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CAUSAL MODELING OF AMAZONIAN DEFORESTATION

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Most models on deforestation in the Brazilian Legal Amazon have emphasized the importance of road building in promoting deforestation over the region. A more recent model has shown that there are other factors related to deforestation, such as rural and urban population density and duration of dry season. To contribute to knowledge of the deforestation process in Brazilian Legal Amazon, we developed a causal model based on structured equations (path analysis), in order to understand direct and indirect effects of these factors, and the magnitude of their impact. We first created an *a priori* causal model, on which the variables road distance, annual rainfall, duration of dry season, river distance, and rural and urban populations were considered as having a direct effect on deforestation. Indirect effects tested were the influence of road distance, river distance, soil fertility, and urban populations on rural populations; and the effects of road distance and rural populations on urban populations. The magnitude of these effects was assessed using standardized coefficients of the regressions. The importance of these factors was tested at two spatial scales, using quadrats of 50 x 50 km and 20 x 20 km in the Brazilian Amazon.

Road distance had the highest impact on deforestation, followed by rural population density. The most important indirect effects were those of road distance on urban and rural populations. Most other effects had significant but weaker impacts on deforestation. Soil fertility and annual rainfall had non-significant effects. Results were similar when the model was applied to both 50 x 50 km and 20 X 20 km quadrats, indicating that our conclusion is not sensitive to the spatial scale of the analysis. These results confirm that roads have important direct and indirect impacts on deforestation, and the main indirect effect is that through rural populations.