

**Integrating Rural Livelihoods and Community Interaction into Migration and
Environment Research: A Conceptual Framework of Rural Out-migration and
the Environment in Developing Countries**

Running head: **Integrating Migration and Environment Research**

Hua Qin*

Climate Science and Applications Program, National Center for Atmospheric Research, Boulder,
Colorado, USA, huaqin@ucar.edu

Courtney G. Flint

Department of Natural Resources and Environmental Sciences, University of Illinois at Urbana-
Champaign, Urbana, Illinois, USA, cflint@illinois.edu

* Author for correspondence.

This research was supported by a Doctoral Dissertation Improvement grant from the Geography and Spatial Sciences Program of the National Science Foundation, and dissertation research funds from the Worldwide Universities Network, the Rural Sociological Society, and the University of Illinois at Urbana-Champaign. An earlier version of this article was presented at the 2009 Annual Meeting of the Rural Sociological Society, and received the Natural Resources Research Group Student Paper Award. Thoughtful comments from Dr. Jeffrey Dawson, Dr. Futing Liao, Dr. Stephen Gasteyer, three anonymous reviewers, and the journal editor are sincerely appreciated.

Abstract

This article presents a conceptual framework linking perspectives from migration-environment with rural livelihoods and interactional community research in the context of rural out-migration and environmental outcomes in developing countries. Household livelihoods and community interaction comprise two core mediating factors between rural out-migration and rural environmental outcomes. Developing an interdisciplinary conceptual framework is an important way to advance migration and environmental research which is built on knowledge from a variety of disciplines. By building linkages across different research fields, our conceptual framework provides an overall picture of the relevant mechanisms through which out-migration affects the rural environment. The framework has implications for theory, methodology, and rural environment and development policy.

Key Words: mediating factors, household livelihoods, interactional capacity, rural migration, rural environment

In recent decades, the relationship between population and the environment has rapidly grown to be a focus of interdisciplinary studies in demography, geography, sociology, and environmental sciences. Pessimistic Malthusian and neo-Malthusian theories suggest simplistic negative relationships between population growth and the natural environment (Ehrlich 1968; Ehrlich and Holdren 1971; Malthus 1798). Others have argued that population increase does not necessarily lead to environmental degradation and resource scarcities (Boserup 1965, 1981; Simon 1981). As both population processes and environmental change are complex systems (Zaba and Clarke 1994), any assumed simple linear relationship between population size and the

environment is problematic. A more complex approach focuses on the socioeconomic, institutional, technological, and cultural mediating factors which modify the relationship between population and environment change (Curran and de Sherbinin 2004; de Sherbinin et al. 2007; Jolly 1994; Marquette and Bilsborrow 1999). In a similar vein, the *STochastic estimation of Impacts by Regression on Population, Affluence, and Technology* (STIRPAT) model incorporates theoretically relevant control variables (e.g., national affluence, urbanization, and geography) influencing the environmental impacts of population dynamics (Dietz et al. 2007; York et al. 2003).

Population growth consists of the difference between fertility and mortality (i.e. the natural population increase), as well as the difference between in-migration and out-migration. As the world fertility rate continues to decline, migration has become increasingly important in population and environment research (de Sherbinin et al. 2008). There is a rapidly growing literature on the relationship between migration and the environment during the past two decades. Researchers examine the environmental influences on migration on one hand, and the environmental consequences of migration on the other. The mediating factor perspective is especially important in explaining the specific mechanisms through which migration influences the environment. Recent literature on environmental impacts of migration identifies a variety of intervening variables including agricultural practices, resource extraction behaviors, common property resource institutions, social capital, and social resilience (e.g., Adger et al. 2002; Cassels et al. 2005; Curran 2002; Ostrom et al. 1999). These factors are conceptually related to rural livelihoods and community interaction in natural resource management. However, the extant migration and environment literature does not explicitly and systematically engage the two research areas. The lack of synthesis across these relatively disparate bodies of literature

represents a major barrier to a complete understanding of the linkages between migration and subsequent environmental outcomes.

