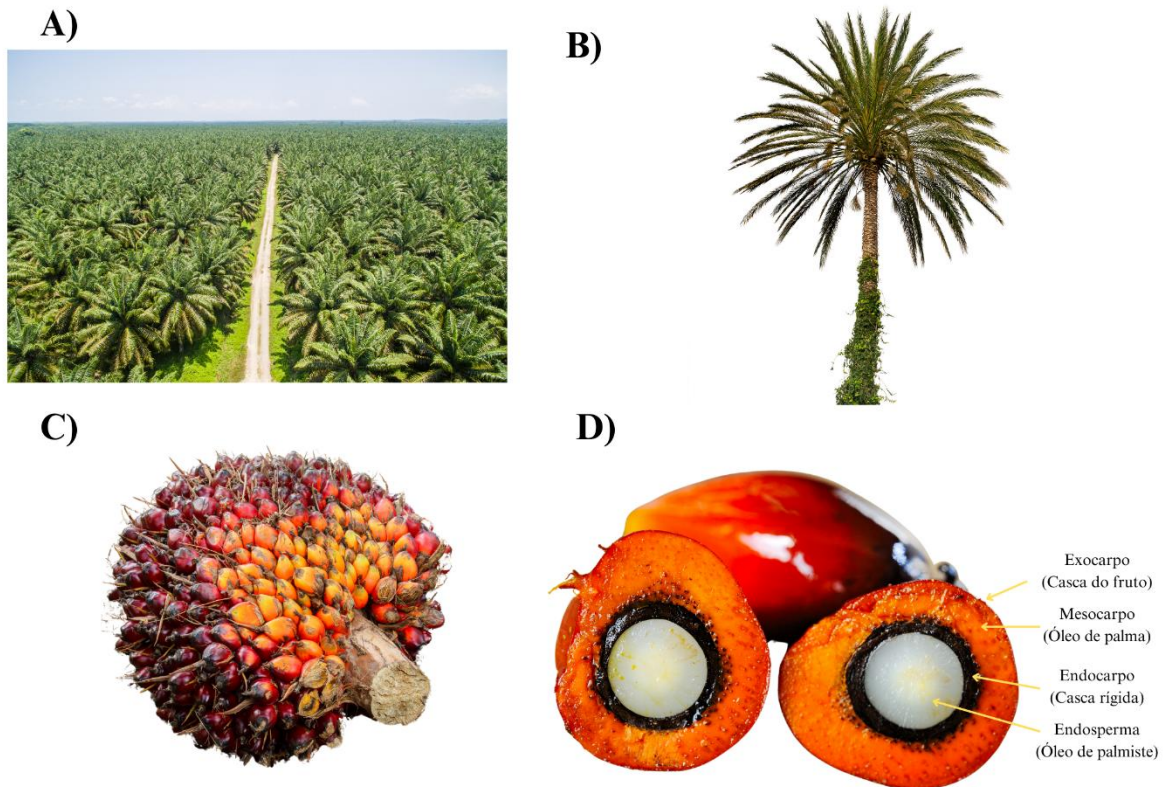
A espécie é normalmente monóica com inflorescências femininas e masculinas dispostas separadamente na planta, mas, às vezes mista. Possui fecundação cruzada, responsável por maior variabilidade genética na planta e seus ciclos de florescimento têm duração variável e dependem da idade, fatores ecológicos, tratos culturais e fatores genéticos da planta (Cunha et al., 2007; Corley; Tinker, 2016).

O sistema radicular é do tipo fasciculado que tem, como principal característica, as raízes dispostas em todas as direções no solo, de modo mais superficial. Tal sistema é formado, a partir do bulbo radicular, localizado na base do estipe (Lody, 2009; Corley; Tinker, 2016). Na palma de óleo, milhares de raízes maduras primárias espalham-se, a partir do tronco, com as novas primárias, substituindo continuamente as raízes mortas (Borges; Collicchio; Campos, 2016).

O fruto é uma drupa séssil, que tem formato esférico e alongado, com uma protuberância no topo, seu comprimento pode variar de 2 a 5 centímetros e seu peso de 3 a 30 gramas (Figura 01). Quando o fruto é cortado, é possível visualizar quatro componentes: o exocarpo ou epicarpo, que é a casca do fruto; o mesocarpo, que tem coloração amarela ou alaranjada, sendo

a parte de onde o óleo é extraído; o endocarpo, que é muito duro, de cor negra e envolvido por fibras; e o endosperma, que tem formato ovóide e ocupa o endocarpo (Silva, 2006).

Figura 01: Detalhes da Palma de óleo: a) plantio em monocultivo; b) árvore *Elaeis spp.*; c) cacho da palma de óleo; e d) detalhes do fruto. Fonte: Elaborado pela autora com imagens do sistema de informação sobre biodiversidade brasileira (SIBBr).



A produção da espécie inicia com baixos níveis de produtividade e no terceiro ano de cultivo atinge um aumento progressivo que se estende até o sétimo ano, quando atinge o platô de produção. O cacho é formado por diversos frutos, o principal subproduto é o óleo de palma, retirado da polpa ou mesocarpo e o óleo de palmiste, obtido da amêndoa ou endosperma (Simas; Camargo Penteado, 2019).

O rendimento de um hectare de palma de óleo gera cerca de cinco toneladas de óleo por ano, contra 700 quilos com a mesma área de mamona e 500 quilos no caso da soja, o que a torna uma das culturas oleaginosas mais produtivas do mundo, para efeito de comparação, a produção de óleo de soja pode demandar até oito vezes mais terra e quatro vezes mais energia para gerar a mesma quantidade de óleo (Silva et al., 2016; MAPA, 2018). É importante destacar que esses valores podem variar conforme os materiais genéticos utilizados, os sistemas de

produção adotados, as condições climáticas e do solo, bem como o grau de eficiência da polinização.

Assim, a produção dessa cultura pode resultar em emissões reduzidas de gases de efeito estufa (GEEs), menor desmatamento, preservação da biodiversidade e maiores rendimentos em comparação com a produção de outros óleos vegetais (Wassmann; Siegrist; Hartmann, 2023). Como consequência dessas vantagens, a demanda por esse óleo aumentou oito vezes ao longo das últimas décadas e continua a mostrar tendências de crescimento. Atualmente, a produção está consolidada em cerca de 80 milhões de toneladas, com a Indonésia e a Malásia liderando como os principais produtores (USDA, 2022).

Devido a sua versatilidade, o óleo de palma desempenha papel importante como ingrediente em diversas indústrias, desde a produção de cosmética e têxtil (utilizado no processo de produção, como lubrificante ou agente de amaciamento), ao uso como biodiesel e na indústria farmacêutica (formulação de medicamentos) e alimentícia (margarina, óleos de cozinha e produtos de panificação), sendo esta última a principal, com demanda de 71% da produção global (MAPA, 2018; Gesteiro et al., 2019).

A proeminência na indústria alimentícia decorre de sua capacidade em substituir a gordura hidrogenada<sup>2</sup>, ao mesmo tempo em que se destaca por não conter gorduras trans<sup>3</sup>. Além disso, este óleo é rico em vitaminas A e E, frequentemente recomendado como valioso suplemento nutricional para comunidades de baixa renda (MAPA, 2018). Do processamento dos frutos da palma de óleo são obtidos alguns subprodutos nas seguintes proporções: torta de palmiste (3,5%), engaços (22%), fibras (12%), cascas (5%) e efluentes líquidos (50%) (Furlan, 2006; MAPA, 2018).

Ademais, a extração do óleo de palma requer grande volume de matéria-prima e cuidados rigorosos com a qualidade do fruto, uma vez que sua elevada umidade favorece a rápida degradação e o aumento da acidez do óleo. Por esse motivo, é fundamental que o cultivo da palma seja realizado próximo às unidades de processamento, a fim de garantir a extração imediata e preservar a qualidade final do produto (Franzini et al. 2020; Wassmann; Siegrist; Hartmann, 2023).

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<sup>2</sup> A gordura hidrogenada é criada através do processo de hidrogenação, no qual hidrogênio é adicionado a óleos vegetais insaturados para torná-los mais sólidos à temperatura ambiente, e, portanto, podem ter impactos negativos na saúde cardiovascular (Borges et al., 2022).

<sup>3</sup> A gordura trans é uma categoria específica de gordura que pode ocorrer naturalmente em pequenas quantidades em alguns alimentos, mas também é criada durante o processo de hidrogenação, são consideradas particularmente prejudiciais à saúde (Quilaqueo et al., 2022).

Entre os aspectos fisiológicos, o estresse hídrico provoca efeitos marcantes na cultura, sendo que, a cada 100 mm de déficit hídrico, pode-se observar uma redução na produtividade de 10 a 20%. Por outro lado, em situações de excesso de chuvas, a cultura pode ser prejudicada pela dificuldade de operação no campo, o que também favorece a erosão e reduz a eficiência da adubação devido à lixiviação dos nutrientes (Corley; Tinker, 2016; Rhebergen et al., 2016).

Nesse contexto, a produtividade está intrinsecamente ligada a condições climáticas específicas e, por isso, ela se desenvolve melhor em regiões tropicais úmidas, como o Brasil (MAPA, 2018). Quando as condições climáticas são favoráveis, esta cultura apresenta elevada produtividade em solos com alta fertilidade natural, contudo, pode ser cultivada, com bons resultados econômicos, em solos pobres e ácidos, desde que seja feita a nutrição adequada das plantas (Wassmann; Siegrist; Hartmann, 2023).

### *3.2 Cultivo da palma de óleo: perspectivas globais e a certificação*

A palma de óleo é um recente caso de sucesso agrícola, especialmente do sudeste asiático, embora fosse amplamente conhecido e comercializado durante a revolução industrial europeia, só se tornou uma cultura importante no século XX. Isto deve-se a uma vasta gama de aplicações na indústria alimentícia e a sua produtividade com rendimentos atualmente quatro vezes superior aos dos estabelecimentos de plantações na década de 1920 (Mayes, 2020; Chew et al., 2021).

A espécie é nativa das regiões tropicais e subtropicais do oeste da África e sua expansão em cultivo ocorreu durante o período colonial, desempenhando um papel significativo como produto de exportação para as potências coloniais europeias, especialmente a Grã-Bretanha. Em seguida, suas sementes foram disseminadas em várias partes do mundo, resultando na expansão dos cultivos para diversas regiões do globo, abrangendo países da Ásia, América Latina e outras áreas tropicais e subtropicais (Meijaard et al., 2020; Lusiana et al., 2023).

Durante as décadas de 1960 e 1970, foi levada para o sudeste asiático, com destaque para a Malásia e a Indonésia, no qual sua introdução ocorreu, principalmente para fins ornamentais, mas, posteriormente, seu cultivo se expandiu em plantações comerciais. Essa expansão marcou o início do desenvolvimento das plantações e da indústria da palma de óleo na Ásia, que atualmente lidera a produção global da espécie (Zheng; Abu, 2019).

Ainda em 1960, o governo da Malásia implementou um programa de diversificação agrícola que desencadeou o crescimento das plantações no país, concebido para reduzir a dependência econômica da nação em relação ao estanho e à borracha natural que estava

entrando em declínio. Além disso, visava combater a pobreza entre os sem-terra e pequenos proprietários de terras, como parte desse esforço, o governo introduziu esquemas de assentamento de terras para o cultivo da palma de óleo na mesma década (Mahat, 2012; Zheng; Abu, 2019).

Em 1966, a Malásia conquistou a posição de principal exportadora mundial de óleo de palma bruto, consolidando-se como um centro para o processamento avançado, uma vez que essa atividade demonstrou ser mais lucrativa do que o refinamento de produtos na Europa. Durante o segundo plano Malásia de industrialização (1996-2005), as empresas foram incentivadas a aprimorar e fabricar produtos avançados de maior valor agregado (Mahat, 2012; Schoroder et al., 2019).

O cultivo da palma de óleo experimentou um notável crescimento no continente asiático, impulsionado pela experiência acumulada com monoculturas voltadas à exportação que resultou em um conhecimento agrícola consolidado e na existência de uma infraestrutura adequada, que permitiu a produção em larga escala (Mahat, 2012; Giacomini, 2018; Ramadhani; Santoso, 2019). Entre 1974 e 2007, a produção de óleo de palma bruto aumentou de menos de 3 milhões para quase 40 milhões de toneladas, representando uma taxa média anual de crescimento superior a 8%. Seguindo essa tendência, a área cultivada com palma cresceu globalmente, passando de 3,6 milhões de hectares em 1961 para 21,4 milhões em 2017 (Ayompe; Schaafsma; Egoh, 2021).

Na América Latina, os plantios foram introduzidos, principalmente nas últimas décadas do século XX e início do século XXI. Foi nesse período que a expansão dessa espécie ganhou destaque na região devido à crescente demanda global por produtos de óleo de palma e às condições favoráveis para o seu cultivo, como o clima tropical e as extensas áreas de terras disponíveis. Alguns dos países mais proeminentes que cultivam palma de óleo na América Latina incluem: Colômbia, Equador, Peru, Honduras e Guatemala (Moreno-Sader; Alarcón-Suesca; González-Delgado, 2020; Devadason; Mubarik, 2022).

No Brasil, existem aproximadamente 236 mil hectares cultivados com palma de óleo, entretanto, o zoneamento agroecológico realizado pela Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA) identificou mais de 30 milhões de hectares com aptidão para a produção sustentável da espécie. A expansão da espécie nas áreas indicadas pelo zoneamento poderia tornar o Brasil líder mundial na produção, sem desmatamento da Floresta Amazônica. Assim, o cultivo da palma pode ser ambientalmente sustentável e gerar desenvolvimento social e econômico para milhares de famílias na Amazônia (EMBRAPA, 2019; IBGE, 2021).

Devido à significativa participação de pequenos produtores no processo de produção, determinar com precisão a quantidade mundial de óleo de palma produzida é um desafio (Corley; Tinker, 2016). De acordo com dados do USDA (2022), em 2021, a Indonésia, Malásia e Tailândia responderam por aproximadamente 88% da produção global e foram responsáveis por cerca de 89% das exportações desse produto, destacando a forte posição do Sudeste Asiático nesse mercado (Ramadhani; Santoso, 2019).




Apesar do sucesso recente no cultivo da palma de óleo, o futuro é incerto devido à diferença persistente entre o rendimento atual e o rendimento potencial em muitos países, juntamente com desafios relacionados a doenças e escassez de mão de obra, bem como ameaças de custos nas plantações. Adicionalmente, para permanecer competitiva no futuro, essa indústria terá que passar por mudanças substanciais, especialmente em termos socioambientais, devido à pressão que enfrenta nos principais mercados, como a Europa (Oosterveer, 2015; Vijay et al. 2016; Schoroder et al., 2019; Mayes, 2020).

Ademais, a demanda crescente por óleo de palma tem colocado pressão sobre os países produtores para garantir a produção sustentável e o desenvolvimento contínuo da indústria. Nesse contexto, sistemas de certificação desempenham um papel fundamental, um exemplo notável é a criação da *Roundtable on Sustainable Palm Oil* (RSPO) em 2004, que representou um ponto de virada na indústria e demonstrou o compromisso do setor com o desenvolvimento sustentável e sua resposta às críticas negativas nessa cadeia produtiva (Tey et al., 2021).

Outrossim, conforme a demanda por óleo oriundo de plantações certificadas aumentou, os países produtores adotaram a iniciativa de estabelecer seus próprios padrões de sustentabilidade, por exemplo o governo da Indonésia lançou o Óleo de Palma Sustentável da Indonésia (ISPO) em 2011, com o objetivo de garantir que todos os produtores na Indonésia, não apenas os que exportam para mercados estrangeiros, adotem padrões agrícolas mais rigorosos. Em 2015, o Projeto Sustentável de Óleo de Palma da Malásia (MSPO) foi introduzido como um padrão nacional pelo governo da Malásia, demonstrando seu compromisso com a produção sustentável de óleo de palma (Majid et al., 2021; Kannan et al., 2021).

As partes interessadas ao longo da cadeia de abastecimento devem aderir a esses padrões estabelecidos para obter a certificação, entre elas, incluem a implementação de sistemas de rastreabilidade, boas práticas agrícolas, gestão aprimorada dos recursos naturais, responsabilidade ambiental e conformidade com as regulamentações nacionais (Majid et al., 2021). Os princípios dessas certificações abrangem, principalmente, a produção sustentável, visando a redução dos impactos adversos nos âmbitos social e ambiental (Tabela 01).

Tabela 01: Princípios das certificações RSPO, MSPO e ISPO. Fonte: RSPO (2023); MSPO (2023); ISPO (2023).

Princípios	RSPO 	MSPO 	ISPO 
Princípio 1	Compromisso com a transparência	Compromisso com a gestão responsável	Cumprimento das leis e regulamentações aplicáveis
Princípio 2	Cumprimento das leis e regulamentações aplicáveis	Transparência	Gestão das plantações
Princípio 3	Práticas responsáveis de produção	Responsabilidade social, segurança e condições de emprego	Proteção de florestas primárias
Princípio 4	Impacto social positivo	Sustentabilidade ambiental	Gestão ambiental
Princípio 5	Práticas de trabalho justas	Boas práticas	Práticas de trabalho justas
Princípio 6	Uso eficiente dos recursos naturais e manejo responsável	-	Responsabilidade pelo empoderamento social e econômico
Princípio 7	Avaliação do impacto ambiental	-	Melhoria contínua dos negócios

Nesse contexto, a crescente demanda por óleo de palma oriundo de manejo certificado está incentivando a adoção de sistemas de certificação que visam promover práticas agrícolas mais rigorosas e sustentáveis, como parte do compromisso de países produtores em adotar esses padrões e responder à crescente preocupação com a sustentabilidade. Assim, o aumento da demanda por padrões de certificação demonstra que a indústria se encaminha em direção a um futuro mais sustentável, comprometido com a mitigação de impactos adversos nos aspectos sociais e ambientais de sua produção.

### 3.3 Produção da palma de óleo na Amazônia brasileira

De acordo com dados da Associação Brasileira dos Produtores de Óleo de Palma - ABRAPALMA (2022), o Brasil ocupa o décimo lugar no *ranking* mundial de produção, com a maior área produtiva no bioma Amazônia, impulsionada por características genéticas superiores, disponibilidade de terras e condições climáticas favoráveis. O Estado do Pará é o maior produtor do país, concentrando mais de 90% da produção nacional, com 186 mil hectares colhidos e 2,8 milhões de toneladas produzidas. Em seguida vem a Bahia, com 12,7 mil hectares colhidos e 39,2 mil toneladas produzidas (Nahum; Santos; Santos, 2020; SEDAP, 2021; IBGE, 2024).

O cultivo da espécie foi incentivado na região para impulsionar o desenvolvimento econômico do espaço rural, com o objetivo de transformar áreas degradadas, anteriormente convertidas em pastagens, em plantios de monocultura produtivas. Notavelmente, cerca de 90% dessa expansão ocorreu nessas áreas em processo de conversão, esse direcionamento propiciou uma ligação sinérgica entre os agricultores familiares e a agroindústria, resultando na geração de oportunidades de emprego e renda em âmbito local (Villela et al., 2014; Barthel et al., 2018; Nahum; Santos; Santos, 2020).

Na década de 80, o governo brasileiro lançou iniciativas de estímulo à implementação da cultura com enfoque econômico na região norte do país. Essas ações foram realizadas, principalmente, por meio de dois programas distintos: o Programa Nacional de Pesquisas com o Dendê e o Programa Nacional para o Dendê, amplamente reconhecido como PRONADEM (Alves, 2007). Essa expansão também teve outras políticas públicas de suporte, como o Programa Nacional de Produção de Biocombustível (PNPB), lançado em 2004 (BRASIL, 2007), o Programa de Produção Sustentável de Palma de Óleo (PPSOP) e o Zoneamento Agroecológico da Palma de Óleo (ZAE-Palma).

