

Household life cycles, population mobility and land use in the Amazon: Some comments and research directions

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Background

A debatable issue in the population and environment literature has been the use of appropriate scales of analysis¹. For example, studies on deforestation in the Amazon have investigated deforestation and land use changes based mostly on aggregate data such as remote sensing imagery. Consequently, factors related to living conditions, individual and household life cycles, household strategies and personal motivations, which are in great extent directly responsible for much of the environmental change, have been usually neglected.

On the other hand, and as illustrated by de Shebernin in the PERN background paper (de Shebernin, 2006), there is a growing literature investigating the associations between changes in the environment, changes in the components of the demographic dynamics (fertility, mortality and migration), and household life cycles. Albeit mostly concentrated on frontier areas (Amazon basin, Central America, Thailand), these studies provide a glimpse on the importance on understanding population-environment interactions as resulting from processes at the micro or meso scales (individuals, households, local communities).

Studies focusing either on micro or macro scales of analysis provide only a partial understanding of the complex relationship between population and the environment, particularly in frontier areas. In this respect, it has recently been suggested the necessity of more empirical research on the *simultaneous* identification of factors at distinct scales and levels which affect the association between population and environmental change (see discussion on Marquete & Bilborrow, 1999). In particular, there has been little empirical research on the determinants of migration flows within frontier areas, and that which exists does not incorporate the effects of intergenerational characteristics associated with family succession coupled with the effects of context. Besides the articulation of spatial scales, it is also important to explicitly incorporate a temporal scale in these studies. The temporal scale is fundamental considering, for example, that attempts to determine the effects of policies on population mobility should consider the fact that policies have a time lag, so their effects could not be easily captured in cross-sectional studies.

This contribution to the PERN Cyberseminar uses insights from a research on the Northern Ecuadorian Amazon – NEA (Barbieri, 2005) to discuss evidences of associations between household life cycles, population mobility and land use changes in a frontier area. These associations are contextualized in a broader discussion about the importance of theoretical and methodological approaches which account for the multi-scale and multi-level structure of incentives and constraints shaping household decisions about land management, mobility and fertility regulation, and interactions with the environment.

¹ I consider here Gibson *et al* (2000) definition of “scale” as the “spatial, temporal, quantitative or analytical dimensions used to measure and study any phenomenon”. The concept of “level” can be used to describe a region along any measurement scale.

Research questions and tentative answers

(1) How does “population mobility” contribute to deforestation and urbanization in the Ecuadorian Amazon?

Migration and other forms of population mobility becomes increasingly the dominant demographic factor in frontier regions over time, considering that fertility and mortality levels tend to be reduced. That is the case of the Northern Ecuador Amazon (NEA). It should become even more important in future years as the second and third generation of settlers continue to reach adulthood and seeks more land or jobs, combined with the declining capacity of farms to sustain members due to population growth and decreasing soil quality with use over time, and therefore declining agricultural yields.

Recent research on the NEA shows that rural-rural migration and temporary mobility linked to the search for off-farm employment are still the most common types of mobility, representing a potentially powerful proximate determinant of deforestation and future threat to loss of biodiversity in the Amazon. On the contrary of Brazil, where the frontier is still “open”, the limited possibilities of land extensification in the NEA stimulates the expansion of the agricultural frontier towards areas of permanent conservation (national parks) and forest areas rich in cultural biodiversity, as well as species biodiversity. In this regard, *population momentum*, with large cohorts of second and even third generation colonists² seeking land as they reach adult and marrying ages in the life cycle, reflects the role of high past and current fertility rates as a powerful endogenous demographic driver of continuing fragmentation of landholdings and consequent deforestation. Another key issue affecting rural-rural migration in many countries is policy-induced price distortions, such as the use of fiscal incentives, including tax breaks and subsidized credit, which have contributed to the expansion of the agricultural frontier especially in Brazil, but also in Ecuador and elsewhere.

While smaller than rural-rural mobility, rural-urban mobility in the NEA is increasingly important, especially considering how urban growth has occurred without corresponding improvements in urban labor markets and urban infrastructure, such as sanitation, garbage disposal and water treatment, and health and family planning facilities. Furthermore, given the selective nature of migration, with the more educated and younger individuals moving more, rural production is affected by the loss of educated manpower (Bilsborrow *et al.*, 1984). The other side of the coin is that the NEA is facing rapid urbanization, with recent rapid growth of some long settled river towns, the formation of new pioneer urban areas, and the incipient transformation of many rural communities into towns, which are acquiring urban characteristics through population growth and acquisition of basic infrastructure. Even improvements in rural livelihoods or the adoption of more supportive agricultural policies are not likely to much affect the pace of urbanization, as illustrated by historical examples in Latin America and other parts of the world (Martine and Guzmán, 2002).

