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A Bio-economic Model For Tropical Forest Harvesting and Habitat Loss

We plan to study the interaction between tropical forest harvesting and the habitat loss for the Bonobos and Pygmy Chimpanzees (Pan paniscus) living in the forest.

Starting from data collected for the Idanre Forest Reserve in the lowland rain forest zone of South -Western Nigeria (and literature review), we constructed an analytic model that classifies the trees into 6 size classes according to their diameter and captures the forest growth over time. Our model assumes linear dynamics and uses a Leslie-like matrix that was fitted to historical time series.

We modeled the economic aspects of the logging activity by introducing variable (dependent on the effort) and fixed (independent of the effort) costs, estimated from real world data. Moreover, to estimate the economic value of the trees in each size class, we constructed a function that relates the diameter to the volume, from which we obtain a monetary value by looking at market prices of tropical wood.

We plan to include a population dynamic model of the animal populations living in the area that is dynamically coupled to the growth processes of the forest. In particular, we plan to capture the effect of each size class on the carrying capacity of the Bonobos and Chimpanzees populations.

Our final goal is to quantitatively study the effect of harvesting policies in terms of economic benefits and on the population survival probability, in order to obtain insights on the structure of more sustainable logging practices.