Lançado em 2004, o Programa Nacional de Produção e Uso do Biodiesel (PNPB) teve como principal intuito integrar o biodiesel à matriz energética do Brasil, com o duplo propósito de mitigar as emissões de gases de efeito estufa (GEEs) e reduzir o impacto ambiental. O país se beneficiou das vantajosas condições climáticas e dos solos propícios para essa produção, somado a uma experiência prévia no aproveitamento de biomassa para a geração de energia. O PNPB se configura como uma estratégia coesa de desenvolvimento sustentável (Souza; Cerqueira; Cardoso, 2022).

Os plantios da espécie foram ampliados por incentivos do Governo Federal por meio do lançamento do Programa de Produção Sustentável de Palma de Óleo (PPSPO) em 2010. O principal propósito desse programa foi regulamentar a expansão da produção, especialmente na região Amazônica, ao mesmo tempo em que estabeleceu mecanismos regulatórios (BRASIL, 2011). Para atingir esse objetivo, o programa delineou diretrizes específicas, que incluíam a preservação das florestas e da vegetação nativa, a expansão da produção de forma integrada com a agricultura familiar e com ênfase particular em áreas degradadas dentro da região da Amazônia Legal (Monteiro, 2020).

Ao direcionar investimentos para novas plantações nesses territórios, o Brasil buscava se tornar um dos principais produtores globais sem desmatar florestas nativas. A estratégia seria ambientalmente sustentável, promovendo o reflorestamento e gerando renda para agricultores

familiares (EMBRAPA, 2016). No entanto, Brito (2015) identificou entraves à expansão da área plantada, como: a) burocracia e dificuldades na obtenção de licenças; b) problemas de regularização fundiária; e c) falta de incentivos à parceria com a agricultura familiar.

A produção em larga escala da palma de óleo atualmente no Brasil ainda é emergente, pois a atividade teve início de forma muito modesta na década de 1970 e começou a atrair interesse de empresários e investidores apenas a partir das décadas de 1980 e 1990 (MAPA, 2018). Apesar da disponibilidade de terras antropizadas e adequadas ao cultivo, o Brasil ainda é um importador líquido de óleo de palma, ou seja, consome mais do que produz, em 2021/22, a produção foi de aproximadamente 550 mil toneladas, enquanto o consumo alcançou cerca de 915 mil toneladas (INDEX MUNDI, 2022).

A baixa representatividade do Brasil no mercado global está relacionada aos altos custos de produção associados às normas trabalhistas e ambientais, que representam cerca de 40% dos custos finais de produção. Além disso, há os custos de logística, transporte e impostos sobre o produto refinado, que são cerca de duas vezes mais altos do que os custos na Malásia e Indonésia, principais produtores mundiais (Veiga; Rodrigues, 2016).

Quanto à produção da palma de óleo no Estado do Pará, embora exista há mais de 50 anos, foi na última década que recebeu maiores incentivos oriundos de políticas públicas (Ferreira et al., 2019; Nahum; Santos; Santos, 2020). No ano de 2013, observou-se aumento significativo das áreas paraenses dedicadas ao cultivo da palma de óleo, passando de 80.272 hectares para 146.611 hectares. Além disso, empresas do setor expandiram suas atividades no Pará, sobretudo nos municípios de Moju, Tailândia, Acará e Tomé-Açu, onde se concentram as maiores áreas de plantio e as principais empresas, que operam com terras próprias e parcerias com agricultores locais, geralmente próximas às unidades de extração de óleo (Lameira; Vieira; Toledo, 2015).

Concomitantemente a essa grande expansão, emergem também os compromissos em relação às questões socioambientais e às condições de trabalho adequadas. Um marco relevante ocorreu em 2016, com a carta de compromisso intitulada “Proposta de elaboração da carta de princípios para o desenvolvimento sustentável e inclusivo da cadeia do óleo de palma do Pará”<sup>4</sup>. Esse compromisso foi estabelecido entre a ABRAPALMA (Associação Brasileira dos Produtores de Óleo de Palma) e as oito empresas envolvidas na extração de óleo de palma no Pará (Monteiro, 2020; Nahum; Santos; Santos, 2020).

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<sup>4</sup> A carta de princípios proposta passa pelo cruzamento dos 10 princípios expressos em indicadores a serem alcançados pelas associadas da ABRAPALMA, no sentido de aprimorar condutas e melhorar as condições de trabalho na cadeia da palma no Estado do Pará.

Em síntese, durante o período de 2008 a 2013, é possível identificar dois padrões espaciais distintos nos plantios da palma de óleo no estado do Pará: (i) menor quantidade de empresas e áreas de cultivo com mais de 10 anos de produção; e (ii) maior número de empresas, infraestrutura mais avançada e o estabelecimento de novos plantios da palma de óleo (Lameira; Vieira; Toledo, 2015; Damiani et al., 2020).

Na safra de 2021/22, o Brasil colheu aproximadamente 185 mil hectares de palma de óleo, dos quais cerca de 90% estavam sob responsabilidade de agroindústrias, 5,1% pertenciam a pequenos e médios produtores, e apenas 4,9% à agricultura familiar. Destaca-se que, entre as safras de 2010/11 e 2021/22, a área colhida aumentou 70%, enquanto a produtividade registrou um crescimento expressivo de 104% (USDA, 2021).

A geração de empregos nos plantios da palma de óleo é considerada significativa quando comparada com a média de geração de empregos rurais no Brasil. Conforme pesquisas indicam, é necessário pelo menos um trabalhador para cuidar de cada 5 a 10 hectares de palma, durante todo o ano, ou seja, não são empregos sazonais como no caso de outras oleaginosas como a soja, milho e girassol (Mustafa; Iqbal, 2021; Mathur, 2023).

No Estado do Pará, a indústria da palma já proporcionou oportunidades de emprego direto para mais de 16 mil pessoas, e estimativas apontam que atualmente cerca de 20 mil pessoas estão envolvidas nesse setor gerando um impacto positivo na economia dos municípios que os plantios são estabelecidos. Contudo, é fundamental ressaltar que a implementação bem-sucedida dessa cultura requer um manejo que seja sustentável, respeitando tanto os direitos dos trabalhadores quanto os aspectos ambientais (Monteiro, 2020; ABRAPALMA, 2021).

### *3.4 Aspectos e dinâmicas socioambientais da palma de óleo*

A produção de óleo de palma, como mencionado anteriormente, é considerada atraente em comparação com outros óleos vegetais devido à sua alta produtividade, resultando em uma maior produção de óleo por hectare. Por esse motivo, muitos governos consideram a cultura da palma como uma alternativa para atender às suas metas de combate às mudanças climáticas e garantia de segurança no abastecimento energético (Tey et al., 2021; Lebid; Henkes, 2022).

Apesar de sua importância global, a espécie está associada a preocupações ambientais e sociais, pois, embora os plantios sejam eficientes no uso da terra e de energia, frequentemente geram desmatamento e conflitos com comunidades locais (Rosdin; Cheah; Moslim, 2023; Wassmann; Siegrist; Hartmann, 2023). Ademais, a indústria enfrenta uma reputação negativa

devido às condições de trabalho nas plantações, bem como à "apropriação de terras" e ao deslocamento de comunidades locais de suas terras tradicionais (Obidzinski et al., 2012).

Dessa forma, a expansão das plantações pode resultar em conflitos prolongados entre as comunidades locais e os produtores, especialmente relacionados à disputa pela posse de terras, e pode também levar à marginalização de agricultores envolvidos em outras atividades (Oosterveer, 2015). No contexto de uso da terra em áreas rurais da Amazônia, as atividades predominantes incluem a agricultura itinerante e outras de baixa produtividade, por isso plantios de palma tem o potencial em proporcionar melhores condições para as comunidades locais e contribuir para a melhoria das suas condições de vida (Almeida; Vieira, 2019; Córdoba; Moreno; Sombra, 2022).

De acordo com dados do Instituto Observatório Social (2013), o setor do óleo de palma tem desempenhado um papel altamente significativo no desenvolvimento econômico local, especialmente na região amazônica, evidenciado pelo fato de que 60% da mão de obra formal ser recrutada de comunidades locais. Além disso, o fato de que um trabalhador braçal em período integral ganha quase 2,4 vezes a renda familiar média regional ressalta o impacto positivo que a indústria tem sobre os níveis de renda das famílias e sobre a redução da pobreza na área.

Conforme a ABRAPALMA (2021), o uso do óleo de palma na produção de biodiesel pode trazer impactos positivos para as áreas de cultivo e ressalta que aspectos como a geração de empregos para agricultores familiares e a atração de mais oportunidades de trabalho para o meio rural são pontos positivos. Dessa forma, a produção poderia contribuir para superar obstáculos importantes do país em termos de desenvolvimento econômico e social (Rosdin; Cheah; Moslim, 2023).

O avanço dos plantios da palma de óleo tem impulsionado o desenvolvimento econômico e social, principalmente na região do Nordeste Paraense, através da valorização da produção com investimentos no setor de agroindustrialização dos subprodutos da espécie (Silva et al., 2011). Contudo, é fundamental que a produção seja conduzida de maneira responsável e sustentável, aderindo à regulamentos trabalhistas e ambientais para concretizar esses benefícios de maneira eficaz (Bertone, 2011; Rosdin; Cheah; Moslim, 2023).

De acordo com pesquisas realizadas pela EMBRAPA, um dos potenciais da produção da espécie é que os plantios podem ser utilizados como parte de um mosaico produtivo para a recomposição de áreas florestais em processo de degradação ou para atender às exigências de reserva legal regulamentadas pelos Estados e pela União, assim as propriedades rurais na

Amazônia que apresentam grande passivo ambiental poderiam recompor essas áreas de maneira produtiva e residual através do cultivo da espécie e obter um retorno econômico (Homma, 2019; ABRAPALMA, 2021).

Por outro lado, pesquisadores apontam que o avanço da cultura pode exercer pressão sobre florestas secundárias, levando à diminuição e, em alguns casos, até à extinção de atividades produtivas locais que, por sua vez, pode resultar na redução da oferta e até mesmo no aumento dos preços de outros produtos localmente. Além disso, quando a incapacidade de transformar os plantios da espécie em uma alternativa socioeconômica e ambiental viável, que possa gerar empregos, renda e melhorias na qualidade de vida das populações locais, ocasiona impactos negativos associados aos plantios (Ferreira et al., 2016; Piraux et al., 2017).

Estudos revelam uma série de riscos associados à expansão dessas plantações, incluindo o uso de remanescentes florestais, pois compromete a integridade ecológica dessas áreas, afetando espécies nativas e contribuindo para o desmatamento indireto (Lees et al., 2015), a contaminação do solo e dos rios em decorrência do uso de produtos químicos (Brandão; Schoneveld, 2015), conflitos e desapropriação de terras com populações locais (Nahum; Santos, 2015), apropriação de terras pelo setor agroindustrial (Backhouse, 2013), bem como a insegurança alimentar e o empobrecimento da biodiversidade local (Almeida, 2015).

Segundo Barthel et al. (2018), o principal impacto ambiental da expansão dos plantios é a conversão do uso do solo, no qual tem como consequência a perda da biodiversidade e aumento da emissão de GEEs. Além disso, deve-se levar em conta que a capacidade de armazenamento de carbono por hectare de plantios da palma de óleo é muito inferior à armazenada em florestas tropicais.

Ademais, essa expansão pode ser vista como uma fonte potencial de conflitos socioambientais, já que os interesses de cada ator envolvido - a empresa, o Estado e os agricultores familiares - diferem em relação à percepção do uso do território. O conflito se inicia com a inserção de nova cultura na região, por não ser uma espécie nativa que não faz parte do modo de produção do agricultor familiar (Santos; Farias; Lopes, 2020; Rosdin; Cheah; Moslim, 2023).

Os conflitos socioambientais entre empresas e agricultores familiares podem envolver uma série de questões, incluindo invasão de terras, dificuldades no processo de formalização do trabalho, falta de assistência técnica, uso de agrotóxicos, trabalho infantil e outras preocupações. Esses conflitos são abordados em estudos conduzidos por Sousa, Gemaque e Beltrão (2019), Santos, Farias e Lopes (2020) e Farias (2022).

É importante observar que muitas dessas preocupações não são exclusivas da cultura da palma de óleo e se aplicam também a outras culturas oleaginosas em uso, como a soja. A expansão dessas culturas é frequentemente considerada insustentável, como indicado por Lima et al. (2022), por isso a gestão responsável e sustentável dessas culturas é fundamental para minimizar impactos negativos no meio ambiente e na sociedade.

Assim, são necessárias pesquisas para identificar as transformações sociais e ambientais relacionadas à expansão desses plantios, como nova frente agrícola, para que se possa acompanhar adequadamente essa dinâmica produtiva (Almeida; Vieira, 2019; Rosdin; Cheah; Moslim, 2023). Assim sendo, a cultura da palma de óleo vem representar novo paradigma de desenvolvimento rural da dinâmica agrícola na Amazônia.

### *3.5. Garantia de qualidade e sustentabilidade: a certificação do manejo da palma de óleo*

Apesar da sua importância no mercado global, os plantios da espécie estão ligados a várias preocupações ambientais e sociais que nos últimos anos se tornaram centrais ao interesse público, especificamente vários estudos abordam o interesse de consumidores com as questões socioambientais associadas (Sodano; Rivero; Scafuto, 2018; Guadalupe et al., 2019; Reardon et al., 2019; Verneau et al., 2019).

Em algumas regiões, a produção de óleo de palma ocorreu de maneira indevida, levando ao desmatamento ou degradação de florestas para dar espaço aos plantios (Innocenti; Oosterveer, 2020). Isso resultou em impactos adversos tanto para o meio ambiente quanto para as comunidades locais, em decorrência dos trabalhadores e agricultores envolvidos na produção enfrentarem condições de trabalho inadequadas e remuneração insuficiente (RSPO, 2023), o que gerou apelos para boicotar o óleo de palma devido a esses efeitos negativos.

No entanto, responder às preocupações dos consumidores por meio da proibição de venda do óleo pode acarretar várias consequências, principalmente, porque a cadeia de produção está associada a renda de milhões de pessoas, muitas delas de países em desenvolvimento (Ostfeld et al., 2019; Innocenti; Oosterveer, 2020). Além disso, os óleos vegetais alternativos não apenas possuem menor versatilidade, mas também são mais dispendiosos e menos sustentáveis do ponto de vista do uso de terra e energia em comparação com o óleo de palma (Schmidt; Rosa, 2020).

Por conseguinte, optar por interromper a produção de óleo de palma em prol de grãos de culturas alternativas poderia acarretar: (a) rendimentos inferiores, potencialmente desencadeando ameaças à segurança alimentar e à pobreza; e (b) a necessidade de uma maior

extensão de terras agrícolas, o que poderia ocasionar impactos ambientais mais acentuados (RSPO, 2018). Por isso, uma abordagem mais pragmática para lidar com essas preocupações durante a produção é buscar o aprimoramento dos padrões de produção, visando minimizar os danos ambientais e sociais associados (Innocenti; Oosterveer, 2020).

Com esse objetivo, diversos *stakeholders* ao longo da cadeia de abastecimento do óleo de palma, em conjunto com investidores e organizações não governamentais, fundaram a *Roundtable on Sustainable Palm Oil* (RSPO) em 2004. Essa entidade internacional sem fins lucrativos implementou um sistema de certificação destinado a sinalizar que um produto contém óleo de palma produzido de maneira legal, economicamente viável, ecologicamente responsável e socialmente benéfica (Tey et al., 2021; Wassmann; Siegrist; Hartmann, 2023).

Essas diretrizes são estabelecidas e revisadas a cada cinco anos pela assembleia geral da RSPO, composta por 850 representantes das indústrias globais de óleo de palma e alimentícia, que estabelece diretrizes para os produtores de óleo de palma obter o selo de certificação por agências credenciadas de certificação (Wassmann; Siegrist; Hartmann, 2023). A RSPO é a maior certificação de óleo de palma, seus padrões são mais específicos para a produção da espécie que outras organizações, como a *Rainforest Alliance*, que, por exemplo, tem um escopo mais amplo no que diz respeito a tópicos gerais de agricultura (RSPO, 2023).

A certificação da palma de óleo é um processo que a produção desse óleo é avaliada em relação a critérios sociais, ambientais e econômicos, que visa promover a produção responsável e sustentável, minimizando os impactos negativos associados a essa atividade (Tey et al., 2021; Wassmann; Siegrist; Hartmann, 2023). Dessa forma, a certificação tem sido usada como ferramenta para monitorar as práticas de manejo, rastreabilidade do fornecimento de matéria-prima e rotulagem de produtos (Kumaran; Suparyono, 2019).

Quando produzido de maneira sustentável, plantios certificados da palma de óleo podem estabelecer meios de subsistência de longo prazo para agricultores e produtores, pois a colheita contínua das palmeiras ao longo do ano permite que as famílias de agricultores em regiões tropicais tenham uma fonte constante de renda. Além disso, a produção sustentável de óleo de palma desempenha um papel vital na redução da pobreza e na promoção da infraestrutura rural nos países produtores (RSPO, 2023).

A RSPO garante que a proteção adequada aos direitos dos trabalhadores (e de suas famílias) nas plantações esteja alinhada com os padrões internacionais e locais, incluindo os instrumentos da Organização Internacional do Trabalho (OIT), os princípios dos Objetivos de Desenvolvimento Sustentável (ODS), os Princípios Orientadores das Nações Unidas sobre

Empresas e Direitos Humanos (2011), bem como as convenções da OIT relativas ao trabalho forçado, à abolição do trabalho forçado, à idade mínima para admissão ao trabalho e às piores formas de trabalho infantil, entre outros (Russell, 2020).

Assim, a certificação assume um papel essencial na remodelação da indústria de óleo de palma nesse território, conduzindo-a em direção a práticas mais sustentáveis e ao aprimoramento das condições socioeconômicas. Entretanto, é fundamental que os esforços de certificação estejam em consonância com a necessidade de preencher as lacunas no cenário social e econômico das comunidades tradicionais presente nos territórios afetados pelas mudanças decorrentes dos cultivos.

#### **4. Procedimentos metodológicos, conteúdo dos artigos e organização da tese**

O primeiro artigo, intitulado *“Beyond the labels: assessing the impact of RSPO certification on palm oil production”*, examina o impacto da certificação RSPO no setor de óleo de palma, com foco específico nos efeitos dessa certificação em termos ambientais e socioeconômicos, visando atingir o objetivo 1 da pesquisa. Esse estudo busca evidenciar se a certificação realmente promove práticas sustentáveis, identificando tanto os benefícios quanto às possíveis limitações no processo de produção.

O segundo artigo, *“An analysis of the palm oil sector and its socioeconomic implications in the state of Pará”*, concentra-se na evolução do setor de óleo de palma no Estado do Pará e explora de forma mais aprofundada as contribuições potenciais dessa atividade, especialmente em relação aos aspectos socioeconômicos da região, cumprindo o objetivo 2 da pesquisa. Este estudo considera dados secundários e estatística descritiva, para analisar como a produção de óleo de palma tem influenciado a economia regional e as condições de vida das populações locais.

O terceiro artigo, *“Opportunities and limitations in oil palm plantations in the Pará Amazon: what socio-environmental sustainability can we expect?”*, foca nos limites e nas possibilidades da certificação RSPO, realizando um estudo de caso aprofundado na Amazônia brasileira. Este artigo busca atingir os objetivos 3 e 4 da pesquisa, analisando a relação entre empresas produtoras de óleo de palma e moradores dos principais municípios produtores do Estado do Pará, explorando os limites e oportunidades na implementação do sistema de certificação RSPO, com foco nas interações entre práticas produtivas e contextos socioambientais locais.