(2) What theoretical elements can inform a multi-scale and multi-level approach to investigate associations between population mobility, household life cycle factors and land use changes?

Recent research in the NEA has considered how multi-scale and multi-level conceptual framework which takes into account the effects of spatially and temporally inter-related factors can be used to investigate the association between population mobility, household life cycle

² Colonists arriving with children in the 1970s who in turn start having their own children in the 1980s.

factors, and land use changes at a given time is mediated by certain contextual aspects. A key issue for a successful operationalization of this conceptual framework is the availability of data sets which allow measuring the risk of mobility at a given time as a function of time-varying factors related to household size and composition, land use patterns, and characteristics of the context.

A particularly useful theoretical approach in the NEA research has been a reformulation of the “multiphasic response model”, originally proposed by Davis (1963), which is defined here as the “extended multiphasic response model” (EMRM)³. The EMRM is able to deal with the issue of how intergenerational factors associated with family succession shape household responses or strategies when stimulated by perceived changes in income and welfare. The four concurrent strategies to diversify risk and achieve desirable income and welfare levels are the allocation of one or more of the household members to mobility, land management (land intensification and land extensification) and fertility regulation. The EMRM thus allows a clearer understanding of mechanisms through which land use and demographic processes are intertwined in household decision-making processes.

The multi-scale research on the NEA shows that a family usually tries, initially, economic responses related to land management. These economic responses can reduce migration pressures overall, but in some cases land extensification can induce short-range mobility (e.g., mobility to lands within the same rural community). Out-migration of young adults is an economic-demographic response that follows as a likely alternative to diversify household income. Fertility regulation, a demographic response, is usually the last response and involves measures such as postponement of marriage or a reduction in marital fertility. Contextual factors related to community infrastructure (schools, health facilities, roads) and segmentation of labor markets (population in primary, secondary and tertiary sectors) are also relevant to indicate the extent or scope to which a household can adopt alternative decisions regarding land management, migration or temporary mobility, or fertility regulation.

(3) How can a multi-scale and multi-level approach contribute to inform policymaking by disentangling “micro-demographic” from “macro-demographic” factors affecting land use change?

A multi-scale and multi-level approach can provide a reliable understanding of the full range of factors affecting population mobility (including the position in a particular household life cycle stage), and thus provide better and more reliable information for policy-making. The approach is useful to isolate the effects of policy-relevant contextual variables from individual and household factors. Community factors may reflect policies at the local level (or formulated at higher levels, and “filtered down” to the local level), and indicate the context of individual and farm household mobility decisions.

Policies to promote socioeconomic development and environmental sustainability in the Amazon will be influenced to a major degree by how governments react to the increasingly important mobility dynamics. For example, Barbieri (2005) shows that farm household life cycle factors are key determinants of demographic dynamics, particularly of the mobility of younger household members in the NEA. This will increase pressure on natural resources of the region, especially due to rural-rural migration, which usually results in further deforestation, and rural-urban mobility, which puts increasing demands on urban infrastructure and budgets. However, the

³ For a review of the “extended multiphasic responses model”, see Bilsborrow and Okoth-Ogendo (1992), Bilsborrow and Carr (2001), Barbieri et al (In press).

former can be ameliorated by appropriate settlement and agricultural policies, and the latter by appropriate urban planning. It is important for planners to understand the implications of population momentum which results from past (and present) high fertility, which has major implications for the future labor supply and consumption demands in urban and rural areas. But there is also momentum in out-migration and off-farm employment. Development policies in the Amazon should consider the momentum in population mobility due to the strong effects of migration networks following a history of previous out-migration from farm households.

An important policy implication is thus the need to adopt a long-term planning perspective, incorporating policies such as family planning to reduce unwanted births and therefore high population growth. This would reduce second-generation effects of past high fertility on patterns of land fragmentation, land use, and living standards. Another policy implication is the desirability of promoting land intensification to improve farm productivity and returns to labor, which would tend to retain more rural labor.

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