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## **The Socio-Ecological Impacts of Palm Oil Production in Rural Communities. A Regional Material Flow Analysis in the Micro-Region Tomé-Açu in Pará, Brazil**

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Pará is the largest palm oil producing state in Brazil, providing roughly 90% of the national palm oil. In 2010, then president Lula da Silva, initiated the PPSPO (*Programa de Produção Sustentável de Palma de Óleo*), a government programme intended to foster a socially and environmentally sustainable production of palm oil by restricting the plantations to deforested and degraded areas in the Amazon, and by including small scale family farmers into the market.

In this work, the socio-environmental impacts of palm oil expansion in the micro-region Tomé-Açu are explored. Combining data driven analysis (regional material flow analysis (rMFA) and land use data) with qualitative work during research in the field, the study examines changes in the agricultural production in the region between 1990 and 2014, which produces about 70% of the palm oil in Pará.

Palm oil expansion influences land use interests as well as rural communities and their agricultural production patterns. One notable change is the increase of fallow land. A crucial fact is that this deforested land type is regarded as degraded and thus suitable for palm oil plantations. A related development is a significant rise of land prices. Put together, these developments make it much more profitable to let these lands lie fallow and eventually sell them to palm oil companies than to use them for extensive cattle ranching.

A second observable change is a decrease in production of local staples, especially cassava. Being a very price volatile crop, cassava production appeared less attractive compared to new employment opportunities or contract farming in the palm oil sector, pulling workforce out of small scale cassava production, thus contributing to lower production and higher prices of this important staple.

In summary, palm oil production pushes economic development in the region but leads to new risks in the competition for land and workforce resources. By describing and analyzing these developments, the study contributes to a deeper understanding of socio-ecological impacts connected to palm oil production in Brazil as it tries to cope with the challenge of producing palm oil in ecologically and socially sustainable ways.

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**Keywords:** Brazil, cassava production, land use change, palm oil, regional material flow analysis, rural communities

## **Introduction**

Palm oil is one of the most consumed vegetable oils in the world (UNDP 2011). Compared to Malaysia and Indonesia which are responsible for about 80% of worldwide production (Hunsberger und Alonso-Fradejas 2015) Brazil plays a comparatively minor role, producing 0,5% of the palm oil in the world. However, due to a government program for the sustainable production of palm oil, the PPSPO (*Programa de Produção Sustentável de Palma de Óleo*), the case of palm oil production in Brazil deserves a closer look. Launched in 2010, the PPSPO intends to foster a socially and environmentally sustainable production of palm oil by including small-scale family farmers into the palm oil market via contract farming schemes and to avoid new deforestation for the plantations by restricting them to areas deforested before 2008 (MDA 2010). Still, some local researchers and experts point at risks concerning e.g. the conditions of the inclusion of small scale farmers (Nahum, Santos 2015), decreasing production of staple food crops (Mota et al. 2015) of which cassava is the most important in that region, as well as environmental consequences for Amazonian ecosystems and biodiversity (Butler and Laurence 2009).

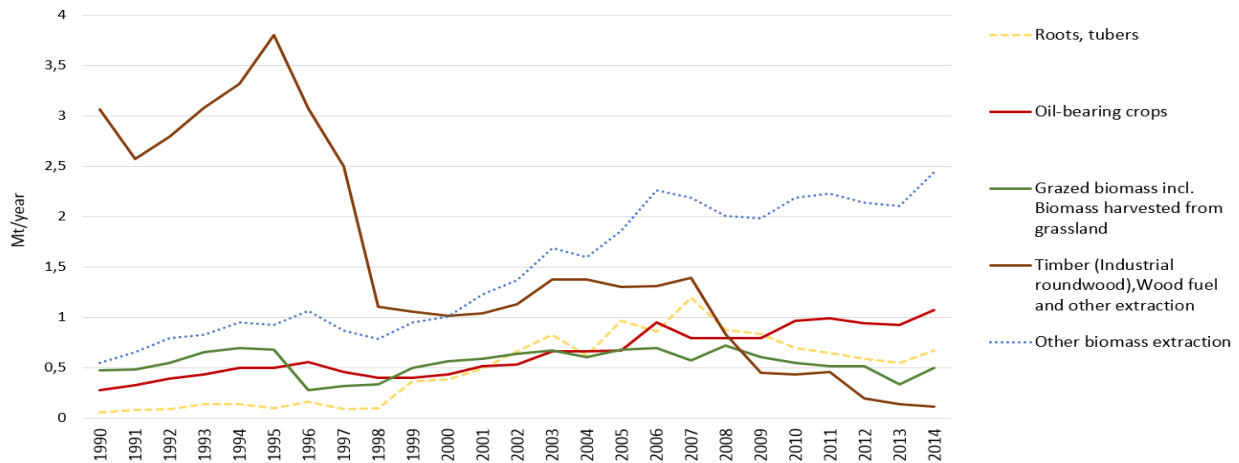
In this context the study explores the socio-ecological impacts of palm oil expansion in the micro-region Tomé-Açu, consisting of the five communities Acará, Concórdia do Pará, Moju, Tailândia and Tomé-Açu, located in the northern state of Pará in the legal Amazon region of Brazil. One focus of the study was on observable changes in land use and land cover in the palm oil producing communities. The second focus elaborated possible impacts of palm oil production on the production of cassava.