O quarto artigo, “*RSPO Certification in Latin America and Asia: Contextual Dynamics, Convergences, and Challenges*”, tem como objetivo realizar uma análise comparativa dos processos de certificação RSPO em países selecionados da América Latina e da Ásia, com foco em suas particularidades regionais, desafios e padrões de conformidade.

A estrutura e o conteúdo dos artigos estão organizados e resumidos no fluxograma abaixo (Figura 02), oferecendo uma visão clara e sintetizada da sequência lógica dos estudos.

Figura 02: Conteúdo dos artigos que compõem a tese. Fonte: Elaboração própria

	ARTIGOS	OBJETIVOS	METODOLOGIA
01	Beyond the labels: assessing the impact of RSPO certification on palm oil production	Objetivo 01	Dados secundários (Relatórios técnicos RSPO) Análise de conteúdo
02	An analysis of the palm oil sector and its socioeconomic implications in the state of Pará	Objetivo 02	Dados secundários (IBGE, Mapbiomas, Incra, Funai, entre outros) Estatística descritiva
03	Opportunities and limitations in oil palm plantations in the Pará Amazon: what socio-environmental sustainability can we expect?	Objetivo 03 Objetivo 04	Pesquisa de campo (Entrevistas com Stakeholders) Software NVivo Qualitativa e exploratória
04	RSPO Certification in Latin America and Asia: Contextual Dynamics, Convergences, and Challenges	Objetivo 05	Dados secundários (Relatórios de auditorias) Software NVivo Análise de conteúdo

A estrutura dos artigos foi planejada para abordar cada um dos objetivos específicos de maneira integrada e coerente com a metodologia da pesquisa, apresentando uma análise integrada das dinâmicas do setor de óleo de palma e do impacto da certificação no Brasil e em outros contextos globais. Por fim, ressalta-se que todos os procedimentos que envolveram coleta de dados com seres humanos respeitaram os princípios éticos definidos pela Resolução nº 466/2012 do Conselho Nacional de Saúde, tendo sido previamente aprovados pelo Comitê de Ética em Pesquisa (CEP) da Universidade Federal de Viçosa – UFV.

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## **5 Artigos científicos**

### *5.1 Beyond the labels: assessing the impact of RSPO certification on palm oil production*

## **Beyond the labels: assessing the impact of RSPO certification on palm oil production**

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**Abstract:** This article analyzes the socio-environmental impacts of RSPO (Roundtable on Sustainable Palm Oil) certification on global palm oil production. Employing an integrated methodological approach based on secondary data and content analysis, the study examines the expansion of the certified area, the inclusion of smallholders, labor productivity, and the environmental and social effects associated with certification. Since 2015, the area certified under the RSPO has grown by 49%, reaching 5.2 million hectares in 2023, equivalent to 8.1% of the global supply of vegetable oils. Smallholders, particularly independent ones, have shown significant growth, although they continue to face significant challenges, including high certification costs, bureaucratic hurdles and limited access to technical assistance. Despite meaningful progress, challenges remain in fully integrating small farmers and ensuring decent working conditions, especially for migrant workers. On the environmental front, certification has contributed to reduced deforestation, more efficient water use, and a lower incidence of fires. However, gaps remain in the protection of secondary forests and degraded areas. The study also highlights improvements in governance, the participation of women, and accountability mechanisms, although the effectiveness of these advances varies depending on the regional context. In conclusion, while the RSPO has achieved notable regulatory and operational progress, further improvements are needed in areas such as transparency, auditing and engagement of local stakeholders. The article emphasizes that certification should not be viewed merely as a seal of approval, but rather as a foundation for deeper structural transformations aimed at sustainability, social justice and environmental conservation.

**Keywords:** RSPO certification; agriculture; socio-environmental; sustainable palm oil.

### **1. Introduction**

The pursuit of sustainable development in agricultural commodity production requires the implementation of sustainability standards throughout global supply chains. This is pursued through various strategies, including corporate commitments and the adoption of socio-environmental certification standards, among the most advanced efforts in the production of goods such as soy, coffee, and palm oil (Statista, 2021; Bishop and Carlson, 2022; Thorning and Mark Herbert, 2022).

Certifications play a crucial role in enhancing organizational processes, products, and services, enabling companies to achieve broader recognition at both national and international levels. These standards are built around principles, criteria, and indicators designed to foster sustainable production, establish traceability systems, promote good agricultural practices, improve natural resource management, mitigate social impacts, and ensure compliance with regulations (Hutabarat et al., 2018; Sanquetta, Mildemberg and Dias, 2022).

Although certification is just one of several mechanisms to ensure and demonstrate sustainability in production, it remains one of the most prominent and widely recognized tools globally. Within this context, certification, anchored in market logic, has seen growing application agricultural sector, paralleling the consistent expansion of "sustainable markets" in recent years (Schleifer and Sun, 2020; Pacheco et al., 2020).

Oil palm cultivation is significant due to its economic value, ease of cultivation, and diverse applications, ranging from food products such bread and butter to the cosmetics like shampoos and toothpaste. It is currently the most widely consumed vegetable oil globally (WWF, 2022). Since 2000, palm oil production has tripled, and meeting the projected demand by 2050 could require an additional 36 million hectares of land (Pye, 2019; Meijaard et al., 2020; Majid et al., 2021).

Despite its importance in the global market, palm oil production is linked to numerous ecological, social, and health concerns. Although oil palm plantations require less space and energy compared to other oilseed crops, they contribute significantly to environmental degradation, such as and biodiversity loss (Butler and Laurance, 2009; Wilcove and Koh, 2010). Additionally, the palm oil industry is often criticized for poor labor conditions, exploitation on plantations "land grabbing" and the displacement of local communities (Obidzinski et al., 2012).

The Roundtable on Sustainable Palm Oil (RSPO) stands out as the leading certification initiative in the palm oil production sector and is currently the only global sustainability standard focused on edible oils. The RSPO certification aims to promote the production and use of sustainable palm oil through adherence to international standards. Certified members must comply with a set of "principles and criteria" that explicitly address the environmental and social impacts (RSPO, 2020; Pacheco et al., 2020; Majid et al., 2021).

While RSPO is the largest certifier in the sector, other standards are Rainforest Alliance, Organic, and International Sustainability and Carbon Certification (ISCC) are also active. However, the RSPO has faced strong criticism for its perceived alignment with industry

interests, insufficient oversight, and inadequate criteria to protect high conservation value areas beyond primary forests (Edwards et al., 2014; Furumo et al., 2020).

Understanding how certification impacts these dimensions is increasingly relevant, especially in the context of development economics and territorial systems science. Voluntary certification mechanisms are playing a growing role in valuing traditional labor and communities while promoting the conservation of ecosystems natural resources (Ting et al., 2016; Dislich et al., 2017).

In this context, a more viable approach to challenges of palm oil production involves fostering better production practices that minimize environmental and social harm. This article seeks to analyze the impact of RSPO certification on advancing socio-environmental sustainability in oil palm plantations, with a particular focus on metrics such as biodiversity conservation, adoption of good agricultural practices, and the mitigation of social and environmental impacts. It argues that while RSPO has achieved notable progress, more stringent measures and deeper engagement with local stakeholders are necessary to fully address the sector's complex challenges

## **.2. Methodology**

An integrated methodological approach was adopted, combining both quantitative and qualitative data to develop a comprehensive analysis of the key advancements and ongoing challenges associated with RSPO certification. The data collection relied primarily on secondary sources, particularly publications from the last five years, including RSPO impact reports, scientific articles, relevant databases, and industry-related documents.

The content analysis followed the methodological procedures proposed by Bardin (1977), structured in three main stages: (i) pre-analysis, involving the organization of material, definition of objectives; (ii) material exploration, through coding, categorization, and identification of units of registration (words, phrases) and units of context (broader excerpts); and (iii) treatment of results, with the interpretation of data theoretical framework, aiming to identify patterns, regularities, and significant correlations.

The analysis was guided by the core principles of RSPO certification, which allowed for a critical discussion of the key findings related to sustainability, production, and the socio-environmental and regional challenges faced. The analysis was conducted comparatively across different producing regions, such as Asia, Africa, and Latin America, to capture contextual nuances and variations in the observed impacts.

However, the limitations of this study are acknowledged, including the reliance on secondary data, the heterogeneity in the quality of available reports, and the regional differences that may influence the generalization of the results. Nonetheless, the adopted methodology provides a solid foundation for evaluating the effectiveness of palm oil certification systems, contributing to a deeper understanding of sustainability practices in the sector.

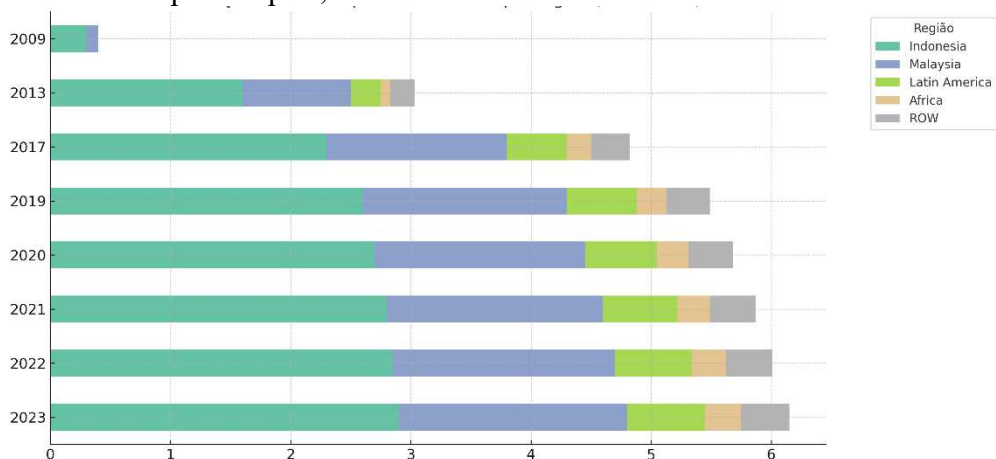
### 3. Results and Discussion

#### 3.1 Certified area, production and inclusion of smallholders

Since 2015, the RSPO certified area has expanded by 49%, reaching 5.2 million hectares, in 2023, dedicated to the sustainable production of palm oil following environmental and social criteria that differ markedly from conventional practices. Although this area represents only 0.9% of global land used for vegetable oil production, it accounts for a notable 8.1% of the global supply, with approximately 16.1 million metric tons of certified palm oil produced in 2023, —a 4.3% increase over the previous year. These volumes are generated by over 6,000 members across the value chain, including 4,159 certified companies, collectively representing about 20% of global palm oil output (RSPO, 2024).

The RSPO Principles and Criteria certified area (Figure 01) spans 23 countries, with Indonesia and Malaysia being the primary holders of certified areas, concentrating about 75% of the total. However, Latin America has shown significant growth, with Panama joining as the ninth country in the region to become part of the RSPO certification group. In Africa, progress has also been substantial: over 100,000 certified hectares were added in 2023 alone, with notable advances in countries such as Cameroon, Ivory Coast, and Nigeria (USDA, 2022; RSPO, 2024).

Figure 01: Evolution of RSPO certified area (hectares/ha) by country or region. Source: Adapted from the Impact Report, 2024.



Although large-scale plantations dominate global production, a substantial share is cultivated by small farmers or through subsistence farming systems. It is estimated that there are at least seven million smallholders worldwide who earn a living (either fully or partially) from palm oil cultivation. Smallholder operations generally fall into two categories: scheme smallholders, who operate under contractual agreements with mills and receive support from them, and independent smallholders (ISHs), who maintain autonomy over their operations and business relations with the mills (Watts et al., 2021; RSPO, 2024).

Table 01 presents data on the distribution and performance of RSPO-certified smallholders in 2023, divided between those linked to organized schemes (such as cooperatives or companies) and those independent. The analysis reveals a notable growth in the participation of independent smallholders, both in terms of numbers and productivity, while scheme-linked producers showed a decline.

Table 01: Distribution and statistics of RSPO certified smallholders (scheme, ISH). Source: Adapted from the Impact Report, 2024.

Category	Certified Smallholders	Certified Production Area (ha)	Certified FFB* Volume (tons)
<b>Scheme-Associated</b>	<b>124,241 (-10.3%)</b>	<b>300,124 (-9.2%)</b>	<b>5,632,624 (-5.0%)</b>
Indonesia	99,629 (-13.3%)	168,597 (-14.3%)	3,267,995 (-11.4%)
Malaysia	2,281 (+14.4%)	9,270 (+13.3%)	156,893 (+11.4%)
Latin America	1,094 (-24.7%)	47,971 (-1.4%)	1,369,004 (+3.8%)
Africa	4,537 (-7.2%)	26,401 (-2.1%)	212,271 (-14.3%)
Rest of the World (RoW)	18,930 (+10.3%)	47,963 (+13.3%)	783,354 (+16.8%)
<b>Independent Smallholders</b>	<b>40,247 (+38.9%)</b>	<b>114,384 (+32.9%)</b>	<b>2,000,022 (+27.2%)</b>
Indonesia	25,579 (+65.2%)	58,418 (+39.5%)	1,051,557 (+46.4%)
Malaysia	2,281 (+14.4%)	9,270 (+13.3%)	156,893 (+11.4%)
Latin America	158 (+35.0%)	2,246 (+4.7%)	20,736 (+292.7%)
Africa	5,113 (-0.1%)	8,427 (-0.6%)	21,682 (-5.5%)
Rest of the World (RoW)	7,116 (+13.5%)	36,023 (+14.3%)	749,154 (+9.4%)
<b>Total Smallholders</b>	<b>164,488 (-1.8%)</b>	<b>414,508 (-0.5%)</b>	<b>7,632,646 (+1.8%)</b>

\* Fresh Fruit Bunches (FFB)

Independent smallholders recorded significant growth of 38.9% compared to the previous year, totaling 40,247 farmers. The certified area for this group increased by 32.9%, reaching 114,384 hectares, and the volume of certified Fresh Fruit Bunches (FFB) production grew by 27.2%, reaching 2 million metric tons. These advances may affect RSPO's efforts to broaden access to certification through targeted technical and financial support initiatives, such as the Smallholder Support Fund (SSSF).

In contrast, smallholders linked to schemes saw a 10.3% decrease in the number of certified farmers (124,241), accompanied by a decline in certified production area (-9.2%) and

FFB volume (-5.0%). This trend may indicate challenges related to maintaining certification, operational limitations within collective schemes, or structural shifts in the sector.

Regionally, Indonesia stood out as the main growth hub, with a 65.2% increase in the number of independent smallholders, as well as a 46.4% growth in certified FFB volume, reflecting the strengthening of sustainable practices in the world's largest palm oil producer. Latin America also saw impressive growth. Although starting from a modest base, the number of independent smallholders increased by 35%, and the FFB production volume surged an impressive 292.7%, indicating a rapid adoption of RSPO standards in the region (RSPO, 2024).

Despite these advances, certified smallholders still represent a small fraction of the total global palm oil producers, highlighting the structural challenges of inclusion. Among the main obstacles are high certification costs, the complexity of technical requirements, and the lack of continuous technical assistance. Additionally, smallholders operating in informal systems, with limited land documentation and restricted access to financing, face difficulties entering formal certification schemes (Watts et al., 2021; Irawan; Supriyadi, 2024).

The RSPO offers certification pathways for both types of smallholders. However, the journey, especially for Independent Smallholders (ISHs), can be long and complex. On average, it takes at least three to five years from initial interest for an independent smallholder to be ready for RSPO Certification. For this reason, RSPO's approach to smallholder inclusion begins well before certification and even before joining RSPO (RSPO, 2024; Irawan et al., 2024).

Recent studies in Indonesia, for example, show that small farmers who adopted RSPO certification improved their livelihoods and increased their economic returns. For instance, the training program for independent smallholders by Musim Mas led in significant gains, with participants earning approximately USD 1.2 million since 2020 from the sale of certified palm oil to international buyers. Additionally, these certified farmers received more appropriate training in the application and handling of fertilizers, herbicides, and pesticides compared to non-certified independent smallholders. Despite these localized improvements, this example still contrasts with the reality of most smallholders (Brandi et al., 2015; RSPO, 2020; RSPO, 2023).

### **3.2 Labor dynamics and social challenges**

Beyond the dynamics of certification and production volumes, the RSPO context also reveals important labor dynamics and social challenges. The number of workers employed in

RSPO-certified units has increased steadily, from an estimated 500,000 in 2021 to 544,036 in 2022 and 591,830 in 2023. Of these, 89% work on farms and 11% in mills, figures that have remained stable, highlighting the labor-intensive nature of palm oil cultivation. Indonesia stands out as the main employer among certified units, with more than 350,000 workers (RSPO, 2024).

Malaysia has the highest proportion of non-local workers (75.9% in plantations and 24.9% in mills), reflecting the sector's dependence on migrant workers. The exploitation of these workers represents a significant—though often invisible—expression of social inequalities associated with the industrial model of palm oil production, which has expanded intensively since the 1960s. It is estimated that more than one million foreign workers are employed in the sector, many of whom face poor conditions, including long working hours, low wages, inadequate housing, and limited access to fundamental rights such as freedom of movement and documentation (Sanderson, 2016; Puder, 2021).

In Latin America, the share of no-local workers on rural farms appears to be increasing, from 1.3% in 2021 and 7.3% in 2022 to 13.0% in 2023, which raises concerns about potential labor risks in the region. This trend may indicate weaknesses in national regulatory frameworks and institutional capacity for monitoring. These data not only reveal a structural change in the profile of the Latin American rural workforce but also signals emerging challenges in the areas of social justice and decent work.

In Brazil, one of Latin America's leading palm oil producers, the industry – smallholder relations are predominantly shaped by the "Contracted Agriculture" (CA) model. In this system, family farmers commit to supplying a predetermined amount of raw material, which is purchased and processed by the industry. However, this scenario highlights the challenges of reconciling global certification requirements for environmental and labor standards with complex local realities, such as the lack of property titles and the inability to meet stringent environmental regulations (Córdoba, Abrams & Selfa, 2022).

Labor productivity in certified units can be estimated based on the amount of Certified Sustainable Palm Oil (CSPO) produced per worker. In Malaysia, each worker is associated with an average of 47.0 metric tons (MT) of CSPO, while in Indonesia and Latin America, the average is 40.2 MT and 42.5 MT per worker, respectively. Africa has the lowest productivity among regions, with 13.5 MT per worker, respectively. Despite lower productivity, regions like Africa have significant potential if structural investments are made. On the other hand, certified units located in other parts of the world concentrate the highest production efficiency, reaching 63.1 MT of CSPO per worker.

The high average production per worker in Malaysia suggests an advanced level of efficiency and potentially better working conditions and infrastructure. This may reflect investments in technologies and more efficient cultivation practices that contribute to higher productivity (Abdul-Hamid et al., 2021; Hassan et al., 2024). In contrast, the African region, with an average production of only 13.5 tons per worker, shows a significant dependence on labor, indicating that production is more labor-intensive and less mechanized, likely due to technological or financial constraints (Williams, 2020; Ayompe et al., 2021).

Similarly, the land-labor ratios provide insight into labor demand. Based on the same set of 2023 data, Malaysia showed the highest ratio, at 10.1:1, meaning one worker is required for every 10.1 hectares of production area. The ratios in Latin America, the Rest of the World, and Indonesia are lower, at 6.4:1, 6.3:1, and 6.0:1, respectively, while Africa has a low ratio of 4.4:1.

### **3.3 Environmental Conservation, social participation, and stakeholder perceptions**

In 2023, RSPO members allocated 466,609 hectares globally for conservation, an increase of more than 100,000 hectares compared to 2022, with notable areas in Indonesia, Gabon, Brazil, Malaysia, and Colombia. While RSPO standards include strict criteria for primary forest conservation, significant gaps remain in the safeguarding of secondary forests and degraded areas, highlighting challenges in the effectiveness of the adopted conservation efforts (Majid et al., 2021).