Migration of the labor force from rural to urban areas has been a particularly important component of the urbanization process, particularly in developing countries (Saracoglu and Roe 2004). Recent literature on the environmental impacts of migration has focused on areas of destination, while such effects in migrant-sending areas remain relatively understudied (de Sherbinin et al. 2008). The large-scale rural out-migration stream can produce profound environmental consequences in rural regions because these areas are where most of the world's natural resources such as land and forests are located. Much rural labor migration in developing countries is seasonal or circular, whereby migrants regularly send money back to, and return to, their resident households in rural communities of origin. This dynamic migration pattern raises additional questions about the effects of migration on the environment in rural origin areas. Since rural places are also the settings in which sustainable livelihoods and community-based natural resource management are usually studied, the impacts of rural out-migration on the rural environment provide an important interface for synthesizing common concepts and perspectives across these relevant fields of study.

The purpose of this article is to join the rural livelihoods approach and the interactional view of community to articulate how rural out-migration influences the rural environment in the developing world. Rural household livelihoods and community interaction comprise two core mediating factors in a conceptual framework for understanding the environmental impacts of out-migration in rural origin areas. The framework has implications for theory, methodology, and rural environment and development policy.

A Conceptual Framework of Rural Out-migration and the Environment in Developing Countries

Conceptual models are tools for communication across disciplines and help to develop questions, clarify boundaries of the systems under study, and identify gaps in existing research (Heemskerk et al. 2003). Developing an interdisciplinary conceptual framework is an important way to advance migration and environmental research which is built on knowledge from a variety of disciplines. Conceptual frameworks represent theories of middle-range which involve abstractions but close to observed and empirical data (Merton 1967). Middle-range models of migration and the environment can link empirical investigation to more inclusive grand theories, and consolidate empirical findings from diversified fields.

Figure 1 illustrates an explanatory model of the relationship between rural out-migration and rural environmental changes in developing countries. By building linkages across different research fields, this conceptual framework provides an overall picture of the relevant mechanisms through which out-migration affects the rural environment. Rural circular labor out-migration causes complex environmental outcomes in origin areas through its effects on rural household livelihoods and community interaction. We discuss these two mediating processes in turn in the following sections.

[Figure 1 about here]

Household Livelihoods

The concept “sustainable rural livelihoods” has gained wide currency in research on rural development, poverty reduction, and natural resource management in rural areas of the developing world. A livelihood comprises the capabilities, assets (natural, social, human,

physical, and financial), and activities required for a means of living (Chambers and Conway 1992; Scoones 1998). Researchers often apply the sustainable livelihoods framework at the household scale (Carney 1998). The household is also the primary unit of analysis in consumption-environment research (Curran and de Sherbinin 2004), and household dynamics are an important driver of resource consumption and environmental degradation (Liu et al. 2003). The household is thus recognized as an appropriate level of analysis for merging research on the dynamic interactions among migration, livelihoods, and the environment in rural areas of developing countries (de Sherbinin et al. 2008).

Rural people draw on a range of activities to maintain and improve their livelihoods (Carney 1998; Ellis 2000). Migration, especially circular labor migration, is one of the most important livelihood strategies available for rural households in developing countries. Rural households in these countries often directly rely on local natural resources for subsistence. Migration influences the roles of other non-migration livelihood strategies, particularly natural resources oriented activities such as agriculture and non-farm resource use, in the livelihood portfolio of rural households. Furthermore, migration and the associated livelihood outcomes cause changes in rural households' material and social resources. These can in turn affect rural households' pursuit of different types of livelihood strategies which imply different environmental outcomes.

Given its important environmental consequences, agricultural production can serve as a major intervening variable in the relationship between migration and environmental changes in rural origin areas. The decline in labor availability associated with rural out-migration may cause a shift from labor-intensive agricultural strategies to labor-saving ones, or the abandonment of some agricultural activities. The forest transition theory suggests that as farmers leave rural areas

for better paying non-agricultural jobs in cities, marginal farmlands are abandoned and eventually return to forests (Rudel et al. 2005). Previous studies found migration-induced farmland abandonment decreased environmental degradation and contributed to more vegetation regeneration in many Latin American countries (e.g., Aide and Grau 2004; López et al. 2006).

