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Global meat consumption trends and local deforestation in Madre de Dios: assessing land use changes and other environmental impacts

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Abstract

Meat consumption is becoming one of the most relevant sectors in terms of environmental impacts globally. In the Brazilian Amazon the effects of this process are seen in the ongoing deforestation and land-use change (about 65% of deforestation can be linked to cattle ranching). One of the main causes of this trend is the increased efficiency of the transport infrastructure: along both sides of the Brazilian Inter-Oceanic highway, about 50km of rainforest have been converted to cattle ranching. In 2011 the Inter-Oceanic highway was finalized also on the Peruvian side: the region of Madre de Dios is neighboring the Brazilian Amazon, therefore the risk is that this area will undergo the same kind of development.

The objective of this analysis is to highlight the contribution of global meat demand trend as cause of land use change and deforestation in the Madre de Dios region. This focus has been chosen since, nowadays, the magnitude of cattle ranching activities is hidden by more evident and damaging activities (e.g., gold mining), and its near-future effects risk to be underestimated. By starting with investigating the preliminary signals of cattle ranching contribution to the local deforestation process, this analysis will serve as basis for more comprehensive future works on local data, including monitoring campaigns of local biodiversity and GHG emissions. Land-use change is, thus, analyzed through FAO data and also through data acquired with remote sensing carried out within other projects. Meat consumption and production outcomes are obtained from the FAOSTAT database. By integrating trends in the regional meat consumption with the emerging trading effects, which are incremented by the new highway, it is possible to highlight the risk that the global convergence in meat consumption trends can locally influence the deforestation in Madre de Dios.

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1. Introduction

The increasing meat demand at the global level has been emerging as one of the causes of global environmental issues like climate change and deforestation, due to the related intensive cattle ranching activities. The Amazon rainforest is one of the most damaged ecosystems by cattle ranching: in particular, in the last decade the deforestation due to these intensive activities has been evident along the Brazilian layout of the Inter-Oceanic highway. After the finalization of the Peruvian part of the same highway, also the areas of Amazon forest in the Peruvian regions which are crossed by this infrastructure risk to undergo the same damages that have taken place on the Brazilian side. Nevertheless, in the Madre de Dios region this risk could be hidden by more prominent and damaging phenomena, like gold mining. Given this threatening risk, we analyze the meat consumption trends in Peru and South America and compare them with the global ones. Consequently, we carry out a preliminary evaluation of the land-use changes in the area, focusing on deforestation and transformation (highlighting permanent pasture and meadows evolution), using open-source data, since nowadays we do not have specific field data available. Thus, this paper aims at highlighting the likely risk that global meat consumption trends could affect the future deforestation process in this specific region.

1.1. Meat consumption trend in the world

In the near future the role of the food system in driving the environmental change on a global level will increase significantly. This is due mainly to two factors: in the first place, the need for food will expand as population will continue to grow [2]; in the second place, income per capita will also rise, and this has traditionally led to a higher consumption of animal protein, fats and sugars [3]. Thus, both the food system and the ecosystems on which it depends will be challenged significantly [4]. The current need is for a way to produce food which accounts for the environmental externalities, while ensuring that the growing global population has a nutritionally correct food supply [5]. The food system of the future should be both resilient and sustainable from the environmental point of view, but with an increased efficiency. As the food sector with the highest impact is that of animal products, it is possible to get a comprehensive picture of the current food system by analyzing three main indicators: land requirement for animal products, meat consumption per capita and the amount of animals slaughtered per capita.

In 2007 the total area harvested for animal products achieved 440 million hectares, while the average global land requirement for animal products per capita was equal to 610 square meters [6]. The meat consumed per capita in 2009 globally was 41 kilograms, which corresponds to a total of nearly 280 Mt of meat globally [1].

The number of animals slaughtered is also significant: in 2009 over ten animals were slaughtered per capita, which translates to almost 63 billion animals (i.e. chickens, pigs and cattle) slaughtered in total (own calculation, data from FAOSTAT). When looking at the evolution of these three indicators in the last 50 years, it is evident that the growth rates for all the Asian countries together with Central and Southern America are much higher than the world average [7]. Such pattern is a consequence of the significant economic development that has occurred in these regions. It is clear that poultry has become more and more relevant globally (values have increased about five times in 50 years), and also that meat consumption is becoming more important in most regions of the world, especially in those undergoing rapid economic growth [7]. It can be said that diets are converging globally in terms of meat consumption, a trend which puts a considerable stress on the environmental resources available globally, including the Amazon forest.

1.2. Amazon deforestation and meat consumption

The Amazon is the largest tropical forest in the world (6 million km²) and its basin covers nine countries within South America. The deforestation of this rainforest has been very noticeable during the last 40 years due to human activities, and continues intensely [8]. Between 2004 and 2011, the Terra-i monitoring system (the only land-cover change monitoring system available that provides satellite based rainfall and vegetation data with consistent spatial - 250m- and temporal resolution -6 days- for the entire of Amazon) detected a cumulative habitat loss of 14,159,913 hectares across the nine countries. Eighty-eight percent of the detected land cover change occurred in moist forest.

The main causes of this prominent land-use change are the demand for firewood, mineral exploitation, the cultivation of illicit crops and forest fires (some caused by practices such as slash-and-burn), but the key drivers have been monocultures and cattle-ranching [9]: their expansion results from the growing global demand for agricultural commodities [8]. In addition, the construction of highways (e.g., infrastructures implemented by the Initiative for the Integration of the Regional Infrastructure of South America, IIRSA) is a crucial factor, which magnifies the influence of other drivers on land use change. In effect, *“the deforestation by shifting cultivation and livestock is directly related to the accessibility of forested lands. Therefore, the road can be considered as an*

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