The average water footprint of certified palm oil was 5.05 m<sup>3</sup> per metric ton of production, substantially lower than other vegetable oils, such as soybean and canola. Regarding fire control, the incidence of hotspots detected in RSPO concessions in Indonesia and Malaysia was only 0.6%, whereas in non-certified areas, it reached 9.7%, highlighting the effectiveness of certification practices in mitigating environmental risks and preventing fires, a critical issue in tropical regions.

In Indonesia, although deforestation and fires continued even after the implementation of RSPO certification, there is evidence that certified palm oil is associated with reduced deforestation rates. Carlson et al. (2018) revealed that certification led to a reduction of approximately 33% in deforestation, although much of the plantations already had low levels of forest cover at the time of certification. As a result, in 2015, certified areas contained less than 1% of the remaining forests within the country's palm oil plantations.

Governance and social responsibility mechanisms have also progressed: 84% of complaints involving human rights violations were closed, with an average resolution time of 272 days after the implementation of appeal procedures. Additionally, there have been advancements in gender inclusion: 28% of certified smallholders are women, with growing participation in management roles on plantations and mills.

Table 02 summarizes the seven principles that form the 2024 version of the RSPO Principles and Criteria<sup>5</sup> for sustainable palm oil production. Each principle reflects a commitment to core sustainability pillars—environmental, social, and economic—and is detailed by mandatory criteria that certified producers must meet. To ensure transparency and accountability, these criteria are measurable through clear, auditable indicators.

These indicators are categorized as either Critical (C) and Non-critical (NC). Critical indicators are essential for certification, and non-compliance with them results in a major non-conformance, requiring immediate corrective action. Non-critical indicators, while also mandatory, allow for corrective adjustments within a given time frame and are classified as minor non-conformities. These indicators are carefully crafted to be clear, measurable, auditable, and adaptable to the local context, ensuring consistency and objectivity in audits.

Table 02: Summary of the RSPO Principles and Criteria 2024. Source: Adapted from the Impact Report, 2024.

<b>Principle</b>	<b>Description</b>	<b>Mandatory Criteria</b>	<b>Measurable Indicators</b>
Transparency, Ethics, and Accountability	Ensure ethical business conduct, transparency in operations, and good governance.	Yes	E.g., public policies, grievance channels, information disclosure
Legality and Accountability	Comply with all applicable laws, legal documentation, and social responsibility.	Yes	E.g., legal compliance, respect for land ownership, legal records
Productivity, Traceability, and Positive Impacts	Optimize operations, ensure traceability, and demonstrate positive impacts.	Yes	E.g., efficient land use, traceability systems, continuous improvement
Human Rights and Community Benefits	Respect human rights and provide benefits to local communities.	Yes	E.g., FPIC application, conflict resolution, community engagement
Smallholder Inclusion	Include, support, and empower smallholders in the sustainable value chain.	Yes	E.g., access to technical assistance, inclusion in certification systems

<sup>5</sup> This version (4-0) is the result of a formal review process that began in 2022, with official adoption on November 13, 2024. It replaces the previous version from 2018 and will come into effect in November 2025, after a 12-month transition period. It replaces the previous version from 2018 and will come into effect in November 2025, after a 12-month transition period.

Workers' Rights and Working Conditions	Ensure decent, safe work free from discrimination or exploitation.	Yes	E.g., fair wages, workplace safety, freedom of association
Conservation and Environmental Protection	Protect forests, biodiversity, and natural resources with good environmental practices.	Yes	E.g., protection of HCV/HCS areas, waste management, GHG emissions

Despite progress in the implementation of certification, several studies highlight that, while it has advanced in normative terms, its effectiveness in practice varies considerably across regions, companies, and local contexts. Brandi (2021) points out that certification partially reduces deforestation and improves some management practices, but does not guarantee complete biodiversity protection, especially in already degraded or fragmented areas. Carlson et al. (2018) demonstrate that RSPO helps reduce deforestation in certain regions of Indonesia, but it is not entirely effective in preventing the conversion of secondary forests and areas of high biodiversity.

Reports from NGOs such as the Forest Peoples Programme and journalistic investigations (e.g., Amnesty International, 2016) indicate that RSPO audits do not always detect environmental or social irregularities, often due to methodological limitations, lack of technical capacity, or conflicts of interest in verification processes. Furthermore, the RSPO (2024) acknowledges that sustainability is an ongoing process and admits that challenges remain in communicating the real impacts on the ground and in the effectiveness of compliance and remediation systems.

On the social front, while the Principles & Criteria (P&C) foresee the protection of workers' rights and community engagement, analyses indicate that enforcement is still inadequate in identifying abusive practices, such as forced or child labor, especially in regions with a large presence of migrant workers. Certification requires compliance with international standards, such as ILO conventions, the SDGs, and the UN Guidelines on Business and Human Rights (Russell, 2020; Muhili et al., 2023), but the effectiveness of these commitments depends directly on the auditing and accountability capacity of the parties involved.

Import policies in consumer countries also influence sustainability incentives. While many markets, especially in the European Union, impose stricter standards, companies can redirect non-certified palm oil to countries with lower regulatory requirements—such as China, India, Russia, and Pakistan—which together account for a significant share of global consumption (Lim, Biswas, and Samyudia, 2015; Brandão et al., 2021).

In parallel, when well implemented, certified plantations have the potential to promote rural development and reduce poverty. The continuous production of oil palms ensures stable

income for tropical farmers and fosters investments in local infrastructure (RSPO, 2023). This makes palm oil a strategic crop for balancing conservation and development.

Finally, the debate on palm oil sustainability is reinforced by its high agricultural yield. If replaced by the second most productive vegetable oil, soybean oil, up to six times the land area would be needed to meet the same global demand (Degli Innocenti and Oosterveer, 2020; Busch et al., 2022; Lieke, Spiller, and Busch, 2023). Moreover, alternatives such as canola or sunflower oil have lower industrial versatility and more intensive environmental impacts in terms of land and energy use (Schmidt and Rosa, 2020).

In addition to technical and operational limitations, there are criticisms of RSPO's governance model, which grants significant influence to large companies in the sector, potentially compromising the ambition and independence of the established standards. Authors such as Nesadurai (2020) emphasize that the RSPO operates within a voluntary transnational governance logic, which often results in weaker commitments and dependency on consumer and NGO pressure to drive structural change.

In response to these criticisms, there is a growing movement from the RSPO and among sectoral companies to adopt traceability technologies, such as blockchain and satellite monitoring platforms, that allow greater visibility into the origin of palm oil and the practices adopted in plantations. These innovations can increase consumer trust and assist in detecting irregular practices, although their large-scale implementation depends on infrastructure and technological costs (SAP, 2020; RSPO, 2021).

The European Union Deforestation Regulation (EUDR), expected to enter into force in 2025, imposes new due diligence requirements on agricultural commodity imports, including palm oil. This may further pressure certified producers to prove deforestation-free sourcing, which could strengthen RSPO standards while also exposing their weaknesses in contexts with low levels governance (RSPO, 2024; Nadras et al., 2024).

#### **4. Final Considerations**

RSPO certification has made significant progress as a tool for promoting sustainability in the global palm oil production chain. Data from 2023 indicate not only territorial and productive expansion of certified areas but also important improvements in environmental, social, and economic indicators associated with certification. With over 5.2 million hectares certified and production representing 8.1% of global vegetable oil supply, RSPO has established itself as one of the main normative references in the sector.

Despite this progress, the unequal distribution of benefits and the persistence of structural challenges reveal that the positive impacts of certification have not yet reached their full transformative potential. The inclusion of smallholders, especially independent ones, has grown promisingly but represents only a fraction of the total number of farmers, exposing barriers such as high costs, complex bureaucracy, and institutional fragility in various producing regions.

On the social front, while progress has been made in formal employment, gender inclusion, and training, significant gaps persist in monitoring and ensuring decent working conditions—particularly among migrant workers and in countries with limited regulatory governance. The growing proportion of non-local workers in certain regions raises concerns about the reproduction of inequalities and the need for ongoing vigilance over labor practices.

From an environmental perspective, indicators suggest real gains in the conservation of primary forests, efficient water use, and the reduction of burning. However, they also expose the limitations of certification in contexts involving secondary forests and already degraded areas, where positive impacts are more difficult to assess. This highlights the need of more robust criteria for protecting threatened ecosystems and a more integrated approach to land-use planning.

Therefore, the effectiveness of the RSPO depends not only on the strength of its principles and criteria but also on its ability to implement, monitor, and audit them fairly and contextually. It is necessary to enhance transparency of verification processes, strengthen accountability mechanisms, and invest in public and private policies that effectively support for the sustainable transition of the palm oil supply chain. More than just a label, certification should be a catalyst for structural transformations that reconciles productivity with social justice and environmental conservation.

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*5.2 An Analysis of the Palm Oil Sector and Its Socioeconomic Implications in the State of Pará*

*Article 2*

## **An Analysis of the Palm Oil Sector and Its Socioeconomic Implications in the State of Pará**

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**Abstract:** This study analyzes the expansion of oil palm cultivation in the state of Pará, Brazil's leading producer of this commodity. The research assesses the potential contributions to the region's socio-economic aspects by collecting data on production, as well as the social and environmental impacts. Specific indicators were used to evaluate socio-environmental sustainability, with a focus on the evolution of palm oil exports and imports between 1997 and 2022, revealing price seasonality and the local agriculture's dependence on this crop. Although Brazil is a net importer, the potential for expansion is significant. The analysis includes demographic and socio-economic data, such as population growth, employment, and income, highlighting challenges and opportunities for more sustainable development in the region. While oil palm cultivation contributes to the local economy, its expansion leads to inequalities and environmental degradation, resulting in conflicts with indigenous and quilombola communities. Therefore, promoting sustainable agricultural practices that respect the rights of affected populations and minimize environmental impacts is essential to ensure balanced economic, social, and environmental development in the region.

**Keywords:** Oil palm; Land use; Socio-environmental governance; Territorial conflicts.

### **1 Introduction**

Oil palm has recently emerged as a success in the agricultural sector. Following this trend, its cultivation area has expanded globally, increasing from 3.6 million hectares in 1961 to 21.4 million hectares in 2017, with an average annual growth rate exceeding 8%. Overall, palm oil extraction represents a significant economic activity in many tropical countries, and in Brazil—particularly in the Amazon biome—it is considered a highly promising agro-industrial option (Chew et al., 2021; Ayompe; Schaafsma; Egoh, 2021).

In the Brazilian Amazon, the expansion of oil palm cultivation has occurred within a historical context of heightened concern over land use and land cover, particularly due to the conversion of forests for livestock farming and agricultural expansion. This loss of native forest cover poses a serious threat to the region's environmental sustainability, leading to consequences such as biodiversity loss, the weakening of ecosystem functions, increased

climate variability, and significant social impacts (Almeida; Vieira; Ferraz, 2020; Brito et al., 2021).

The cultivation of the species (*Elaeis guineensis* and its varieties) was promoted in the region as a strategy to stimulate economic development in rural areas, aiming to transform degraded lands—previously converted into pastures—into productive monoculture plantations adapted to local conditions. Approximately 90% of this expansion took place in areas already undergoing conversion, fostering a synergistic relationship between small-scale farmers and the agroindustry, which ultimately led to the creation of employment and income opportunities at the local level (Barthel et al., 2018; Nahum; Santos; Santos, 2020).

Although Brazil has vast areas suitable for oil palm cultivation, large-scale production remains in its early stages. Initially developed on a modest scale in the 1970s, the sector began to attract significant interest from entrepreneurs and investors (MAPA, 2018). The country remains a net importer of palm oil, producing approximately 550,000 tons while consuming around 915,000 tons in the 2021/22 period (INDEX MUNDI, 2022).

Thus, although oil palm cultivation has been present in the Brazilian Amazon for over 50 years, it has received more significant incentives only in the past decade, driven by public policies with far-reaching consequences for land use, leading to substantial ecological and economic changes (Nahum; Santos; Santos, 2020). In 2013, there was a notable expansion of oil palm cultivation areas in the state of Pará, particularly in the municipalities of Moju, Tailândia, Acará, and Tomé-Açu, where the largest plantations and the main companies in the sector are concentrated (Lameira; Vieira; Toledo, 2015).

In summary, between 2008 and 2013, two distinct spatial patterns can be identified in oil palm plantations in the state of Pará: (i) a smaller number of companies and cultivation areas with more than 10 years of production, and (ii) a larger number of companies, more advanced infrastructure, and the establishment of new oil palm plantations (Lameira; Vieira; Toledo, 2015; Damiani et al., 2020).

Estimates indicate that approximately 20,000 people are currently involved in the sector, contributing positively to Pará's economy. However, the successful implementation of this crop requires efforts toward sustainable management, taking into account both workers' rights and environmental considerations (ABRAPALMA, 2021).

However, despite its relevance on both national and global scales, palm oil production is intrinsically linked to environmental and social concerns. Although plantations are efficient in terms of land and energy resource use, they often trigger significant environmental impacts

(Rosdin; Cheah; Moslim, 2023; Wassmann; Siegrist; Hartmann, 2023). Furthermore, on a global scale, the sector has faced a negative reputation due to poor working conditions on plantations, as well as issues related to land grabbing and the displacement of local communities from their traditional lands (Obidzinski et al., 2012).

Although oil palm cultivation represents only a small fraction of land use in the Brazilian Amazon, several questions remain regarding the changes induced by this crop, and its expansion requires a careful assessment of its potential effects. These effects have been extensively studied in Southeast Asia, where even low-impact management techniques have failed to conserve forests and natural landscapes, resulting in significant socioeconomic consequences (Almeida; Vieira; Ferraz, 2020).

To monitor the productive dynamics associated with oil palm cultivation, it is essential to identify the socioeconomic and environmental changes linked to its expansion. In this context, the objective of this study is to analyze the expansion of oil palm cultivation in the state of Pará—Brazil's leading producer—assessing its potential contributions, particularly concerning the region's socioeconomic aspects.

## **2 Methodological procedures**

### *2.1 Study area*

The state of Pará, located in the North region of Brazil, stands out as the country's largest producer of palm oil, accounting for 82% of national production, which is estimated at 2.9 million tons over a harvested area of 185,963 hectares (IBGE, 2023). This production is concentrated in northeastern Pará and dates back to the 1940s and 1950s, closely linked to government-led research initiatives aimed at establishing alternative crops in the region (Souza, Cerqueira & Cardoso, 2022).

The analysis focused on the regions with the most extensive plantation areas and the largest palm oil-producing companies, covering the municipalities of Acará, Moju, Tailândia, and Tomé-Açu, all located within the Tomé-Açu microregion, in the Northeast Pará mesoregion (IBGE, 2024). The local vegetation is characterized by dense alluvial plain forests in floodplain areas, as well as secondary vegetation and dense forests on plateaus and low terraces (IDESP, 2014; IBGE, 2022).

These four municipalities are the largest palm oil producers in the state of Pará, collectively accounting for more than 60% of the state's total production (FAPESPA, 2017). Investigating this region is particularly important, as most of the land deemed suitable for oil

palm expansion under the Agroecological Zoning (ZAE – Economic-Ecological Zoning) is located within these municipalities.

## 2.2 Methodology

Data collection was carried out to encompass the economic aspects of palm oil production, as well as the social and environmental impacts of the activity within the study area. In analyzing the sector's evolution and impacts, variables were categorized into economic, social, and environmental dimensions, as detailed in Table 1.

Table 1: Description of variables used to analyze the evolution and impacts of the palm oil sector. Source: Prepared by the author

<b>Dimension</b>	<b>Variable</b>	<b>Description</b>	<b>Data Source</b>
ECONOMIC	Land use and occupation evolution	Land use categories considered: agriculture, livestock, and oil palm plantations	MAPBIOMAS (1985, 2022)
	Employment and income	Population dynamics, Human Development Index (HDI), jobs generated by the sector, employed population, average salary, access to social programs, Gross Domestic Product (GDP), people in poverty and extreme poverty	IBGE (2022), Ministry of Social Development and Assistance (2023), Ministry of Labor and Employment (2017)
SOCIAL	Education	Basic Education Development Index (IDEB), schooling rate, and number of schools	IBGE and INEP (2022)
	Health	Number of healthcare facilities, hospital beds, vaccination coverage, and infant mortality	IBGE and DATASUS (2022)
	Public services	Household waste collection, sewage treatment, water supply, and diseases related to inadequate sanitation	IBGE and SNIS (2022, 2021)
ENVIRONMENTAL	Sustainable Development Goals (SDGs)	Sustainable Development Index of Cities (IDSC)	Sustainable Cities Institute (2023)

	Traditional territories	Indigenous, quilombola, extractivist, and agrarian reform settlements	FUNAI, ICMBIO, INCRA, SEMA/PA (2023)
	Conflicts	Map of conflicts involving environmental injustice and health in Brazil	FIOCRUZ (2024)

The data related to the indicators used in this study were obtained directly from the Brazilian Demographic Census (IBGE, 2022), accessible through the official website of the Brazilian Institute of Geography and Statistics (IBGE) and other sources, such as the MapBiomass Project, Ministry of Economy, Ministry of Social Development and Assistance, Ministry of Labor and Employment, National Institute for Educational Studies and Research Anísio Teixeira, among others.

The collected data underwent descriptive statistical analysis and temporal analysis. This approach allowed for the identification of patterns, variations, and trends in the data, providing a comprehensive understanding of the evolution over the period of analysis. The purpose of this methodology is to identify trends and the impact of oil palm cultivation on the living conditions of the study area.

### 3 Results and discussion

#### 3.1 Economic aspects of palm plantations in the main producing municipalities of Pará

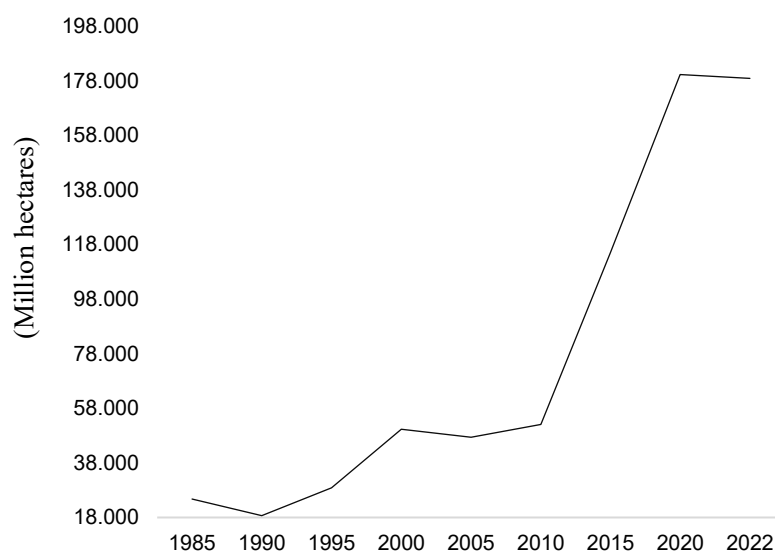
Large-scale palm oil production in Brazil is still considered an emerging industry, having started modestly in the 1970s and only gaining significant interest in the 1980s and 1990s (MAPA, 2018). Although the country has suitable land for cultivation, it remains a net importer of palm oil, bringing in more than it exports (INDEX MUNDI, 2022). Representing less than 1% of global exports, Brazil has significant potential to increase its share in the global palm oil market (Silva, 2019).

The seasonality of palm oil exports is influenced by climatic conditions, particularly in the state of Pará, which accounts for more than 80% of national production (Benami et al., 2018; Teixeira, 2018). The peak production months coincide with stable export prices, whereas significant price fluctuations occur during other periods. This means that the species' productivity varies across time and space, depending on regional and local climatic conditions (Teles, 2014; Monzon et al., 2022).