## **Material and Methods**

The methodological approach combines a quantitative data-driven analysis with qualitative work during field research. The quantitative part consists of a regional material flow analysis (rMFA) used to analyze the domestic extraction of biomass. For the calculation official statistical data (IBGE) were complemented by data collected during field research. Additionally, land use and cover data from the TERRACLASS project from the National Institute for spatial research (INPE), were examined to understand changes in the agricultural activities and to reveal the role of palm oil fruit extraction within the agricultural sector of that region between 1990 and 2014. The qualitative method consisted of 42 semi-structured interviews with local experts from research, policy, involved companies, labor unions and non-governmental organizations as well as visits to the palm oil producing communities and plantations.

## **Results and Discussion**

The calculation of the rMFA uncovered the development of the biomass flows in the region of Tomé-Açu, framing the setting in which palm oil expansion takes place. Furthermore, it confirmed a pattern of biomass resource use that interview partners described as “typical land use cycles” of young communities in the Amazon, of which the study region is an example. Within the biomass extraction between 1990 and 2014, the extraction of wood, grazed biomass, roots (cassava) and oil bearing crops (about 70% palm oil fruits) are the largest flows, presented in Figure 1. As the graph shows, the domestic extraction of these four biomass categories displays significant changes in this period. These changes show similarities in the biomass extraction profiles of all five communities. Figure 1 illustrates the succession of land use stages: the high timber extraction in the early 1990s indicates the establishment of young rural communities, which in this case had formed until the late 1980s. A typical land use subsequent to deforestation is pasture, here shown as grazed biomass, increasing since the early 2000s. putting cattle on recently cleared lands presents an economically simple form of land use and is an important means to declare ownership and use of these areas (Coy and Klingler 2014). After the land is further flattened by cattle, annual or perennial cultures like coconut, fruit trees or palm oil trees are planted, depending on their current market prices.



**Figure 1:** Domestic extraction of biomass in the micro-region of Tomé-Açu between 1990 and 2014 in Megatons per year (Mt/year)

This land use pattern reveals a close relation between pasture and cattle ranching (decreasing since 2008), and palm oil plantations as a potential subsequent land use. In the micro-region palm oil was produced since the late 1960s but especially from 2000 onwards, its amount increased massively, doubling until 2010 when more than 800.000 tons are produced. From then on the region produces about 80% of the palm oil in Pará and 50% of the palm oil in Brazil (IBGE 2015).

These biomass extractions and deforestation rates of the communities also signify that due to early wood extraction, huge areas of the region, up to 80% of the community areas are deforested already in the early 2000s. Consequently, the restriction of the PPSPO to plant palm oil trees only on areas deforested before 2008 is not a very limiting factor for the expansion dynamics.

#### ***Land use and cover change and indirect deforestation***

The link between pasture and palm oil plantations can be further understood using land use and cover data for 2008, 2010 and 2012 which allows examining changes in land use and cover development two years before and two years after the PPSPO implementation in 2010. One notable change this data present is the increase of fallow land (degraded pasture, regenerating pasture and secondary vegetation) in 2010 whereas well preserved pastures show the opposite trend, decreasing in all communities in the same year. A parallel development can be observed for the cattle herds in this period, in contrast to a strong increase in the rest of the state of Pará.

The interviews then revealed that pastures were the areas most used for plantations, especially since the PPSPO restricts plantations to deforested areas. This fact, together with the significant rise of land prices since 2005 (Silva 2015), offers a reasonable explanation for the land use and cover changes: in this changed context it seems much more profitable to let pastures lie fallow and eventually sell them to palm oil companies than to use them for extensive cattle ranching.

A possible risk of that development is a shift of cattle farming further towards economic frontier regions in the inner Amazon where there is less environmental control and where it may cause new deforestation. Often activities like deforestation or cattle ranching don't disappear but move to other places that bear the opportunity for new profits.

This trend is already more closely analyzed for soy or sugar cane plantations on pasture areas in the south of Brazil that pushed pastures further north, causing indirect deforestation (Barona et al. 2010; Gollnow und Lakes 2014).

