



## LOOKING AHEAD We do not know enough about how deforestation, simplification of diets and decreasing agricultural biodiversity are dynamically linked

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This essay raises the issue that only few studies link agricultural biodiversity, land use and food access in rural landscapes over time. In the study described, a trade-off is identified between income generation and market opportunities linked to the expansion of commercial agriculture at the Amazonian forest frontier, and lower forest cover and agricultural diversity, as simplified food production systems emerged. The observed homogenization of agricultural production toward commercial crops and simplified production systems, paralleling a homogenization of diets and sources of food, is an important result that calls for further research and eventually policies coupling human and environmental health.

time (or time period)	2000 – 2015
country & region	Peruvian Amazon, Ucayali region
context & agro-eco landscape type	upland and floodplain mestizo communities; wet and dry season; agriculture including cattle farming, hunting and forestry represent the main productive activities; staple crops (banana, cassava, papaya, rice and maize) and expanding cash crops (oil palm, cacao, coffee); illicit crops; road expansion; chronic malnutrition for children
key actors, stakeholders & beneficiaries	Researchers, policy makers, food, health and environmental agencies/decentralized services
model and/or tools used	-

### Overview

Few studies link agricultural biodiversity, land use and food access in rural landscapes over time. Expanding agricultural systems at the forest frontier are often associated with reduced agricultural biodiversity and ecosystem services, but the relationship between these changes and access to food or changes in diets is complex and only relatively recently attracted significant amounts of interdisciplinary research. The Peruvian Amazon, part of one of the most mega-diverse regions on earth, has attracted a growing body of literature on land use and socioeconomic change. Land use changes have been linked to agrarian policies, smallholder resettlement schemes, road and infrastructure development, oil palm, cattle farming and cultivation of illicit crops. Cropland expansion has been identified as a major driver of land cover change. At the same time, the use of increasing amounts of land for agriculture has not directly

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improved human nutrition. In the Ucayali region, between 2010 and 2013 one in four children under five was reported to be suffering from chronic malnutrition.

In 2000, researchers conducted a study to understand to what extent child nutrition and health were affected by seasonal ecosystem dynamics. They collected, among other, data on the socio-economic characteristics of farming households, their use of agricultural biodiversity and food consumption. In 2015, a group of researchers involving some of those who participated in the initial study, set out to evaluate the changes occurring in these dimensions. Mixed methods combining semi-structured household surveys, focus groups, in-depth interviews with key informants, and satellite imagery were applied. Of the initial 132 households interviewed in upland and floodplain mestizo communities (colonist settlers), 53 had migrated. The final sample was based on 53 full household surveys.

Through the analysis of the different sources of data collected, we found an emerging transition towards less diversified food consumption, loss of forest cover and lower agricultural biodiversity.

In the early 2000s, these farming households regularly ate what they grew and harvested from their land, fish, wild fruits and other products collected from the Amazon forest, contributing to a relatively diverse diet. Their diets were based on a limited consumption of meat and dairy items and high consumption of plant-based foods from their own production.

In 2015, their agricultural production focused on income generation through commercial crops, oil palm and cacao in particular, only partially satisfying household consumption. The diversity of crops they used to cultivate decreased from an average of seven crops to four crops, often at the expense of rice, maize, cassava, beans and fruit trees.

Food consumption appeared geared towards foods with high protein and fat content, such as meat and dairy, with food items increasingly purchased in the market, with a reduction of the food groups consumed in the 24 hours previous to the household survey, compared to their food consumption in 2000.

At the same time, over the 14-year period (2001 – 2015), more rapid deforestation and more forest loss was observed in Ucayali than other Amazonian departments in Peru. For the communities studied, we estimated a total forest loss of 30% (12,430 ha) between 2001 and 2015. Peak deforestation years in the 15-year period appear linked with incentives for agricultural expansion for smallholders and forest cutting from a multinational enterprise. We asked farmers who had reported a change in land use why they made this change. Income generation potential and support in the form of government incentives led several households to increase the area they devoted to oil palm cultivation. Some farmers mentioned the availability of family labour as a reason for increasing their cultivated area.