In 2013, a significant increase was recorded in the area dedicated to palm oil cultivation in Pará, expanding from 48,177 hectares to 80,791 hectares, as shown in Figure 1 (MAPBIOMAS, 2023). According to data from the Brazilian Institute of Geography and Statistics (2023), Pará has 863 establishments growing oil palm, producing 2,901,177 tons with an average yield of 15,601 kg/ha.

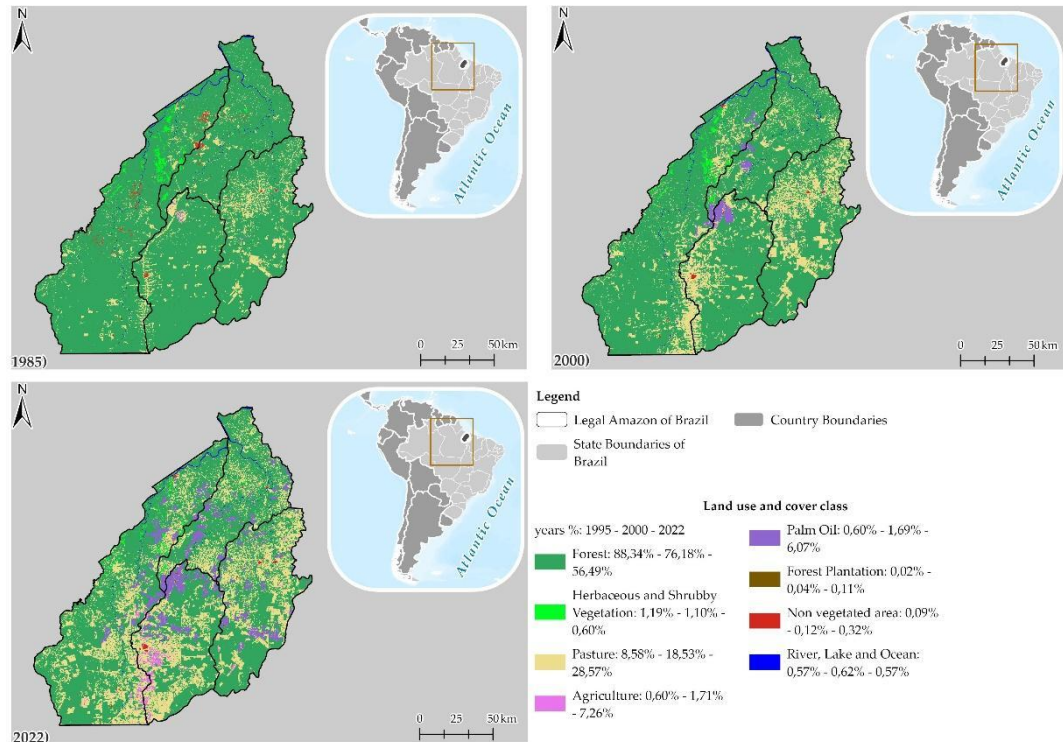
This growth was primarily driven by government incentive policies and the establishment of companies in the municipalities of Acará, Tailândia, Tomé-Açu, and Moju, where the largest plantation areas and the main companies in the sector are concentrated (Lameira, Vieira, and Toledo, 2015). Among the companies and production units, the Agropalma group stands out in practice for being a pioneer in the industry and having a deep-rooted and extensive presence. It serves as a prototype for other corporate projects, such as Marborges S.A. and Belém Brasil Bioenergia S.A. (Nahum, Santos, and Carvalho, 2017).

Figure 1: Evolution of Oil Palm plantations in Pará between 1985 and 2022. Source: Prepared from data from Mapbiomas (1985; 2000; 2022).



In municipalities with the largest planting areas and the presence of major industry players, dependence on oil palm cultivation as an agricultural activity is significant. However, livestock remains the dominant activity. The municipality of Tailândia stands out with a lower dependency (69.40%), diversifying its production with fruit farming, such as cacao. In contrast, Tomé-Açu (92.52%) and Acará (99.69%) show a strong dominance of oil palm, while Moju (79.38%) follows a similar trend. Across the state of Pará, oil palm cultivation occupies 18.61% of agricultural land. Figure 2 illustrates the evolution of land use and cover, highlighting the expansion of oil palm cultivation in the region (MAPBIOMAS, 2022).

Figure 2: Evolution of land use and land cover in municipalities in the area of interest from 1985 to 2022. Source: Mapbiomas (1985, 2000, 2022).



Oil palm plantations in the state are structured under different production models, involving agroindustries of various sizes, ranging from small to large companies. In addition to these, the sector also includes family farmers and independent farmers organized into cooperatives (ABRAPALMA, 2023). Thus, the production of palm oil encompasses a broad diversity of producers and is not exclusive to large companies, which are involved in both cultivation and the extraction of oil and its derivatives.

A characteristic of this production system is ownership of properties, as agroindustries own their own production areas, usually in large extensions of over 700 hectares, where they establish contracts with third-party companies and rural workers to carry out management and administrative services for the properties, as well as cultural practices. Moreover, these agroindustries promote the training of specialized labor to work in palm oil cultivation management, such as technicians, agronomists, and managers, and provide technical assistance to their business partners (family farmers, extractivists, and independent farmers) (Monteiro, 2018; ABRAPALMA, 2021).

The attraction of an increasing number of people to the regions where palm oil ventures are established is a common phenomenon, driven by the direct and indirect jobs generated throughout the production chain. In the main producing municipalities in the state of Pará, the population totals 283,195 inhabitants (Table 2), with Moju being the most populous, with 84,094 inhabitants, and Acará being the least populated, with only 59,023 inhabitants. The rural population is predominant in the municipalities of Acará (76.44%) and Moju (64.06%) (IBGE, 2022).

Table 2: Population dynamics of the area of interest, by municipality. Source: IBGE (1991; 2000; 2010; 2022).

City	1991	2000	2010	2022	GGR*	Urban population (%)	Rural population (%)
Acará	37,184	52,126	53,569	59,023	0.81%	23.56%	76.44%
Moju	44,424	52,941	70,018	84,094	1.54%	35.94%	64.06%
Tailândia	17,706	38,435	79,297	72,493	-0.74%	74.04%	25.96%
Tomé-Açu	41,403	47,404	56,518	67,585	1.50%	55.85%	44.15%
Pará	5,181.570	6,192.307	7,588.078	8,116.132	0.56%	68.5%	31.5%

\* Geometric Growth Rate (GGR) between 2010 and 2020

The municipalities of Acará, Moju, and Tomé-Açu have experienced population growth, while Tailândia was the only municipality to register a negative geometric growth rate between the 2010 and 2022 censuses. However, when compared to the municipality's population in 1991, it saw a population increase four times greater. The population growth in these municipalities can be attributed to a more favorable economic environment, characterized by robust job opportunities and investments from the expanding palm oil industry.

Table 3 presents labor and income indicators in the area of interest, as the social relations of each region intertwine with the complexities of the main economic activities, shaping a scenario in which variables such as employment, wage variation, and labor force participation play fundamental roles. In this context, the analysis of these indicators not only reveals current challenges but also points to strategic opportunities that can be explored to promote more equitable and sustainable development.

Table 3: Variables indicating work and income, by municipality. Source: IBGE (2021; 2020) and Ministry of Development and Social Assistance, Family and Fight against Hunger (2023).

City	HDI	GDP per capita	Average salary *	Employed population	CadÚnico <sup>6</sup>	Families with Bolsa Família
Acará	0.506	R\$ 25,714.69	2.1	9.81%	19,763	13,808
Moju	0.547	R\$ 16,005.52	1.7	12.59%	25,549	16,107
Tailândia	0.588	R\$ 11,579.35	1.7	12.51%	22,229	13,980
Tomé-Açu	0.586	R\$ 16,107.91	1.6	15.72 %	19,164	11,918
Pará	0.690	R\$ 29,953.00	1.5	32.5 %	1,941.610	1,351.702

\* measured in minimum wages.

The Human Development Index (HDI) is a widely recognized indicator that assesses the social and economic progress of a population. In the municipalities of Acará and Moju, the HDI is classified as low, with values of 0.506 and 0.547, respectively. In contrast, Tailândia and Tomé-Açu have an HDI considered medium, with values of 0.588 and 0.586. Compared to the state of Pará's average HDI of 0.690, it is evident that all the municipalities analyzed fall below the state average.

Regarding access to government social programs, data from the Federal Government's Cadastro Único (CadÚnico) serve as a relevant tool for mapping local vulnerabilities, planning actions, and selecting beneficiaries for social programs administered by federal entities. In Acará, approximately 33.48% of the population is registered in CadÚnico, while in Moju, this percentage is 30.38%, in Tailândia, 30.66%, and in Tomé-Açu, 28.36%. Although Moju has a larger population, Acará has a higher proportion of families in socioeconomic vulnerability.

Bolsa Família, one of Brazil's most well-known social programs, is part of the federal government's income transfer policies, providing an average benefit of R\$712.51 to families living in poverty or extreme poverty. In Moju, 16,107 families benefit from the program, while in Tailândia, 13,980; in Acará, 13,808; and in Tomé-Açu, 11,918 families receive the benefit. Pará is the northernmost state with the largest number of beneficiaries, totaling 1.3 million families, underscoring the program's importance as an essential social safety net.

According to the data from the Social Information Matrix (2018), the municipality of Acará has the highest percentage of its population living in poverty and extreme poverty, reaching 65.9%. In Tomé-Açu, the poverty rate stands at 53.0%, while in Moju, it is 55.9%, both higher than the state average for Pará, which is 41.46%. On the other hand, Tailândia has the lowest rate of population living in poverty and extreme poverty, with 31.7%. These figures

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<sup>6</sup> The Single Registry (CadÚNICO) is a government tool for identifying and socioeconomically characterizing low-income families living in Brazilian territory, which are those with a monthly income of up to ½ minimum wage per person.

highlight the urgency of policies and programs aimed at improving the socioeconomic conditions in the region.

According to Goal 8.7 of the 2030 Agenda, immediate actions must be adopted to eradicate forced labor, modern slavery, and human trafficking, as well as eliminate all forms of child labor by 2025. Between 1995 and 2023, the municipalities in the study area recorded 347 rescues of victims of slave labor, with a notable 173 rescues in Tomé-Açu and 117 in Tailândia, where agricultural activities are often associated with these practices. In Brazil, a total of 63,516 rescues were reported, with 13,459 in Pará alone. These figures emphasize the severity of slave labor in the region and the urgency of interventions to combat this violation of human rights (MPT/OIT, 2023).

A significant milestone in the context of oil palm cultivation occurred in 2016 with the signing of the commitment letter titled "Proposal for the Development of the Principles Charter for Sustainable and Inclusive Development of the Palm Oil Chain in Pará." This commitment was established between ABRAPALMA (Brazilian Association of Palm Oil Producers) and the eight companies involved in palm oil extraction in Pará (Monteiro, 2018; Nahum, Santos, and Santos, 2020). The proposed principles charter is based on the intersection of 10 principles expressed through indicators to be achieved, aiming to improve conduct and enhance working conditions within the palm oil chain in the state of Pará.

Currently, there are seven companies in Pará engaged in planting, processing, and marketing palm oil, contributing over 15,000 direct and indirect jobs. Job creation in palm oil plantations is considered significant when compared to the average rural job generation in Brazil. Research indicates that at least one worker is needed to care for every 5 to 10 hectares of palm throughout the year, meaning these are not seasonal jobs like those in other oilseeds such as soybeans, corn, and sunflower (Mustafa; Iqbal, 2021; Mathur, 2023).

### ***3.2 Social and environmental aspects in the main producing municipalities in Brazil***

To analyze education in the municipalities within the study area, the Basic Education Development Index (IDEB) was used. This is a quality indicator for education based on school flow and performance averages in annual assessments, aiming to measure the quality of teaching and the learning process. The IDEB ranges from 0 to 10, where the closer to zero, the lower the quality of education. In all municipalities within the study area, the index is classified as low, especially for the final years of basic education.

The data on the initial and final Basic Education Development Index (IDEB) in Acará, Moju, Tailândia, and Tomé-Açu show a decline in education quality. All municipalities have final IDEB scores lower than the initial scores, with Tailândia standing out negatively, as it presents the lowest final IDEB, 3.6, which is below the state average of 4.2.

Although the IDEB shows poor results, as shown in Table 4, all municipalities have schooling rates above 89%, close to the state average of 93.1%. This indicates that most children of school age are enrolled, but the challenge lies in the effectiveness of the education systems and the availability of institutions, especially at the secondary level. It is essential to focus on improving the quality of education to promote meaningful learning and enhance educational outcomes, overcoming existing deficiencies.

Table 4: Basic Education Development Index, number of schools and school enrollment rate, by municipality. Source: INEP (2021)

City	Initial IDEB	Final IDEB	Number of Schools (Primary)	Number of Schools (Secondary)	Schooling Rate (%)
Acará	4.7	4.3	148	2	92.90%
Moju	4.9	4.4	160	4	93.10%
Tailândia	4.4	3.6	63	7	89.70%
Tomé-Açu	4.7	4.4	97	3	95.60%
Pará	4.8	4.2	9,006	1,007	93.10%

Table 5 presents health indicators for the main oil palm producing municipalities. Moju, the most populous, has the highest number of healthcare facilities, indicating a better capacity for service delivery. In contrast, Tailândia, with the second-largest population, faces a significant challenge due to having the lowest number of establishments in the Unified Health System (SUS), which may compromise the quality of life for the local population. Overall, the State of Pará has 3,965 healthcare establishments, highlighting the importance of an equitable distribution of these services to ensure that all citizens, especially in areas with high population density, have adequate access to healthcare.

Regarding the number of hospital beds available for patient admissions, an essential metric to evaluate the capacity for medical and hospital care, the municipality of Tomé-Açu stands out with 95 beds, which represents a significant portion of the State of Pará's capacity, which totals 4,435 beds. Moju and Tailândia follow with 52 and 51 beds, respectively, contributing to healthcare provision in the region. Together, these cities account for 198 beds,

or approximately 4.5% of the total available in the state, indicating that while there is a reasonable distribution, there is still room for improvement in access to healthcare services.

In terms of vaccination coverage, which estimates the proportion of the target population vaccinated, Tomé-Açu (83.25%) and Tailândia (73.49%) stand out, while Moju has the lowest rate (46.44%), falling below the State of Pará's average of 83.09%. Vaccination coverage is a crucial indicator for disease prevention and public health protection, and these discrepancies underscore the importance of efforts to improve awareness and access to vaccination across the region.

Table 5: Infant mortality, number of health establishments, hospital beds and vaccination coverage, by municipality. Source: IBGE, 2020; DATASUS (2022).

City	Infant mortality	Health Facilities (SUS)	Hospital beds	Vaccination coverage (%)
Acará	22.18	17	33	66.95
Moju	18.36	19	52	46.44
Tailândia	12.66	6	51	73.49
Tomé-Açu	11.57	8	95	83.25
Pará	15.05	3,965	4,435	83.09

The Sustainable Development Index of Cities (SDIC) provides an overall and integrated view of each of the Sustainable Development Goals (SDGs), measuring the overall progress of cities in achieving all 17 SDGs with a score where 100 indicates the optimal achievement of the Sustainable Development Goals. According to the Sustainable Cities Institute (2023), Acará achieved a Socioeconomic Development Index (SDIC) of 30.54, while Moju recorded 35.70, Tailândia 35.95, and Tomé-Açu 32.93.

It is observed that the overall scores and development levels of the municipalities show predominantly low results, with all municipalities having indices considered "very low." These results suggest that there is a significant challenge to be faced in these municipalities to improve their conditions and achieve a healthier balance between the economic, social, and environmental pillars of sustainable development.

Regarding basic sanitation services in the area of interest (Table 6), it is observed that the sewage network index is the lowest among those analyzed. In the municipality of Moju, only 1.81% of the area has a sewage network, followed by Tomé-Açu with 3.73%. The other municipalities presented low sewage network indices, which may lead to challenges in the supply of drinking water due to contamination of local water sources. Consequently, 315 deaths related to inadequate sanitation were recorded between 1996 and 2020.

Table 6: Data on sanitation services, by municipality, 2022. Source: IBGE, 2022

City	Sewage Network	Water Supply	Families Without Water Connection	Garbage Collection	Diseases Due to Inadequate Sanitation*
Acará	2.20%	24.56%	55.85%	26.74%	66
Moju	1.81%	36.24%	46.68%	56.97%	70
Tailândia	5.18%	37.71%	44.80%	85.77%	119
Tomé-Açu	3.73%	68.68%	27.19%	69.86%	60
Pará	19.99%	48.90%	24.70%	78.08%	-

\* Between 1996 and 2020.

The data regarding water supply in the municipality of Tomé-Açu reveals a coverage of 68.68%, while neighboring municipalities such as Acará, Moju, and Tailândia show lower rates of 24.56%, 36.24%, and 37.71%, respectively. This disparity suggests the existence of specific challenges in each locality that directly impact the availability of potable water and access to this service. For example, regarding the number of families without access to piped water, the municipalities of Acará (55.85%) and Moju (46.68%) have the worst indices. It is worth noting that all the municipalities in the study area showed a higher percentage of families without piped water than the average in the state of Pará (SNIS, 2021).

Compared to the state average of 48.90% for water supply in Pará, this figure is below the national average of 84.2% (SNIS, 2021). This indicates that all municipalities are below the national index, and these discrepancies can be attributed to a number of factors, including inadequate infrastructure, lack of investment in basic sanitation, and challenging geographical characteristics.

When examining the data on household waste collection in the mentioned municipalities, a significant variation in the effectiveness of this essential service is observed. The municipality of Acará has the lowest coverage rate, at 26.74%, while Moju, Tailândia, and Tomé-Açu have more favorable rates of 56.97%, 85.77%, and 69.86%, respectively. The state average of 78.08% highlights the urgent need for public policies to expand the coverage of this essential service in both urban and rural areas, aiming to protect the environment and improve the well-being of the population.

### ***3.3 Traditional territories and land use conflicts***

The cultivation of oil palm, although not generally seen as a major environmental villain—especially when compared to large-scale soy production—can have both positive and

negative effects, depending on the methods and objectives guiding its development. With sustainable practices and proper management policies, oil palm can bring social benefits, such as job creation and the strengthening of local economies. However, without adequate regulation and planning, its cultivation can contribute to environmental degradation, loss of biodiversity, and social conflicts, due to pressure on communal lands and forest areas (Rosdin; Cheah; Moslim, 2023; Wassmann; Siegrist; Hartmann, 2023).

No município de Moju a população indígena é de 258 habitantes divididos em cinco aldeias da etnia Anambé. Ademais, os indígenas da etnia Tembé de Tomé-Açu dividem-se especialmente em duas áreas tradicionais, a TI Turé-Mariquita I, homologada em 1991, e a Reserva Indígena Turé-Mariquita II, sobre a qual buscam a demarcação. Além dos Tembé, o município de Tomé-Açu possui outras sete aldeias indígenas das etnias Anambé, Turiwara, Amanayé e Tenetehara, ao todo o município tem uma população indígena de 583 habitantes (FUNAI, 2019; IBGE, 2022).

In the municipality of Moju, the indigenous population consists of 258 people, divided into five villages of the Anambé ethnicity. Additionally, the indigenous people of the Tembé ethnicity in Tomé-Açu are primarily divided into two traditional areas: the Turé-Mariquita I Indigenous Land, which was homologated in 1991, and the Turé-Mariquita II Indigenous Reserve, for which they are seeking demarcation. In addition to the Tembé, the municipality of Tomé-Açu has seven other indigenous villages of the Anambé, Turiwara, Amanayé, and Tenetehara ethnicities, with a total indigenous population of 583 inhabitants (FUNAI, 2019; IBGE, 2022).

