

Abstract

Biomass is still the dominant source of energy used by most rural households in the developing world. Current use patterns have been linked to adverse effects on forest resources. Alternative fuels such as kerosene could mitigate these negative effects. In order to design policies that enhance the use of alternative fuels, a first step is to understand the household fuel use dynamics in terms of quantity, types and sources. This research looks into the consumption of different fuels by rural households living next to a common property resource forest in western Kenya. There are three focuses. First, it examines the determinants of the choice of fuel consumed by rural households through a multivariate probit approach. Second, it estimates a complete demand system for household fuel consumption using the two-stage Linear Expenditure System -Almost Ideal Demand System (LES- AIDS) model. Third, it analyses charcoal trade, with a focus on the trader involvement in Kakamega town, situated on the edge of the public forest. Empirical results are based on a quantitative study of 285 households randomly selected from the community living in villages within 5km from the edge of Kakamega forest, western Kenya. This is incorporated with an analysis of the charcoal supply chain focusing on charcoal traders operating within the Kakamega municipality. Primary data collection was carried out between July 2009 and February 2010. The data collected include details of the quantities and values of different energy types used as well as household and demographic attributes. Results show that the public forest is an important source of biomass fuel supplying firewood to 50% and charcoal to 15% of sampled households as well as 21% of the charcoal sold in Kakamega town. The poverty level is an important determinant of the type of fuel combination consumed by the household as well as the source of biomass fuel. Poorer households depend more on the forest for their biomass fuels than the better off households. Households with the higher land holdings tend to rely more on biomass fuels produced from their farms. Household income is an important, but not the only determining factor for the type and level of fuel consumption. The household attributes and prices of different fuel types also play an essential role. The results of this study confirm biomass fuels are used alongside modern fuels without displacing them, evidence of fuel stacking as opposed to fuel switching, a phenomenon also observed in urban households. There is evidence of continued forest degradation from legal and illegal use of the forest for firewood and charcoal, despite the protection of the forest. The demand for charcoal, the most forest destroying fuel, is most responsive to changes in its own price, changes in the price of firewood and liquefied petroleum gas. This offers a potential for a change to a more forest conserving fuel with increasing scarcity of charcoal and increased access to the other more forest conserving fuels. However, as household incomes increase, there is a disproportionately high increase in the demand for charcoal with negative impacts on forest conservation. Charcoal trade in Kakamega town is dominated by charcoal sourced from outside the Kakamega region with a significant contribution from the public forest. The town offers a ready market for charcoal from the forest due to its growth and proximity to the forest. Therefore charcoal use and trade in the Kakamega municipality has an impact on the conservation of the Kakamega forest. Despite the fact that charcoaling in the forest is banned, it is a thriving business. The results of this study show that charcoal from the forest enters the supply

chain only through the hawkers. They therefore act as an important link between charcoal trade and deforestation and forest degradation. Charcoal producers only cut some specific indigenous trees from the forest. This selective felling of the preferred hardwood trees for charcoal may lead to biodiversity