A BIOECONOMIC MODEL OF SUSTAINABLE SMALL-SCALE FISHERIES IN A HIGHLY INTACT AREA OF THE BRAZILIAN AMAZON

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This paper develops a bio-economic model, capable of guiding policy decisions related to sustainable development of fisheries and other non-timber forest products. The paper differs from conventional fisheries models in that the objective is not to maximize wealth or income, but to determine the effect of external shocks (such as climate change or population growth) and the impacts of policy decisions on the well-being of traditional communities and on the health of ecosystems in our study area (municipios of Barcelos and Santa Isabella in Amazonas State and Roraima State, an area of over 400,000 km2, roughly the combined size of Spain and Portugal). The model consists of four interacting components. These consist of an external shock module, which inputs shocks such as climate change into the bioeconomic model. For example, this model would predict the direct impact of climate change on fish stocks. The second component is a model that relates rainforest community well-being to environmental, social and economic variables. This model is based upon the choice modeling approach. The third component is based on the household production function approach, in this model, the dependent variable is the measure of welfare derived in the choice-modeling approach and the explanatory variables are time allocations (made by households), environmental variables, land use decisions and economic variables such as the price of non-timber forest products. This model will predict how time allocations as a result of changes in abundance of fish from climate change or from other factors. The time allocations will have an effect on land-use and the harvest of fish and non-timber products. The impact of these changes will be modeled in the fourth component, the ecosystem model which will show the impact on broader environmental variables, such as biodiversity and forest biomass. The paper will discuss the ways in which the model can inform policy, how to model interactions among the components of the model, as well as the data requirements for a full implementation of the model.