#### ***Impact on local cassava production***

A second observable change in the palm oil producing communities is a decreasing production of certain local food crops like beans but especially of cassava. Cassava is predominantly produced

by small scale farmers for local markets (Embrapa 2008). Its production has declined strongly since 2007 as Figure 1 shows. Understanding potential influences of palm oil expansion on cassava decline was challenging but field research revealed three plausible explanations: 1. Land of small scale farmers was sold to palm oil companies until 2010, when the PPSPO turned the focus on including those farmers. 2. The inclusion of the small scale often resulted in too little area, too little time and too few working hands left, to grow food crops while also taking care of the palm oil plantations. 3. New employment opportunities in the palm oil sector emerged attracting mainly young, strong men out of family farming and thus cassava growing. And because cassava is a very price volatile crop, income appeared less secure compared to these new employment opportunities or to contract farming in the palm oil sector, pulling workforce out of small scale cassava production and thus leading to less production and higher prices.

## Conclusions and Outlook

The study led to the conclusion that palm oil production regulated by the PPSPO may lead to improvements like preventing direct new deforestation and for the farmers included into the production due to higher income or by offering new employment opportunities and thus improving livelihood and economic development in the communities. But as pointed out, there are also risks and indirect impacts that have to be considered. A profound understanding of the historical patterns of land use as a precondition to avoid shifting pastures and indirect deforestation elsewhere is as important as regarding possible impacts on local food production. However, because the palm oil program PPSPO is recent and still ongoing, the results are still preliminary but contribute to a deeper understanding of socio-ecological impacts connected to palm oil production in Brazil and to assess whether, even under the Brazilian national program for sustainable palm oil production, PPSPO, sustainable palm oil production seems possible.

## References

1. Barona, E., N. Ramankutty, G. Hyman, O. T. Coomes (2010): The role of pasture and soybean in deforestation of the Brazilian Amazon. *Environmental Research Letters* 5, 2/2010, S. 1–9.
2. Butler, R. A., W. F. Laurance (2009): Is oil palm the next emerging threat to the Amazon? *Tropical Conservation Science*, 2(1)/2009, S. 1–10.
3. Coy, M., M. Klingler (2014): Die sozial-ökologischen Kosten des Wachstums. Ein Bericht von der Pionierfront. In: Drekonja-Kornat, G., U. Prutsch (Hrsg.): *Brasilien 2014. Aufbruch und Aufruhr*. LIT-Verlag, Münster, Hamburg, Berlin, Wien, London, Zürich, S. 85–108.
4. Embrapa (2008): *Sistemas e Custos de Produção de Manioca Desenvolvidos por Pequenos Agricultores Familiares do Município de Moju, PA*. Alves, R. N. B; Cardoso, C. E. L.
5. Gollnow, F., T. Lakes (2014): Policy change, land use, and agriculture: The case of soy production and cattle ranching in Brazil, 2001–2012. *Applied Geography* 55, 2014, S. 203–211.
6. Hunsberger, C., A. Alonso-Fradejas (2015): The discursive flexibility of ‘flex crops’: comparing oil palm and jatropha. *The Journal of Peasant Studies* 43, 1/2015, S. 225–250.
7. IBGE (2015b): SIDRA. <http://www.sidra.ibge.gov.br/>.
8. MDA (2010): Programa de Produção Sustentável de Óleo de Palma no Brasil. [http://www.agricultura.gov.br/arq\\_editor/file/camaras\\_setoriais/Palma\\_de\\_oleo/1\\_reuniao/Programa.pdf](http://www.agricultura.gov.br/arq_editor/file/camaras_setoriais/Palma_de_oleo/1_reuniao/Programa.pdf) [Assessed 16.06.2015].
9. Mota, D. M. d., E. M. d. Silva, H. Schmitz, L. N. Alves, M. d. S. G. Ferreira (2015): Produção de cultura alimentares e dendê nos estabelecimentos familiares no nordeste paraense. *Seminário Internacional América Latina: políticas e conflitos contemporâneos*. SIALAT/2015, UFPA, Belém.
10. Nahum, J. S., C. B. d. Santos (2015a): O boom do dendê na microrregião de Tomé-Açu, na Amazônia paraense. *confins*, 25/2015.
11. Silva, E. P. d. 2015. *Agroestratégias e monocultivos de dendê: a transferência silenciosa das terras da reforma agrária para o grande capital na Amazônia paraense*. Master thesis, Universidade Federal do Pará.
12. UNEP (2011): Oil palm plantations: threats and opportunities for tropical ecosystems. [http://www.unep.org/pdf/Dec\\_11\\_Palm\\_Plantations.pdf](http://www.unep.org/pdf/Dec_11_Palm_Plantations.pdf) [Assessed 19.05.2015].