The quilombola territories, identified as areas of ancestral occupation by Afro-descendant communities, are found in three municipalities in the area of interest. In Acará, there are 12 quilombola communities; in Moju, 20; and in Tomé-Açu, 7, all officially certified by the Palmares Cultural Foundation, the body responsible for certifying quilombo remnants in Brazil. Additionally, the Agrarian Reform settlements, designated as areas for land redistribution for agrarian reform purposes, are distributed in Acará (14), Moju (7), Tailândia (5), and Tomé-Açu (7) (FUNAI, 2023; INCRA, 2023).

Regarding the conflicts identified in the study area (Table 7), three are associated with oil palm cultivation. In northeastern Pará, specifically in the municipalities of Tomé-Açu and Acará, the quilombola communities of Nova Betel, Alto Acará, and the Tembé indigenous community in the Turé-Mariquita Indigenous Land live near the plantations and suffer the impacts directly (Damiani et al., 2020). Since 2007, the quilombola communities have been

advocating against the expansion of oil palm cultivation on their territories and have requested the regularization of their lands to prevent consequences, such as the use of large quantities of pesticides, which end up in rivers and groundwater and reach the communities through contaminated water (FIOCRUZ, 2024; Costa; Ravena, 2024).

Table 7: Conflicts involving traditional communities in the study area, 2024. Source: FIOCRUZ (2024).

City	Conflict	Populations	Generating Activities	Health Impacts	Socioenvironmental Impacts
Acará	Quilombolas of Alto-Acará	Quilombolas	Agroindustry, Pesticides, Monocultures	Deterioration in quality of life and violence (threats, murder, physical coercion, bodily harm, and psychological violence)	Environmental degradation, pollution, deforestation, and risky working conditions.
Moju	Quilombola communities of Moju suffering from river and stream contamination due to kaolin pipeline leaks	Quilombolas	Waterways, roads, railways, port complexes/terminals and airports, Mining, gold mining, and steel industry, Pipelines, oil and gas pipelines	Deterioration in quality of life	Pollution, deforestation, land disputes, and soil erosion.
Moju	Quilombolas, riverside dwellers, and family farmers fighting for land titling and against contamination	Family farmers, Quilombolas, Riversiders	Government entities' actions, Timber companies, Monocultures, Public policies and environmental legislation	Food insecurity, deterioration in quality of life, and violence (threats and murder)	Deforestation, land disputes, and pollution.
Tomé-Açu	Tembé Indigenous people of the Turé-Mariquita Indigenous Land and traditional communities fighting for their land against BBF company in the "War of Palm Oil"	Family farmers, Indigenous people, Quilombolas, Riversiders	Pesticides, Government entities' actions, Waterways, roads, railways, port complexes/terminals and airports, Timber companies, Mining, gold mining, and steel industry, Pipelines, oil and gas pipelines, Monocultures, Livestock	Malnutrition, non-communicable or chronic diseases, food insecurity, deterioration in quality of life, and violence (threats, murder, physical coercion, and bodily harm)	Environmental degradation, deforestation, pollution, land disputes, and climate change.

In the municipality of Moju, for example, the quilombola territory of Jambuaçu is located, where residents formed settlements along the rivers, typical of the riverside populations of the Amazon. Starting in the 1980s, with the opening of highways such as the PA-150, there was an expansion of agricultural activities, accompanied by extensive deforestation. The local population began to engage in conflicts with oil palm cultivation companies, reporting cases of

hired gunmen and threats. In recent years, these conflicts have intensified due to the actions of the Vale Consortium, responsible for the Paragominas Bauxite Mine Project, further escalating tensions and threats to traditional communities (FIOCRUZ, 2024).

Additionally, the Temb  indigenous people residing in the municipality of Tom -A  had conflicts with mining companies, which began exploiting the indigenous territory commercially in 1995. However, starting in 2007, through government incentive policies, companies in the oil palm sector were installed, altering traditional ways of life, contributing to the disruption of the relationship chain, and provoking conflicts, summarized by the communities themselves as "the Palm War" (Damiani et al., 2020; FIOCRUZ, 2024).

The first impact occurred in 2009 with the removal of native vegetation and exposure of the soil in the area surrounding the indigenous territory. Satellite images show that, between 2008 and 2014, within the perimeter of the Indigenous Land (TI), 2,287.8 hectares were converted into oil palm plantations. This situation reveals a significant contradiction in the expansion of plantations, as the Brazilian government encouraged the cultivation of oil palm in already deforested areas of the Legal Amazon, using this argument to present the practice as an alternative for producing oil for food and energy purposes (Thury, 2017; EMBRAPA, 2019; Moraes J nior; Parkateje; Oliveira, 2022).

Water contamination by substances such as glyphosate, soil pollution, deforestation, and the reduction in the availability of fish and game animals have direct impacts on the health of local communities, as well as intensifying social and land conflicts. Starting in 2022, conflicts between local communities and companies escalated. In 2023, the chief L cio Temb  from the Tur -Mariquita Indigenous Land was the victim of an armed attack, heightening fear in the local communities (BRASIL, 2023).

The data provided confirm other studies that point to a series of risks associated with the expansion of these plantations, including the use of forest remnants (Lees et al., 2015), soil and river contamination due to the use of chemicals (Brand o; Schoneveld, 2015), conflicts and land expropriation with local populations (Nahum; Santos, 2020), land appropriation by the agroindustrial sector (Backhouse, 2013), as well as food insecurity and the impoverishment of local biodiversity (Almeida, 2015; Ferreira et al., 2023).

Moreover, this expansion can be seen as a potential source of socio-environmental conflicts, as the interests of each actor involved—the company, the state, and family farmers—differ regarding the perception of land use. The conflict begins with the introduction of a new

crop in the region, as it is not a native species and does not align with the family farmer's mode of production (Santos; Farias; Lopes, 2020; Rosdin; Cheah; Moslim, 2023).

Socio-environmental conflicts between companies and traditional populations can involve a range of issues, including land invasions, difficulties in formalizing work, lack of technical assistance, pesticide use, child labor, and other concerns. These conflicts are addressed in studies conducted by Sousa; Gemaque; Beltrão (2019), Santos; Farias; Lopes (2020), and Farias (2022).

It is important to note that many of these concerns are not exclusive to oil palm cultivation and also apply to other oilseed crops in use, such as soy. The expansion of these crops is often considered unsustainable, as indicated by Lima et al. (2022). Therefore, the responsible and sustainable management of these crops is crucial to minimizing negative impacts on the environment and Society.

#### **4 Final considerations**

Palm oil production represents an important source of employment and income for the regions where it is cultivated, significantly contributing to the local economy. However, the results also reveal complex socioeconomic issues, such as inequalities in human development, economic dependence on palm oil, and the need for policies and social programs to address poverty in the municipalities.

Furthermore, the analysis of social indicators highlights the importance of integrated and sustainable approaches to the development of the palm oil industry, considering not only economic aspects but also social and environmental impacts. It is essential to adopt measures that ensure the inclusion and empowerment of local communities, while promoting environmental protection and sustainable development.

The discussion about the expansion of palm oil cultivation also reveals contradictions in existing analyses, as while some studies point to palm oil as responsible for deforestation, others argue that its introduction primarily occurred in already deforested areas previously designated for livestock. This divergence illustrates the complexity of the issue and suggests that palm oil cultivation is not the sole factor contributing to environmental degradation, as activities such as mining, highway expansion, and other productive practices also play significant roles in the tensions between local communities and industries.

Therefore, adopting more sustainable approaches to palm oil cultivation that take into account the rights and interests of local communities, as well as environmental protection, is

crucial. This may involve implementing more sustainable agricultural practices, respecting the territorial rights of indigenous and quilombola communities, and strengthening environmental and labor regulations related to the palm oil industry.

In light of the results, it is essential that stakeholders involved in the palm oil industry, including companies, governments, and civil society organizations, collaborate to find solutions that balance economic growth with social and environmental responsibility. This integrated and participatory approach is key to addressing the social and environmental challenges inherent in palm oil cultivation, aiming to promote development that benefits all parties involved.

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*5.3 Opportunities and limitations in oil palm plantations in the Pará Amazon: what socio-environmental sustainability can we expect?*

## **Opportunities and limitations in oil palm plantations in the Pará Amazon: what socio-environmental sustainability can we expect?**

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**Abstract:** This article analyzes the relationship between oil palm cultivation companies and residents of the main producing municipalities in the state of Pará, Brazil, identifying the limits and opportunities in the implementation of the Roundtable on Sustainable Palm Oil (RSPO) certification system, focusing on the interactions between production practices and local socio-environmental contexts. To this end, semi-structured interviews were conducted with stakeholders, addressing the relationship between the sector and communities, changes in land use, impacts of plantation expansion, and certification, with an emphasis on the perceptions and practical experiences of the interviewees. The collected data were organized in NVivo software version 12.2 and analyzed with the help of Content Analysis proposed by Bardin (1977). The results highlight concerns about environmental impacts and working conditions. The expansion of plantations has significantly changed land use, affecting the lives of family farmers and generating labor and environmental conflicts. Negative impacts include increased pressure on public services and degradation of water resources. Most respondents also reported little meaningful interaction between companies and local communities, although some social responsibility initiatives were identified. Our study shows that while oil palm cultivation can drive economic growth, relations between companies and communities are characterized by challenges and tensions, and improvements in communication and governance are needed to promote more sustainable oil palm production.

**Keywords:** Environmental governance; Socio-environmental conflicts; Sustainability certification schemes; RSPO.

### **1. Introduction**

Livestock farming, soybean cultivation and oil palm plantations are currently the main drivers of land use change at a global level. They exert significant impacts on the spatial configuration of landscapes and the capacity of forests to provide ecosystem services and benefits to human populations (Marengo et al., 2018; Carvalho et al., 2020).

The "modern" agricultural model subordinated agricultural activities to new interests, social classes, and ways of life and consumption. This development pattern is associated with

the idea of unlimited growth, disregarding the natural limits of the environment. Thus, society has gone beyond its limits to meet a series of disordered consumption needs, driven by the capitalist mode of production and its market economy (Navarro, 2001; Pedroso, 2024).

The expansion of oil palm plantations (*Elaeis guineensis* and its varieties) reconfigures the landscape, alters spatial organization, and transforms territorial dynamics (Nahum, Santos, 2022). This process is linked to land accumulation, driven by land insecurity in some regions, especially in Latin America, where development policies promote agrarian changes, resulting in increased land prices and rural exodus (Rosdin; Cheah; Moslim, 2023; Wassmann; Siegrist; Hartmann, 2023).

In Brazil, the largest concentration of production is concentrated in the state of Pará, which encompasses the Amazon biome, favoured by adapted genetic characteristics, availability of land and suitable climatic conditions (Nahum; Santos; Santos, 2020; SEDAP, 2021). The country ranks tenth in the world in terms of production. It is part of an international division of labour, where Asia, Africa and Latin America produce and export palm oil, mainly to India, China and the European Union (USDA, 2020; Mota, 2022).

The cultivation of the species was encouraged in the region to boost rural economic development, transforming degraded areas, previously converted into pastures, into productive monocultures. By directing investments towards new plantations, the Brazilian government sought to become one of the main global palm oil producers, thus avoiding the deforestation of native forests (Barthel et al., 2018; Nahum; Santos; Santos, 2020).

Although oil palm cultivation is not the main driver of land use and land cover changes in the Amazon, several important questions remain regarding the transformations induced by this activity. The ecological, social and economic implications of these changes continue to be the subject of debate and study, especially about environmental degradation, biodiversity loss and impacts on local communities (Almeida; Vieira; Ferraz, 2020; Ferreira et al., 2023).

A more pragmatic approach to addressing concerns about palm oil cultivation and processing has been to seek to improve production standards to minimize the environmental and social harm associated with them. The Roundtable on Sustainable Palm Oil (RSPO) is one of the main certification initiatives in the palm oil supply chain, and is the only global sustainability standard that covers edible oils (Innocenti; Oosterveer, 2020; RSPO, 2024).

Although certification is just one of several measures to ensure and demonstrate sustainability in production, it remains one of the most internationally recognized mechanisms. In this context, this market-oriented approach has gained prominence in the agricultural sector,

accompanied by the steady growth of “sustainable markets” in recent years (Schleifer; Sun, 2020; Pacheco et al., 2020). In Brazil, efforts to adopt RSPO certification are still in the initial phase, with only two companies having their supply chain linked to the certification (RSPO, 2025).

Therefore, researches that explores the socio-environmental transformations resulting from the expansion of palm plantations as a new agricultural frontier is essential to to understanding more deeply the productive dynamics and their implications for the environment, the local economy and the communities involved (Almeida; Vieira, 2019; Rosdin; Cheah; Moslim, 2023).

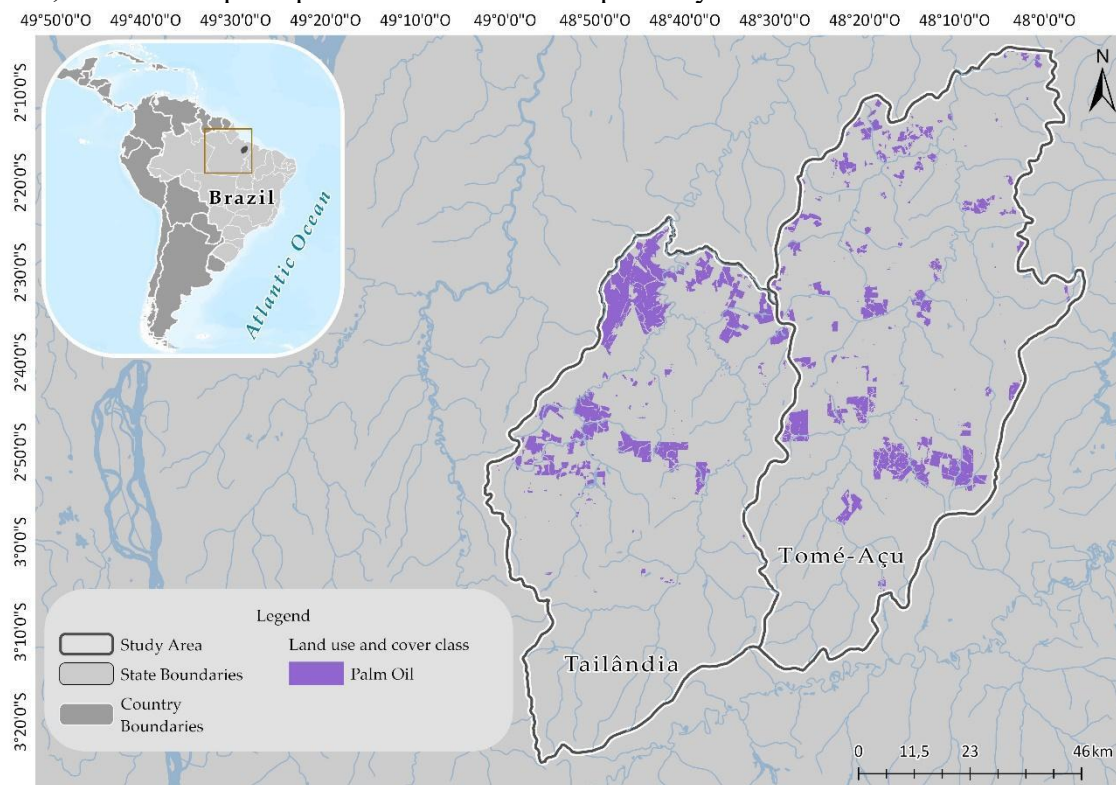
In this context, this article aims to analyze the relationship between oil palm cultivation companies and residents of the main producing municipalities in the state of Pará. It explores the limits and opportunities in implementing of the RSPO certification system, focusing on the interactions between production practices and local socio-environmental contexts.

## **2. Methodology**

We conducted semi-structured interviews with stakeholders, including residents, workers, leaders and other relevant actors, during June 2024 in the municipalities of Tomé-Açu and Tailândia, located in the northeast of the State of Pará (Figure 01), a region that is home to the largest concentration of companies in the sector. The interviews addressed the relationship between companies in the sector and communities, changes in land use, and the impact of the expansion of plantations in communities and certification, focusing on the interviewees’ practical perceptions and local experiences.

The search for interlocutors for the investigation was carried out through non-probabilistic sampling, using the "snowball" method - an advantageous approach for studying populations that are difficult to access or whose numbers are uncertain. This method consists of identifying key informants or documents relevant to the investigation, where the first contacts indicate new contacts, expanding the sample with each interview. This process continues until the sample is saturated, when no new names or additional information emerge (Vinuto, 2014).

Figure 01: Location of the municipalities of Tailândia and Tomé-Açu in the state of Pará in Brazil, detail of oil palm plantations. Source: Prepared by the author.



The collected data were organized in the NVivo software version 12.2, which facilitates qualitative and mixed-methods analysis by enabling the import and organization of various data types. The software allows coding data into themes and categories, performing word frequency and identifying patterns and correlations. Additionally, its integration of quantitative data supports mixed-methods research, providing a systematic approach to analyze and present results comprehensively.

Subsequently, the Content Analysis proposed by Bardin (1977) was conducted, following three main stages: pre-analysis, which involves organizing the material and defining objectives and hypotheses; exploration of the material, which includes coding, categorization, and identifying recording units (words, phrases) and contextual units (more extensive excerpts); and treatment of the results, which entails interpreting the data in light of the hypotheses and theoretical framework, identifying patterns and relationships.

In addition, the prerogatives of Resolution No. 466/2012 of the National Health Council for Scientific Research in Human Beings were met, and the Research Ethics Committee (CEP) of the Federal University of Viçosa was approved.

### 3 Results and discussion

Our results cover 62 interviews (28 men and 34 women) with participants between 18 and 69 years old. The predominant level of education among the participants was incomplete primary education (72.2%). The interviewees live in rural communities (52%) and urban areas (48%) adjacent to palm oil plantations. The analysis of the collected data reveals a significant panorama of local communities' perceptions regarding the involvement of palm oil companies in the northeast of the State of Pará.

The results indicate that the most frequent words used during the interviews were dendê (palm oil), environment, company and people (Table 01). These results, meticulously extracted and analyzed using the advanced software NVivo, point to a scenario in which environmental impacts, the role of companies and social changes are central themes in the interviews.

Table 01: Frequency of main words used in interviews. Source: Prepared by the author based on data and application of NVivo.

Words	Count	Weighted Percent (%)
Dendê (Palm Oil)	150	22.0%
Environment	110	16.2%
Companies	95	13.9%
People	85	12.5%
Company Z	70	10.3%
Changes	60	8.8%
Municipality	50	6.6%
Tiring	40	5.9%
Water	30	3.8%

"Dendê" is the most frequently mentioned word in the interviews, representing 22.0% of the total, indicating that the interviewees see palm oil as a crucial element, possibly related to the region's economic, social, and environmental aspects. "Environment" is the second most frequent word, with 16.2% reflecting the interviewees' concern with this practice's environmental impacts.

The words "Companies" and "People" appear with 13.9% and 12.5%, respectively, suggesting a focus on the relationships between companies in the sector and local communities. "Company Z" (10.3%), one of the largest companies in the sector, reinforces the idea that the interviewees are concerned about its practices and policies. Finally, terms such as "Municipality" (6.6%), "Tiring" (5.9%), and "Water" (3.8%) highlight concerns about local impacts, work exhaustion, and water problems.

### 3.1. “We don’t eat palm oil”: impacts of land use change

The rapid growth of oil palm plantations driven by development policies is responsible for a new rearrangement in the complex agrarian landscape of the Northeast of Pará, a region inhabited by diverse groups, such as indigenous people, quilombolas, riverside communities and squatters. Among the main concerns arising from the change in land use, 39% of the interviewees highlighted working conditions, 31% pointed out environmental impacts, 11% mentioned land and health issues, and the remaining 19% stated that they had no significant concerns.

