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## PREDICTORS OF DEFORESTATION IN THE BRAZILIAN AMAZON

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We assessed the effects of biophysical and anthropogenic predictors on deforestation in Brazilian Amazonia. Using a GIS, spatial data coverages were developed for deforestation and for three types of potential predictors: (1) human-demographic factors (rural-population density, urban-population size); (2) factors that affect physical accessibility to forests (linear distances to the nearest paved highway, unpaved road, and navigable river), and (3) factors that may affect land-use suitability for human occupation and agriculture (annual rainfall, dry-season severity, soil fertility, soil waterlogging, soil depth). To reduce the effects of spatial autocorrelation among variables, the basin was subdivided into >1900 quadrats of 50 X 50 km, and a random subset of 120 quadrats was selected that was stratified on deforestation intensity. An ordination analysis was then used to identify key orthogonal gradients among the ten original predictor variables.

The ordination revealed two major environmental gradients in the study area. Axis 1 discriminated among areas with relatively dense human populations and highways, and areas with sparse populations and no highways; whereas axis 2 described a gradient between wet sites having low dry-season severity, many navigable rivers, and few roads, and those with opposite values. A multiple regression analysis revealed that both factors were highly significant predictors, collectively explaining nearly 60% the total variation in deforestation intensity. Simple correlations of the original variables were highly concordant with the multiple regression model and suggested that highway density and rural-population size were the most important correlates of deforestation.

These trends suggest that deforestation in the Brazilian Amazon is being largely determined by three proximate factors: human population density, highways, and dry-season severity, all of which increase deforestation. Our findings suggest that current policy initiatives designed to increase immigration and dramatically expand highway and infrastructure networks in the Brazilian Amazon are likely to have important impacts on deforestation activity. Deforestation will be greatest in relatively seasonal, southeasterly areas of the basin, which are most accessible to major population centers and where large-scale cattle ranching and slash-and-burn farming are most easily implemented.