

ARILD ANGELSEN [S26-P110]

New Insights on Woodfuel Reliance and Human Welfare

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Over 3 billion people globally rely on woodfuels (fuelwood and charcoal) to meet basic energy needs for cooking and heating. Reliance on woodfuels and the emissions associated with burning them has major implications for climate, sustainable forest use, health and human well-being. We use data from approximately 7,000 households throughout the low income tropics collected by the Poverty Environment Network at the Center for International Forestry Research to provide new insights into the role of woodfuels in rural livelihoods and factors that influence their supply and demand.

We find that income from woodfuels is the major source of forest income, with the vast majority of fuelwood for subsistence consumption and charcoal production for sale. In relative terms fuelwood is much more important for poor households, whereas charcoal production occurs roughly equally across all income quintiles. We also find that a large share of households (>40%) collect fuelwood for subsistence use from areas outside of forests including fallows, bushland etc. Households in dry forest ecosystems have higher woodfuel incomes and spend more time collecting fuel, particularly in sites on the forest edge or mosaic.

We explore determinants of absolute and relative household income from fuel, and the amount of time spent collecting fuel using a series of multi-level mixed effect regression models. We find that ownership of a gas or electric stove in the household reduces absolute forest income, and has a positive and weakly statistically significant effect on the share of forest income from fuel. However, we do not observe a full substitution of woodfuels for modern fuels, suggesting that households are fuel stacking rather than transitioning exclusively to cleaner fuels. Travel time from the household to the forest has a positive and weak statistically significant effect on time required to collect fuel. The finding confirms that the more time required to get to the forest, the more time households spend collecting woodfuels, all else being equal. Households with a higher share of fuel coming from non-forest areas have higher absolute fuel income and higher relative fuel income. We find evidence of a substitution effect between forest and non-forest fuels, particularly for dry ecosystems forests. We find evidence of supply side effects when we consider forest domains in aggregate. In general, households further along the forest transition spent more time collecting fuelwood. We also find a negative and statistically significant relationship between biomass availability and number of hours spent collecting fuelwood. Finally, we consider investment in tree planting for fuel. We find that correlation coefficients between above ground biomass and tree planting are negative, suggesting that lower levels of biomass availability catalyze tree planting. While we find considerable investment in household-level tree planting for fuel (roughly 20% of households in our sample), use of woodlots/plantations for fuel remains very limited.

Sustainable energy transitions in developing countries are the focus of Social Development Goal #7. Our analysis provides new insights into understanding the role and determinants of woodfuel reliance in the tropics.