Working conditions mainly encompass changes in the rural worker’s life and the loss of the identity of the Amazonian family farmer who is now being employed on company plantations. This scenario is evident in the interviewees’ statements, as observed in interview 46: *“Where palm oil is planted, it is no longer suitable for other crops. We don't eat palm oil, we eat cassava, açai, and so on, and we're not planting anymore”* (Interview 46, 2024, NVivo).

Other reports show that the process of cleaning the plantations is extremely exhausting and risky, due to the common presence of venomous animals in the canopies and at the feet of the palm trees, as demonstrated by the following statements: *“My husband lost 11 kg working in the palm oil there, it's practically slave labour”* (Interview 21, 2024, NVivo).

The negative impacts of population growth in this region have been associated with “increased pressure” on already overburdened public services, such as education and health. The severity of this situation is evidenced by reports such as that in interview 07: *“I am tired of seeing people poisoned in the medical unit, sometimes there are 10, 20 workers with lots of thorns and animal bites”* (Interview 07, 2024, NVivo).

As the expansion of oil palm advances and interacts with diverse land use systems, concerns have been raised regarding potential environmental impacts. Although the species demonstrates high productivity under the soil and climatic conditions of the Eastern Amazon, some studies suggest that oil palm plantations may influence land use dynamics (Silva; Tabarelli; Vieira, 2023).

The main environmental concern highlighted by interviewees concerns the contamination of water resources, caused by the inadequate disposal of “tiberna” — water used to wash palm fruits during industrial processing. This impact is highlighted in interview 12: *“The river that everyone used to bathe in and now it's black. When we talk about it, you don't believe it, right, but you must see it to believe it. It's oil in the water, residue from palm oil, it's already killed a lot of fish”* (Interview 12, 2024, NVivo).

From the processing of the oil palm fruit, some by-products are obtained in the following proportions: palm kernel cake (3.5%), stalks (22%), fibers (12%), shells (5%) and liquid effluents (50%) (MAPA, 2018). Tiborna, also known as "sludge oil" or "sludge oil", is generated in the oil removal process, which appears in the oil clarification stage, when solid residues, such as fibers and sediments, accumulate at the bottom of the settling tanks. This mixture of solid waste and residual oil makes up tiborna, which, if not adequately treated, can become a source of environmental pollution (Ferreira et al., 2023).

The palm oil production chain in the region is established close to bodies of water, constituting an area of environmental risk. This proximity can result in the deposit of inputs in riverbeds and in the water table, especially during rainy periods, in addition to causing other typical environmental events (Nahum; Santos, 2023).

A second perspective is the impact of the expansion of plantations on local fauna and climate change. As reported by the interviewees: *"Fish have become scarcer, there are almost no more in the streams after the palm plantations"* (Interview 12, 2024, NVivo) and *"There are jaguars in the yard. The climate impact is very strong, last year it went 6 months without raining a drop"* (Interview 04, 2024, NVivo).

In Brazil, approximately 90% of the expansion in oil palm production occurred on lands that were previously degraded pastures and not in forest areas (Benami et al., 2018). However, based on the interviewees' reports and the literature, it can be inferred that oil palm cultivation can be as harmful to regional biodiversity as other agricultural land uses and is considered a use with a "high" socio-environmental impact (Almeida; Vieira; Ferraz, 2020).

### **3.2 Palm Oil Territories: the relationship between companies and communities**

Companies in the sector have a significant influence in the region, where residents depend on cultivation and processing activities as one of their main sources of income. However, 78.0% of those interviewed reported that there is no significant involvement by companies with local communities. In comparison the remaining 24.0% indicated that there is some level of involvement, whether through meetings with community representatives or through social responsibility programs as a way of interacting with communities.

Specifically, when asked about the support of companies in the sector for projects and/or initiatives that benefit local communities, 67.0% of those interviewed said they did not perceive any significant effort in this regard. In contrast, 33.0% acknowledged support for several projects, including: young apprentices, maintenance of road/branch infrastructure, planting in

partnership with family farmers, donation of toys, lectures, and training workshops in partnership with educational institutions.

According to the analysis carried out, a participant who works at a school in the municipality of Tailândia highlighted that: *“At our school, Company W has been working on campaigns for a year, such as the Health in School Program (PSE), Orange May, and conversation circles in partnership. They are the only company that works with us, and they even entered the school's annual action plan. They bring snacks, materials, and speakers and ask students and parents directly what they want to do at school. Recently, there was a workshop on homemade bread and cakes for the students' mothers”* (Interview 36, 2024, NVivo).

Integration between companies and family farming occurs mainly through contracts, where farmers supply raw materials to companies, which ensure the purchase of the product and offer assistance and technical training to farmers (Gomes; Schmitz; Mota, 2021). This partnership is highlighted in interview 02: *“The union has a partnership with Company W and family farmers. It is happening now because they are being forced to do so because of the certification, the green seal, it is a quid pro quo”* (Interview 02, 2024, NVivo).

Integration via contract is often seen as an opportunity for farmers to modernize their production, increase income, and contribute to developing countries, either through commodity exports or food supply for the population (Graziano; Navarro, 2015). However, some authors evaluate this practice beyond the economic dimension, emphasizing negative impacts on farmers' ways of working, autonomy, and use of time, as they become subordinate to the productivity demands imposed by companies (Futemma; Castro; Brondizio, 2020; Córdoba; Abrams; Self, 2022). Additionally, these studies point to demographic growth, increased violence, circulation of money, and urban expansion as outcomes of this integration. While infrastructure improvements often accompany these changes, residents also report rising drug trafficking, murders, prostitution, and hospital demand, corroborating findings from other studies such as Carvalho (2016); Nahum and Santos (2020); and Costa and Teles (2022).

The economic growth and regional development driven by agricultural commodity production also bring externalities. Cities heavily dependent on commodity production may face vulnerability to market fluctuations, leading to socioeconomic instability. Interviewees highlight issues such as unemployment, unresolved labour termination agreements, and worker rights delays, particularly in Company Y. These challenges underscore the dual-edged nature

of commodity-driven economic development, which, while fostering growth, also exposes local communities to a range of social and economic risks (Ferreira et al., 2023).

This labour conflict becomes evident in the interviewees' statements: *“Because of the conflict with the indigenous people, my husband was fired last month, as were several Company Y employees”*. *They divided his rights into 5 instalments and they haven't even paid the first instalment yet. They're saying that the company is going to go bankrupt”* (Interview 08, 2024, NVivo) and *“We had many problems with labour rights that were not respected... issues of unhealthy conditions. People don't even stop to drink water or eat to increase productivity in the fields”* (Interview 46, 2024, NVivo). Company Y has accumulated a series of conflicts involving the indigenous peoples of the Temb  ethnic group, which gave rise to the “palm oil war”. The indigenous people accuse the company of impacts on biodiversity, water resources, health and control of the territory, which part of the allegations made by the Temb  have already been recognized in legal proceedings by the Federal Public Ministry (MPF) (Damiani et al., 2020; Damiani et al., 2023).

In communication about company operations, 83% of respondents reported that companies do not provide regular information about their activities, and 17% said they receive official communications, usually during community meetings. The lack of adequate communication can foster distrust and tensions, hindering the construction of a positive and collaborative relationship between companies and local communities.

Finally, when asked to evaluate the relationship between companies and local communities, 67% of participants rated it as poor, highlighting significant difficulties such as lack of trust and persistent tensions. In contrast, 19% rated the relationship as fair, citing ongoing challenges related to communication and trust. Only 14% rated the relationship as good, although they acknowledged that there is still room for improvement, especially in communication and community engagement.

### **3.3 Sustainable palm oil production: limits and opportunities**

Palm oil cultivation, when carried out with good governance, is recognized as a driver of economic growth and poverty alleviation in tropical developing countries. In contrast, rural areas in the Amazon face significant challenges, such as high dependence on government aid, low literacy, limited technical capacity, restricted access to technology and markets, high transportation costs, and lack of public services (Homma, 2024).

In Brazil, there are still several gaps in understanding how the production of agricultural commodities, such as palm oil, can contribute to the growth of cities near plantations and influence other sectors, particularly local non-agricultural sectors, through spillover effects. The expansion of this activity was strongly encouraged by public policies aimed at regional economic development, such as the National Program for the Production and Use of Biodiesel (PNPB) of 2004, the Sustainable Palm Oil Production Program (PPSOP) launched in 2010, and the offer of credit lines such as PRONAF Eco (Silva; Navegantes-Alves, 2017).

The Brazilian government launched the PPSOP to combine economic growth with social and environmental responsibility in Amazon, in which the government encouraged the private sector to invest in palm oil production to increase biodiesel production, which was in line with the goals of the agro-energy program. The program was innovative in prioritizing environmental protection, directing cultivation to degraded areas, outside conservation areas and indigenous territories by the Agroecological Zoning for cultivating oil palm in the Amazon (ZAE-Palma) (Brandão et al., 2021).

The government used tax incentives and credit lines to encourage companies to integrate small farmers into the production chain, providing technical assistance, financing, inputs, and guarantees for the acquisition of production. Thus, the PPSOP promoted the growth of palm oil production in the eastern Brazilian Amazon (Córdoba et al., 2018).

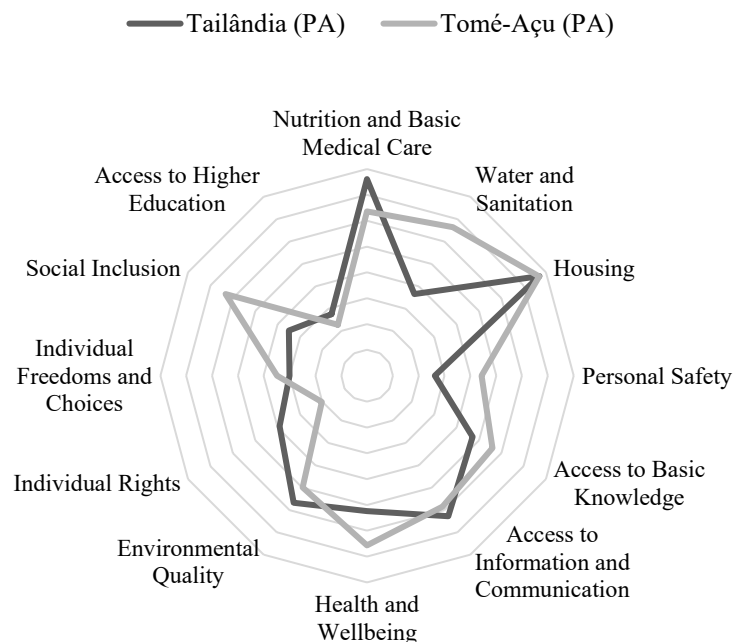
Palm oil production in the Amazon, primarily for export, can significantly boost the economic status of Amazonian municipalities and foster urban growth in these areas. The benefits of this production extend to the promotion of intersectoral connections, the increase in value added to services, and the stimulation of urban population growth. Moreover, the expansion of palm oil production has led to improvements in the infrastructure of the producing region, such as road paving, rural electrification, bridge and port construction, and the establishment of telephone and transportation services (Nahum et al., 2020; Ferreira et al., 2023).

In external production chains for export, especially in increasingly demanding markets, minimizing negative socio-environmental impacts by boosting urban and economic growth can offer a competitive advantage. The relationship between oil palm plantations and socio-environmental effects is an issue that deserves attention. Although the cultivation of the species in Brazil follows different land use patterns from the alarming deforestation rates observed in Africa and Southeast Asia, the region still requires close monitoring (Ordway et al., 2019; Gaveau et al., 2022).

Critiques of palm oil production primarily focus on its negative effects on socioeconomic factors (contractual asymmetries, land grabbing, and impacts on small farmers) and environmental damage (ecosystems and water and air quality). The most significant conflict mitigation is over the issue of traditional peoples (quilombolas and indigenous peoples) who have publicly decried the encroachment on their territory, which has affected food security by disrupting hunting and fishing activities. The Social Progress Index (IPS), developed by the 'Social Progress Imperative' methodology, assesses the ability of municipalities to meet the basic needs of their citizens, with a rating assigned on a scale of 0 to 100, where higher values indicate greater social progress and better fulfilment of basic needs.

In this context, the municipality of Tailândia has an IPS of 47.22, while Tomé-Açu has an IPS of 51.86. Figure 02 shows the comparison of the municipalities through the 12 components evaluated, providing a more in-depth view of the specific areas (IPS, 2024). The comparison between these municipalities allows a detailed analysis of the particular areas evaluated, highlighting the importance of integrated strategies that encompass both economic growth and the improvement of social and environmental conditions.

Figure 02: Graphical comparison of the 12 components of the Social Progress Index (IPS, 2024).



These indicators can be compared to the demands of the RSPO (Roundtable on Sustainable Palm Oil) certification, which aims to align palm oil production with

environmentally responsible and socially just practices. Among the most concerning areas are access to higher education, environmental quality, social inclusion, and individual rights, which show particularly low performance, especially in Tailândia. These indicators reveal structural deficiencies that directly impact the population's well-being and the region's sustainable development.

Regarding environmental quality, both municipalities exhibit worrying indices, highlighting environmental degradation that may be associated with improper land use practices, including agro-industrial activities such as palm oil cultivation. Low environmental quality affects not only ecosystems but also the health of local populations, compromising long-term sustainability. Another critical aspect is social inclusion. In Tailândia, the indicators suggest greater challenges in integrating vulnerable communities into economic and social activities.

When analysing the interview data, three aspects of the areas were identified, guided by limits and opportunities for residents' lives. These aspects are described in Table 1, which presents the aspects, their respective descriptions, and the interlocutors responsible for introducing them during the interviews. The analysis of the elements that make up the current context of the leading palm oil-producing municipalities reveals a complex web of limits and opportunities reflected in the responses of different interviewees.

Table 01: Aspects of limits and opportunities that make up the current context of the main oil palm producing municipalities. Source: Prepared by the authors based on data and application of NVivo, 2024.

Aspects	Limits	Opportunities	Interviewees
<b>Social</b>	Conflicts with traditional traditions	Integration of corporate social responsibility programs	1, 5, 9, 12, 18, 22, 27, 33, 40, 45, 50, 55
	Lack of basic infrastructure in local communities	Development of social inclusion initiatives and improvement of quality of life	2, 8, 14, 21, 28, 34, 41, 48, 52, 56, 61
	Social inequality and marginalization of vulnerable groups	Capacity building and empowerment of communities through education and training programs	3, 10, 16, 23, 29, 35, 42, 49, 57, 62
<b>Environmental</b>	Deforestation and biodiversity loss	Implementation of certified sustainable agricultural practices (e.g. RSPO)	4, 7, 15, 19, 26, 31, 37, 44, 51, 53
	Degradation of water resources and pollutants	Restoration of polluted degraded areas and use of environmental conservation technologies	1, 6, 11, 17, 25, 30, 36, 43, 47, 54, 58
	Negative impacts on local fauna and flora	Continuous environmental monitoring and development of biodiversity preservation projects	13, 16, 20, 24, 32, 38, 39, 46, 55, 60

<b>Economic</b>	Excessive economic dependence on planning	Creation of jobs and increase in local income	2, 6, 12, 18, 23, 27, 33, 40, 44, 50, 55
	Economic vulnerability in the event of events that affect the finances of companies	Diversification of the local economy through the development of complementary production chains	3, 9, 14, 21, 29, 35, 41, 47, 52, 57

Table 01 reflects the reality of complex challenges and numerous opportunities that, if well used, can lead to more balanced and sustainable development in palm oil-producing municipalities. Implementing measures that incorporate these issues in an integrated manner with companies, considering local particularities, will be fundamental for developing this production chain.

In addition, these efforts not only contribute to local development but also pave the way for obtaining sustainability certifications, such as RSPO, and for consolidation in the international market, where the demands for environmentally and socially responsible practices, such as fair labour conditions, community engagement, and respect for Indigenous rights, are increasingly greater.

#### **4 Final considerations**

This study sought to analyze the perceptions of local communities about the impact of the activities of palm oil companies in northeastern Pará, especially in the municipalities most affected by the expansion of monocultures. The interviews revealed a predominantly critical view on the part of the residents, who pointed out several problems associated with this activity, such as environmental impacts, negative social changes and precarious working conditions. The data analysis also highlighted the complex relationship between companies and communities, marked by limited and non-transparent interaction. Although some social responsibility initiatives were reported, most interviewees considered the involvement of companies to be unsatisfactory, which contributes to a climate of distrust and tensions. In addition, environmental impacts, especially related to the degradation of water resources and the loss of biodiversity, were widely mentioned. The expansion of oil palm, if conducted with adequate governance and respect for the principles of sustainability, could represent a significant opportunity for economic development for the region. However, it's urgent to stress the importance of sustainable agricultural practices, as they are necessary to ensure the long-term viability of the industry and the preservation of the environment. Furthermore, the future of oil palm cultivation in the Amazon will depend on a delicate balance between economic growth and socio-environmental preservation, such as the adoption of sustainable agricultural practices

and the construction of a transparent and inclusive dialogue between companies and communities are essential steps for this activity to contribute positively to the development of the region.

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*5.4 RSPO Certification in Latin America and Asia: Contextual Dynamics, Convergences, and Challenges*

## RSPO Certification in Latin America and Asia: Contextual Dynamics, Convergences, and Challenges

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**Abstract:** Palm oil has become one of the world's leading tropical crops, driven by high productivity and international demand for food, cosmetics and biofuels. Although originally from West Africa, its expansion has occurred mainly in Southeast Asia and Latin America. However, the environmental and social impacts of this expansion have led to the creation of voluntary certification schemes, such as the RSPO (Roundtable on Sustainable Palm Oil), established in 2004. This study aims to comparatively analyze RSPO certification processes in Brazil, selected countries in Latin America and Southeast Asia, focusing on regional specificities, implementation challenges and compliance standards, based on RSPO audit reports. The analysis reveals striking differences: Latin American units presented more non-conformities, especially in labor rights and occupational safety, while in Asia the main problems were concentrated in environmental management and documentation. Latin America stood out for its use, mainly of the “Identity Preserved” model in traceability, greater presence of social projects and greater depth in stakeholder consultations. The inclusion of small producers is more structured in Latin America, while in Asia, barriers such as land insecurity and high certification costs persist as barriers for small producers. Despite formal compliance with RSPO criteria, the effectiveness of certification varies according to the local institutional and socioeconomic context. Finally, the study concludes that, in addition to international standards, it is essential to consider the territorial and political arrangements that shape the implementation of sustainability in the palm oil sector.

**Keywords:** Environmental Governance; Global value chains; Market mechanisms; RSPO certification

### 1. Introduction

Oil palm (*Elaeis guineensis* and varieties) stands out as a notable example of recent agricultural success, characterized by its high productivity and diverse industrial applications, particularly in food, cosmetics, and biofuels. Although known since the European Industrial Revolution, the crop only achieved global economic relevance in the 20th century, propelled by increasing international demand and advances in agricultural management (Mayes, 2020; Chew et al., 2021).

Native to West Africa, oil palm was initially promoted as an export crop during the colonial era and later introduced to tropical regions in Asia and Latin America (Meijaard et al., 2020; Lusiana et al., 2023). In Southeast Asia, especially Malaysia and Indonesia, the crop was introduced in the 1960s and 1970s, and quickly evolved into the basis of a highly profitable industry. These countries emerged as global leaders in palm oil production due to strategic industrial policies, investments in infrastructure, and prior experience with export-oriented monocultures (Zheng & Abu, 2019; Schroder, Hertel and Tyner, 2019).