The selective nature of migration processes (e.g., migrant selectivity by age and gender) may also result in different environmental outcomes in rural origin areas through influences on agricultural production patterns. In southern Yucatán of Mexico, Radel et al. (2010) found gender norms and ideologies embedded in male labor out-migration led to distinct agricultural and land use strategies of rural migrant households (abandonment of fields, continued cultivation using hired laborers, and/or conversion of farmland into pasture), which in turn caused differential vegetation cover changes.

The role of remittances is particularly important to relationships among household income and consumption, natural resource use, and environmental impacts of migration in rural origin areas. Rural labor out-migration and remittances usually lead to increased household income and asset accumulation, which have mixed impacts on the rural environment. On one hand, enhanced income level may generate positive environmental outcomes by allowing households to substitute purchased goods for local subsistence resources (such as alternative fuels substituting for firewood), or invest in environmentally friendly production or resource conservation projects (de Sherbinin et al. 2008; Naylor et al. 2002). On the other hand, remittances may result in negative environmental impacts by stimulating increased exploitation of natural resources and/or investment in environmentally destructive livelihood practices such as the overuse of chemical fertilizers and the conversion of mangrove forests to shrimp aquaculture (Adger et al. 2002; Davis and Lopez-Carr 2010; Moran-Taylor and Taylor 2010).

When remittances allow greater levels of daily consumption, the increased economic resources of rural migrant households could also lead to more pressures on the local environment. For example, Le (2004) suggests that the greater household consumption brought by labor out-migration has exacerbated already serious residential pollution problems in rural China due to the lack of efficient waste and garbage disposal.

A useful research strategy of assessing the effects of migration on the environment based on this conceptual framework is to compare migrants (or migrant households) and non-migrants (or non-migrant households) on activities having important environmental consequences. Migrant and non-migrant households in rural origin areas are expected to be significantly different with respect to those livelihood components which link migration strategy to environmental outcomes, such as agricultural production, income and consumption, and natural resource utilization. The differences found between rural migrant and non-migrant households in these aspects can provide important implications for the ultimate environmental consequences of rural out-migration in terms of changes in land quality, soil erosion, and forest conservation.

Community Interaction

Rural household livelihoods are shaped by local community and broader social, economic, and environmental contextual factors. From an interactional perspective, community is an emergent process among people who share a common territory and interact with one another on various matters and plays a critical role in local ecological well-being (Kaufman 1959; Wilkinson 1991). Household livelihoods and community interaction are two interrelated components in this conceptual framework for rural out-migration and environment. The capital assets and livelihood activities of rural households are embedded in the broader context formed by community

interactions. When higher community interaction leads to improved community structure and quality of life, individual households are more likely to achieve livelihood security. Impacts of migration on rural livelihoods at the household level can eventually aggregate to the community level. The overall level of community interaction and collective action also depends upon individual households' participation in general community activities.

Beyond the household level, rural out-migration may produce positive or negative environmental impacts across the entire migrant-sending area through its influences on local community structure and environmental conservation. Community-related intervening variables identified in the migration and environment literature, often conceptualized as "social capital" or "social resilience" (Adger et al. 2002; Curran 2002), all show a logical connection with the interactional conception of community (Qin 2009), thus providing a good prospect for productive synthesis.

Community social interaction and capacity for collective action are the essence of community-based natural resource management (Flint et al. 2008). Therefore, higher community interactional capacity can normally contribute to better resource conservation and environmental sustainability. The impact of rural migration on local community interaction can serve as an important predictor of subsequent environmental outcomes in rural origin areas. In general, rural communities with higher level of community interaction are expected to be in a better position to ameliorate the environmental impacts of rural out-migration than those with lower interactional capacity.