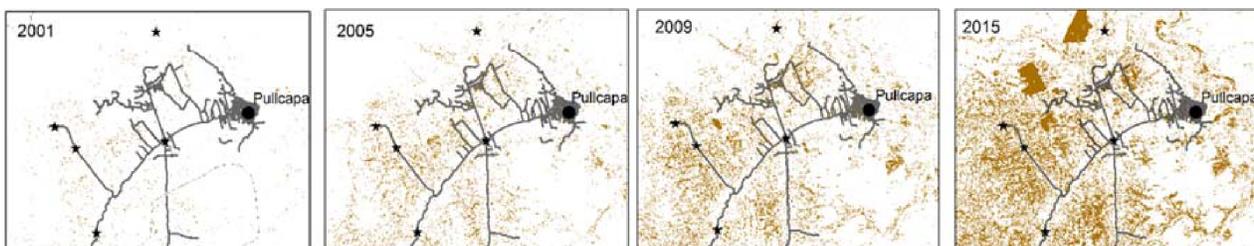
**Figure 1.** Agricultural production at the forest frontier

Overall, our results point to a trade-off between income generation and market opportunities linked to the expansion of commercial agriculture at the Amazonian forest frontier, and lower forest cover and agricultural diversity, as simplified food production systems emerged. Moreover, this trade-off also emerged with food access, as the number of food groups consumed decreased, whilst food provisioning became more market dependent.

The observed homogenization of agricultural production toward commercial crops and simplified production systems, paralleling a homogenization of diets and sources of food, is an important result that calls for further research and policies coupling human and environmental health. Longitudinal nutritional analyses taking into account the life cycle, coupled with fine-grained analyses of land use change processes to pinpoint trade-offs and synergies are urgently needed. Such studies have major implications for land use and food policies in the region, but also for health policies, as unhealthy diets have been identified as a central cause of disease worldwide.

## Relevance to different spatial and temporal levels

We found that over a 15-year period, farming households in an Amazonian forest frontier shifted from diets based on limited consumption of meat and dairy items and high consumption of plant-based foods from their own production, towards diets with high protein and fat content, with food items increasingly purchased in the market. In parallel, production systems became less diversified, more market-orientated and specialized toward commercial crops, oil palm and cacao in particular; whilst deforestation increased significantly.



**Figure 2.** Deforestation in the communities studied, over a 15-year period

The conversion of tropical forest to commercial agriculture, while potentially improving rural income in the short term, may threaten local livelihoods and food access in the long term. Policy makers aiming to

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promote sustainable and inclusive development, ensuring food security while protecting ecosystem services, would benefit from in-depth assessments of the multiple impacts of land use change that look at multiple scales. Long-term analyses that study changes in diets, agricultural biodiversity and deforestation over time are urgently needed to support decision-making and integrated agricultural, food, and health policies that target improved human and environmental health.

#### Key terms

- **Food access** - the ability to acquire sufficient quality and quantity of food to meet all household members' nutritional requirements for productive lives'
- **Agricultural biodiversity** - all components of biological diversity, e.g. plants, animals and microorganisms, of relevance to food and agriculture, including associated socio-cultural practices

#### Key references

G. Blundo-Canto, G.S. Cruz-Garcia, E.F. Talsma, W. Francesconi, R. Labarta, J. Sanchez-Choy, L. Perez-Marulanda, P. Paz-Garcia, M. Quintero. Changes in food access by mestizo communities associated with deforestation and agrobiodiversity loss in Ucayali, Peruvian Amazon. *Food Security*, 12 (2020), pp. 637-658 <https://link.springer.com/article/10.1007/s12571-020-01022-1>

Murray, T.P. (2006). *Rhythm of the rivers: an ecosystem approach to child nutrition and health on the Amazon frontier*. Unpublished Doctoral Dissertation, College of Health and Science, University of Western Sydney, Richmond, NSW, Australia.