Between 1974 and 2007, oil palm production in Asia rose from less than 3 million to nearly 40 million metric tons annually, with the cultivated area expanding from 3.6 million to 21.4 million hectares (Ayompe, Schaafsma & Egoh, 2021). However, this rapid expansion generated significant environmental pressures, including tropical rainforests deforestation and increased carbon emissions, placing palm oil among Forest-Risk Commodities (FRCs), alongside soy, beef, and timber (Cosimo et al., 2024).

In Latin America, oil palm was introduced as early as the 17th century by enslaved Africans, but large-scale cultivation began only in the mid-20th century, initially through efforts by the United Fruit Company in Central America (Richardson, 1995; Rhoades, 2011). In recent decades, countries such as Colombia, Ecuador, Peru, Honduras, and Guatemala have emerged as important producers, establishing Latin America as the world's second-largest palm oil-producing region, accounting for approximately 7% of global output. The cultivated area in this region has nearly doubled over the past decade (Moreno-Sader et al., 2020; FAO, 2020).

Despite economic growth, the sector faces technical, logistical, and environmental challenges, exacerbated by increasing international market demands for sustainable practices (Vijay et al., 2016). To address these concerns, various social and environmental certification systems have arisen, most notably the Roundtable on Sustainable Palm Oil (RSPO), established in 2004 to promote sustainability standards and mitigate the adverse impacts of palm oil production (Tey et al., 2021).

Within this context, this article aims to comparatively analyze RSPO certification processes in Brazil, selected Latin American countries, and Southeast Asia, focusing on regional specificities, implementation challenges, and patterns of compliance, based on RSPO audit reports. This study contributes to the debate on sustainability and transnational regulation by emphasizing understanding certification schemes within their specific contexts rather than generalizations of their effectiveness or impact.

## 2. Methodology

This study adopts a qualitative, document-based, and comparative approach to analyze the certification processes of the Roundtable on Sustainable Palm Oil (RSPO) across different regional contexts. The analysis focuses on certified units located in selected countries in Latin America and Asia, using publicly available audit reports published on the official RSPO website.

Countries and audited units were selected intentionally based on their significance in global palm oil production and regional representativeness. The dataset comprises complete reports from 2023 and 2024, covering main assessments, re-certification, and surveillance audits.

Data collection involved systematic extraction of information from public audit reports, with particular attention to fulfilled and unfulfilled criteria, descriptions of major and minor non-conformities, Corrective Action Plans (CAPs), community participation, socio-environmental impacts, and remediation practices.

The collected data were organized using NVivo software, version 12.2, enabling the import, coding, and classification of diverse data types. This facilitated identification of recurring themes, patterns and correlations. The study compared the frequency and types of non-conformities, proposed corrective actions, challenges faced by certified units, and best practices, allowing a critical evaluation of RSPO certification's effectiveness and applicability under varying socio-environmental conditions.

## 3. Results and discussion

### *3.1 Regional Profile of Non-Conformities in Asia and Latin America*

Based on the analysis of 32 audit reports—16 from Latin America (Mexico, Colombia, Brazil, and Costa Rica) and 16 from Asia (Indonesia, Malaysia, and Thailand)—all assessed operations were found to be in compliance with the 2018 RSPO Principles and Criteria. This compliance includes adherence to specific national interpretations and complementary standards, such as the requirements for Supply Chain Certification (SCC) and New Plantings Procedures (NPP).

Despite equal representation in the sample, Latin American operations accounted for **45.78% of Major Non-Conformities (NCs)** and **65.08% of Minor Non-Conformities**, whereas Asian operations were responsible for **54.22% of Major NCs** and **34.92% of Minor**

NCs. On average, each Latin American unit recorded **2.38 Major NCs** and **5.00 Minor NCs**, compared to **2.81 Major NCs** and **2.69 Minor NCs** per unit in Asia.

In terms of thematic distribution of NCs (Table 01), Latin American operations exhibited greater challenges related to **labor rights**, including management of outsourced workers, contractual obligations, use of Personal Protective Equipment (PPE), and occupational health and safety—with 44 labor-related NCs in total. Conversely, Asian operations presented more **major NCs in environmental management** (17 versus 7 in Latin America) and **governance-related issues**, highlighting persistent challenges in documentation and compliance with environmental regulations and internal procedures. Social participation and grievance mechanisms appeared less frequently in both regions, though Latin America still registered higher counts.

Table 01: Number of Major and Minor Non-Conformities by thematic category and region (Latin America and Asia). Source: Compiled by the authors based on RSPO audit reports (2024).

Theme	Major NCs (LA)	Minor NCs (LA)	Major NCs (Asia)	Minor NCs (Asia)
Labor Rights	18	26	11	10
Environmental Management	7	18	17	12
Governance and Transparency	9	21	14	17
Social Participation & Grievances	3	11	2	4
Other	1	4	1	0

In Asian countries, especially in Indonesia, land tenure insecurity remains a major barrier to RSPO certification. Legal ambiguities surrounding land ownership intensifies conflicts between companies and local communities. This challenge is especially critical for independent smallholders, who often lack formal land titles, making it difficult to meet RSPO requirements related to traceability, Free, Prior and Informed Consent (FPIC), and territorial management (Choiruzzad, Tyson & Varkkey, 2021; Vos et al., 2023).

In contrast, Latin America's main issues involve labor rights violations, such as non-payment of minimum wages, lack of formal contracts, poor occupational health and safety, and the absence of effective anti-discrimination, harassment, and child labor policies. As Pacheco et al. (2020) note, despite regulatory advancements in several Latin American countries, precarious labor conditions persist, particularly in rural areas where oil palm cultivation is concentrated, highlighting a significant gap between legal frameworks and their practical

enforcement. This undermines full compliance with international standards required by certification.

The situation becomes even more complex when considering the global distribution of certified areas: approximately 75% of certified land is concentrated in just two Asian countries—Indonesia and Malaysia—which dominate global production of certified palm oil (RSPO, 2024). This geographically uneven distribution underscores Asia's central role in the RSPO certification system, while simultaneously highlighting the structural asymmetries faced by regions such as Latin America. Despite important advances in traceability and smallholder inclusion, systemic challenges persist (Johnson, 2022; O'Reilly & Varkkey, 2024).

While the 2018 RSPO Principles and Criteria are often more rigorous than national legislation, this rigor exposes gaps between international benchmarks and local practices and. According to Brandi et al. (2015), certification effectiveness is limited where institutional capacity is weak. In contexts with fragile enforcement of labor and environmental norms, full compliance with RSPO standards becomes significantly more difficult.

In the Latin American context, Brazil exemplifies this dynamic, having one of the most comprehensive labor legislations guaranteeing minimum rights, occupational safety, and the eradication of child labor. However, audits have identified a significant number of non-conformities related to these safeguards. This illustrates how strong legal frameworks alone are important, but insufficient without consistent enforcement and an organizational culture committed to compliance for RSPO certification to be truly effective (Pacheco et al., 2020).

### ***3.2 Chain of Custody, Environmental Conservation, and Smallholder Inclusion***

The chain of custody models identified in the audit reports were predominantly Identity Preserved (IP), which requires complete physical segregation of certified palm oil from plantation to final product, and Mass Balance (MB), which allows mixing of certified and non-certified oil along the supply chain, provided proportional volume control is maintained (RSPO, 2023). In Latin America, all audited units reported using the IP model, ensuring full traceability of certified fruit. In contrast, Asian operations employed a mix of IP and MB, with some reports failing to clearly specify the model used.

The reports also highlighted the existence and protection of High Conservation Value (HCV) areas, which are critical for biodiversity and demonstrate companies' environmental sustainability commitments. In Latin America, notable initiatives such as those in Colombia have designated over 400 hectares for conservation, supported by systematic monitoring and

community involvement. In Asia, HCV areas were also cited, though with less detail on management strategies and local engagement efforts.

In contrast to the extensive deforestation historically associated with oil palm expansion in Southeast Asia, particularly in Indonesia and Malaysia, palm cultivation in Latin America has mostly expanded into already converted lands, such as degraded pastures and agricultural areas (Castellanos-Navarrete & Pacheco, 2021). In Asia, the rapid expansion since the 1980s—driven by global demand and government incentives—often involved large-scale clearing of tropical forests, frequently using fire, resulting in biodiversity loss, carbon emissions, and socio-environmental conflicts (Turner & Snaddon, 2023; Rahman et al., 2025).

A recurring theme in Latin American audit reports is the emphasis on integrating smallholders and third-party suppliers into certified palm oil supply chains, reflecting efforts toward social inclusion and productive diversification. Certified units in Colombia and Costa Rica, for example, reported between 18 and 60 independent suppliers linked to the certified chain, receiving technical support and undergoing internal audits as part of certification requirements.

Oil palm production in Latin America follows three main trajectories: (1) smallholder-led expansion, where small farmers manage most of the cultivated area (as in Honduras and Mexico, with 61% and 53%, respectively); (2) mixed models with a relatively balanced presence of small and large producers (e.g., Ecuador, Peru, and Costa Rica); and (3) expansion led by large agro-industrial enterprises, with corporate plantations dominating the sector, as seen in Guatemala, Colombia, and Brazil (Castellanos-Navarrete & Pacheco, 2021).

These differing trajectories reflect each country's political economy, which shapes agrarian change and development policies. In countries like Guatemala, Colombia, and Brazil, the dominance of large-scale models stems from historically unequal land structures, tenure regimes favoring land concentration, and public policies that often prioritize large-scale producers (Córdoba et al., 2018).

The inclusion of smallholders is often pursued through the paradigm of “inclusive business,” which seeks to replace high public rural development spending with public-private partnerships. This model aims to integrate small farmers into agribusiness supply chains, portraying itself as a “win-win” solution benefiting local livelihoods, the private sector, and rural economies. Examples include Guatemala's ProRural Program, Brazil's Sustainable Palm Oil Production Program, and Colombia's Alianzas Productivas framework (German et al., 2020).

In Asia, although the presence of third-party suppliers is acknowledged, there is less emphasis on structured support or certification programs targeting smallholders. Most reported actions focus on consultation and institutional stakeholder engagement, with little detail on consistent policies to integrate smallholders into RSPO certification schemes. This gap may hinder the certification's effectiveness in fostering a more inclusive and equitable supply chain.

Smallholders in Asia face a range of challenges in obtaining certification, particularly due to financial constraints and the high costs of the certification process. Key barriers include the need to organize collectively and prove legal land ownership, which is crucial to avoid land tenure conflicts and prevent cultivation in forested areas. Furthermore, smallholders often struggle to implement standardized agricultural practices and maintain accurate productivity records, which are essential for traceability. These challenges are compounded by the perception that initial and recurring certification costs often outweigh the expected economic benefits (Tey et al., 2020; Vos et al., 2023).

More broadly, several studies have shown that the most significant cost components in independent smallholder certification are third-party audits, legal documentation requirements, and training programs. Among these, land legalization and document management rank as the second most expensive category after audit costs, making them major barriers to smallholder inclusion in RSPO-certified supply chains (Irawan et al., 2024).

### ***3.3 Social participation, consultations, and stakeholder perceptions***

An analysis of RSPO audit reports from certified units in Asia and Latin America reveals valuable qualitative information derived from the mandatory stakeholder consultations conducted as part of the certification process. These consultations aim to assess the perceptions of diverse interest groups—including workers, trade unions, local communities, environmental NGOs, public agencies, and fruit suppliers—regarding the socio-environmental compliance of audited operations.

Regional differences in stakeholder engagement are summarized in Table 2, which highlights the greater depth and diversity of interactions in Latin America compared to the more institutionally focused approach observed in Asia.

Table 2: Regional Differences in Stakeholder Feedback. Source: Compiled by the authors based on audit reports (2024).

<b>Aspect</b>	<b>Latin America</b>	<b>Asia</b>
Depth of consultations	High – presence of internal committees, local NGOs, Indigenous, urban, and rural communities	Medium – primarily focused on workers and institutional compliance

Transparency and responsiveness	High – companies conducted guided visits with communities and opened technical dialogues	Less detailed – no reports of open technical visits with communities
Reported social projects	Diverse: education, health, infrastructure, culture, and gender	Less frequently mentioned or lacking detail
Presence of complaints	Medium – when present (e.g., water use), evidence of remediation was reported	None recorded

Although both regions involve similar stakeholder groups, Latin America stands out for adopting more inclusive and decentralized consultation practices. These are evidenced by the establishment of internal thematic committees such as those focused on gender, occupational safety, and community relations, as well as the active participation of indigenous peoples and urban communities. In contrast, stakeholder engagement in Asia tends to be more limited in scope, often emphasizing institutional verification process centred on occupational health and safety, with comparatively less attention to broader social or environmental initiatives.

Johnson (2022), in his analysis of RSPO certification impacts in Ecuador, identified significant changes in governance within the sector. Initially, certification led to more technical, formalized relationships between companies and communities. This evolved into a hybrid model of governance, marked by collaboration among businesses, government institutions, NGOs, and community representatives in decision-making. Eventually, governance efforts became more regionalized, adopting territorial approaches to address socio-environmental impacts more holistically.

Nevertheless, participatory governance continues to face structural limitations. While oil palm smallholders—particularly migrant settlers—are partially integrated into the production model, Indigenous and Afro-descendant communities living in forest frontier regions are often excluded. These groups, typically organized under communal land tenure systems and reliant on forest-based livelihoods, have limited presence in certification schemes. Mexico stands out as an exception, where the “ejido system”<sup>7</sup> has received state support for oil palm cultivation. In most other countries, however, the inclusion of smallholders within communal land contexts remains rare (Ojeda et al., 2015).

#### 4. Final Considerations

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<sup>7</sup> The ejidal system in Mexico refers to a model of rural property where land is held communally by rural communities, often based on indigenous traditions and the heritage of the Mexican Revolution (Contreras, 2024).

The analysis of audit reports reveals that, although certified production units meet the minimum requirements for RSPO certification, substantial regional differences persist in terms of non-conformities, social inclusion, traceability, and stakeholder engagement. By demanding standards that often exceed national legislation, RSPO certification exposes underlying structural and institutional weaknesses—particularly in contexts where enforcement capacity or technical support is limited.

Latin America stands out for adopting a more participatory and inclusive approach; however, it continues to face significant challenges in ensuring labor rights and occupational protections. In contrast, Asian operations tend to emphasize documentary compliance but often lack depth in the implementation of social and environmental practices. Both regions exhibit notable progress as well as critical limitations that must be addressed in the development of public policies and corporate strategies aimed at sustainability in the palm oil sector.

Overall, while the RSPO provides a valuable framework for promoting more sustainable and socially responsible palm oil production, its implementation remains uneven across regions. Ultimately, the effectiveness of the certification depends not only on formal adherence to its criteria but also on the ability of certified units to meaningfully internalize and operationalize its principles within diverse socio-environmental contexts.

The comparative analysis shows that the RSPO does not produce uniform outcomes across the different contexts in which it is implemented. On the contrary, its appropriation is deeply shaped by local institutional frameworks, pre-existing agrarian structures and the degree of engagement by social actors and state. This heterogeneity of effects confirms the initial hypothesis of the study, that voluntary certifications such as the RSPO operate as instruments of environmental governance that do not impose a single standard, but are reinterpreted and reconfigured according to local and regional dynamics.

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## 6 Considerações finais

Os resultados evidenciam que a certificação RSPO tem potencial para induzir práticas socioambientais mais responsáveis na cadeia da palma de óleo, especialmente ao fomentar a adoção de boas práticas agrícolas, conservação da biodiversidade e avanços nas condições de trabalho. Entretanto, o alcance desses benefícios mostra-se desigual, limitado por fatores como concentração fundiária, conflitos territoriais, burocracias regulatórias e desigualdades estruturais que marcam territórios como a Amazônia paraense, no Brasil.

Observou-se que, embora a certificação seja reconhecida como um instrumento importante de governança e diferenciação de mercado, sua efetividade depende fortemente de arranjos institucionais, participação social e articulação com políticas públicas locais. Em contextos em que predomina a ausência ou fragilidade de políticas territoriais inclusivas, há maior risco de que os benefícios da certificação se restrinjam a grandes empresas, deixando de alcançar pequenos produtores e comunidades locais que mais necessitam de proteção e oportunidades.

No campo internacional, a análise comparativa demonstrou que o desempenho da certificação varia conforme os contextos políticos, econômicos e culturais, revelando convergências em relação aos princípios gerais, mas também desafios específicos de implementação e fiscalização em diferentes países. Esse panorama reforça que a certificação não deve ser vista como solução única, mas sim como parte de uma estratégia mais ampla que inclua fortalecimento da governança territorial, participação comunitária, políticas públicas integradas e maior fiscalização.

Por fim, conclui-se que a certificação RSPO pode contribuir significativamente para tornar a cadeia da palma de óleo mais sustentável e socialmente justa, desde que acompanhada por políticas e iniciativas que promovam a inclusão, respeito aos direitos territoriais e fortalecimento de capacidades locais. Assim, a certificação se consolida não como um fim, mas como um instrumento que, articulado a outras estratégias, potencializa transformações rumo a um modelo de desenvolvimento rural mais equilibrado, inclusivo e sustentável.

## APÊNDICE A – ROTEIRO ENTREVISTAS

Nº da entrevista:	Data:
Nome do entrevistado(a):	
Município:	

### PARTE I – INFORMAÇÕES GERAIS

- 1) Gênero:  
 Homem  Mulher  Outro: \_\_\_\_\_
- 2) Idade: \_\_\_\_\_
- 3) Escolaridade:  
 Não frequentou a escola       Ensino fundamental incompleto  
 Ensino fundamental completo       Ensino média incompleto  
 Ensino média completo       Ensino superior incompleto/cursando  
 Ensino Superior completo       Pós-graduação

### PARTE II – LIMITES E OPORTUNIDADES

- 4) Como as empresas que atuam no setor da Palma de Óleo no nordeste do Estado do Pará envolvem ativamente as comunidades locais em decisões que afetam diretamente suas vidas?  
 Através de consultas regulares e reuniões comunitárias  
 Por meio de representantes comunitários nas tomadas de decisão  
 Através de programas de responsabilidade social corporativa  
 Não há envolvimento significativo  
 Outros (especificar): \_\_\_\_\_
- 5) Você percebe os esforços das empresas para apoiar projetos ou iniciativas nas comunidades locais? Se sim, pode fornecer exemplos?  
 Sim  Não
- 6) Quais são os principais desafios ou preocupações que as comunidades locais têm em relação às operações das empresas de Palma de Óleo?  
 Impacto ambiental  
 Condições de trabalho  
 Questões fundiárias  
 Saúde pública  
 Outros (especificar) \_\_\_\_\_
- 7) Como as empresas comunicam regularmente informações relevantes às comunidades locais sobre suas operações?  
 Reuniões comunitárias  
 Comunicados oficiais  
 Canais de mídia locais  
 Redes sociais  
 Não informam

8) Como você avalia o relacionamento das empresas com as comunidades locais nas áreas onde são realizados os plantios de palma de óleo?

(        ) Excelente - A empresa mantém um relacionamento positivo e colaborativo com as comunidades locais, promovendo o diálogo e a participação

(        ) Bom - O relacionamento com as comunidades locais é satisfatório, mas ainda há espaço para melhorias na comunicação e no envolvimento

(        ) Regular - O relacionamento com as comunidades locais é instável, com alguns desafios de comunicação e confiança

(        ) Ruim - A empresa enfrenta dificuldades significativas no relacionamento com as comunidades locais, com falta de confiança e tensões

9) Você observou mudanças notáveis na região/localidade após a implantação dos plantios da Palma de Óleo?

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10) Você nota alguma diferença na forma como as empresas certificadas e não certificadas interagem com as comunidades locais e lidam com os impactos ambientais?

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11) Você notou benefícios nas comunidades que foram proporcionadas pelas empresas do setor da Palma de Óleo (por exemplo, na área da saúde, geração de renda, educação, entre outros)?

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