Households and Cycles of Land Use

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Household life cycle (HHLC) models have provided a key linkage between micro-demographics and land use change. By partitioning the landscape into parcels affected by individual households and then creating a stylized model of the endogenous changes in land use by that household over time, researchers have been able to scale up to the landscape level (Brondízio et al. 2002; McCracken et al. 1999; Walker et al. 2004; Walker and Homma 1996). The stylized model of household change over time itself shows the interdisciplinary nature of population and environment research, drawing on anthropological models of the domestic cycle (Goody 1958; Goody 1976) and economic models of peasant behavior (Chayanov 1966). Alex de Sherbinin's background piece and Robert Walker's statement for this cyberseminar provide clear descriptions of the assumptions and basic arguments of the model. Building on those contributions and acknowledging the substantial empirical testing and theoretical development of this model, this contribution comments on current evaluation of the HHLC model and suggests some future directions for the study of households and cycles of land use. In doing so, I draw on ongoing collaborative research with colleagues at the Anthropological Center for Training and Research on Global Environmental Change at Indiana University, most notably Eduardo Brondízio, Alvaro D'Antona and Emilio Moran, examining households and land use / land cover change in the Brazilian Amazon.

Empirical Evidence for the HHLC Model

Walker and colleagues (Walker et al. 2002) review a large number of studies that explicitly test the HHLC model or that conduct empirical analyses that can be read as tests of the model. This review of the literature provides only weak support for the majority of the predictions of the HHLC model. In the majority of studies, no significant effects are found of household size, household composition or age of the household head. What evidence there is for household size, composition or age effects is inconsistent across studies, possibly due to differences in the political economy of study areas, the dependent variables utilized (area or proportion of area cleared, remaining area in forest, area in a variety of productive land uses), or measurement/modeling differences. In our own recent work (VanWey, D'Antona and Brondízio 2006b), we use data collected in two study sites in the Brazilian Amazon to examine the effects of household age and gender composition on land use and land cover (the intervening variables between life cycle stage and land use in the HHLC model). We find few significant effects, these effects differ across study areas, and they fail to support the HHLC model.

In contrast, there is clear evidence across many studies (included those covered and not in Walker et al.'s review) that there are significant effects of the duration of residence or the time since the property was "opened" in new frontiers (Godoy et al. 1998; Godoy, Wilkie and Franks

1997; Pichón 1997; Walker et al. 2002). Across studies we can see that forest cover decreases with duration on a parcel, though not always linearly, and that in general pasture and area in cash crops increase as households stay on (or own) a parcel for longer. These cycles have been interpreted as evidence of HHLC effects by several researchers in the Brazilian Amazon (Brondízio et al. 2002; McCracken et al. 1999; Moran, Brondízio and VanWey 2005). However, this interpretation rests on the assumption that settlers (or buyers of land) acquire parcels when they are early in their household life cycle, soon after marriage when children are small and household dependency ratios are high. Our recent work on this topic (VanWey et al. 2006a) has examined this empirically by estimating independent effects of household age (time since the household was formed through the marriage of the male and female household heads) and duration of ownership (time since the household began making decisions about the property) on land use (areas in forest, perennials and pasture) in two study sites in the Brazilian Amazon. We find that there is considerable variation in the timing of household formation relative to acquisition of property, and that the household age has no independent effect once the time since acquisition is controlled. We further find that the time since acquisition only has significant effects in our Altamira study site, a recent frontier which provided evidence of cycles of deforestation based on time since acquisition in McCracken et al. (1999) and Brondizío et al. (2002).

Revisiting the Theoretical Model

The HHLC model is so compelling and has been so influential in population and environment work because of the strength of its theoretical development and because of its intuitive appeal. It is rooted in time-tested anthropological and economic theories. Walker (2003) has developed the mathematics behind the arguments and shown results consistent with empirical patterns. It also makes intuitive sense; the majority of us have been through at least some of the stages of the household life cycle and understand the changing risk aversion and time horizons. However, the conditions assumed by Chayanov and motivating recent uses of the HHLC model no longer hold in the frontiers that we have been studying (if they even held for more than a few years after the opening of the frontier). Households arriving on the frontier are not uniformly (or even mostly) young families with small children. Nor do they currently face an absence of labor or land markets, or as strong a credit constraint as assumed. While these markets might not function perfectly, non-family labor in the form of sharecroppers or temporary laborers is easily available in many areas to which we wish to apply this model. At least in our study areas, land markets do not function perfectly but buying, selling and trading are common. While the absence of affordable credit is a constraint for many households, government credit programs meet this need for some households and sharecroppers allow other households to add labor without substantially increasing cash expenditures.

In our further theoretical development, the field needs to revisit our consideration of risk and changing risk aversion. It is possible that we misestimated the risk aversion of early settlers (who, after all, were willing to risk a move across the country to an unsettled wilderness). It is also possible that we have missed other ways of managing risk that are open to colonists and eliminate any life cycle effects. Because we do not have the isolated peasants focusing on subsistence that Chayanov assumed, we must understand land use decisions in the context of decisions about off-farm employment, education, and migration (and remittances). It is well-established in the migration literature that migration (and remittances between migrants and their

families) is a strategy for mitigating risks associated with rural production (see Stark 1991 for the theoretical development; Stark and Levhari 1982).

Finally, as Robert Walker notes in his contribution to this cyberseminar, we need to develop theoretical models of intergenerational processes. In this, we can be guided by social demographic and economic demographic theories of the changing family over the course of development. Models of institutional change from family sociology and intergenerational exchange from economic demography will be particularly relevant to understanding the ways in which both older and younger generations make decisions about migration, on- vs. off-farm employment, investment in agriculture vs. urban lifestyles, and cooperation between siblings vs. division of properties.

Future Directions

Further understanding of households and land use depends on the theoretical and empirical consideration of intergenerational processes. It is now a reasonably well-accepted fact that the population of households is more important for understanding environmental change than is the population of individuals (Entwisle et al. 2005; Liu et al. 2003; MacKellar et al. 1995). The main time at which new households are formed is the marriage (or setting up of an independent household after marriage) of a young adult – such a transition is part of a fundamentally intergenerational process. In frontier areas, the future will be in part determined by whether land is fragmented through inheritance and by how the practices of the current generation of landholders are maintained or changed by their children. These processes will be influenced by the relationships between parents and children and between siblings, necessitating new theoretical considerations and a less atomized empirical approach to households.

As alluded to above, the study of households and land use must move beyond HHLC models and other models developed mainly for understanding land use change. Land use decisions are part of a household's strategy for increasing incomes or status, reducing risk, and smoothing consumption. As are migration, employment and education decisions. In all of these decisions, the institutional and economic contexts (credit markets, land and labor markets, insurance markets, linkages to global commodity chains, government provision of services and social security, etc.) interact with systems of social organization that structure opportunities for people of different ages and genders and that determine what is a desirable outcome (particularly an urban vs. rural lifestyle, ownership of cattle). Individuals and households are embedded in webs of social relations that structure their opportunities and decision processes. The social sciences already know a great deal about migration, education, employment, and the effects of political-institutional contexts and social networks on which we may draw.

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