Analysis of the potential effects of out-migration on rural community and environment should focus on the consequent changes in local social interaction regarding general community issues and particularly natural resource management. There are multiple ways of viewing the

influences of migration on community based on emphasis of different aspects of community interaction. Rural migration is linked to the community interaction processes in origin areas through its direct impact on local population size. Declining population caused by out-migration may increase the extent of population dispersion and restrict the kinds of social contacts in community relations. The long absence of community members may reduce the extent of community activities and the general level of social interaction. In addition, due to migrant selectivity by sociodemographic characteristics such as age, gender, and marital status, rural migration may dramatically change the demographic structures of home communities. Such changes in population composition can influence community structure and organization, and eventually lead to shifts in community interaction and affect local social institutions governing natural resource use. Case studies from rural Mexico and India showed the selective out-migration of young men threatened the continuance of traditional common resource management practices (Robson and Nayak 2010).

Rural migration may also disturb local social interaction due to its effects on social and economic stratification in origin communities. Migration and remittances are likely to exacerbate income inequality in early stages (Taylor et al. 1996). The uneven distribution of income is expected to create obstacles to social interaction and communication among people with different capital assets, and in turn undermine collective action capacity in resource use and management (Adger et al. 2002). However, this detrimental effect on community may be mitigated at a later stage when a majority of rural households in origin areas are involved in migration and gain access to remittance income (Taylor et al. 1996).

From another point of view, rural out-migration may have positive effects on local community through its influences on some major spheres of community interactional capacity.

To assess the degree of “community-ness”, a number of key facets of community interaction and activities are generally recognized: number of actors, locality orientation of action, comprehensiveness of action, organization of action, goal of action, and objects of action (Kaufman 1959; Sutton and Kolaja 1960). While out-migration undoubtedly diminishes the number of social actors in the community field, it may cause constructive changes in other aspects of community actions such as increased identification with locality and community awareness of action if the smaller population base leads to a higher level of community cohesiveness. For instance, a case study of migrant-sending communities in the Ecuadorian Amazon region suggested that the out-migration of male labor enhanced the social cohesion of remaining residents (often women) and promoted community activities in pursuing sustainable livelihoods (Rudel 2006).

Rural population distribution patterns constitute a barrier to the emergence of community by restricting rural social contacts primarily to close and intimate relationships (Wilkinson 1991). The social network developed in rural migration may increase social contacts via “weak ties” between and among circular migrants at destination places and remaining residents in origin communities, as compared to typical “strong ties” among family members and friends in traditional rural communities (Granovetter 1973). Reduced population size may also increase migrant-sending communities’ density of acquaintanceship and improve local people’s ability to interact (Freudenburg 1986). Although the spatial boundaries and “spaces of engagement” of rural communities (Cox 1998) may be extended by the migration process, the territorial dimension is still essential in the conceptualization of community at places of origin. In essence, it is the locality of a rural origin community that provides a common field for the continuing communication and social interaction among people across places.

Additionally, return migrants may bring knowledge gained while away from home back with them to become active agents of collective community response to ecological problems and thus affect the environmental outcomes of migration in rural areas of origin. Rural migrants may return with new perceptions of human-environment relationships and infuse new capacity for local community-based natural resource management (Moran-Taylor and Taylor 2010). Prior research found return migrants to Caribbean islands proceeded to invest in more sustainable agro-forestry projects and the establishment of local nongovernmental environmental protection organizations (Conway and Lorah 1995; Thomas-Hope 1999).

Conclusions and Implications

This article establishes theoretical and empirical linkages among common concepts across multiple fields of study which have relevance for research on the relationships between rural migration and the environment. Major intervening variables identified in recent literature on environmental impacts of migration revolve around rural livelihoods and community interaction in natural resource management. We develop an interdisciplinary conceptual framework evaluating environmental consequences of rural migration in the developing world based on a synthesis of knowledge from multiple research areas. A key assumption is that household livelihoods and community interaction are two integrative mediating factors between rural out-migration and the rural environment. Although we focus on the environmental effects of rural migration in areas of origin in our discussion, this framework can be readily adapted for studying such effects in rural destination areas.

This conceptual framework is an effort toward a middle-range theory of migration and the environment. Population and environment research benefits greatly from a greater emphasis

on middle-range theories and studies that attempt to explain limited phenomena in a specific context as well as possible (Marquette and Bilsborrow 1999). The intermediate level conceptual framework developed in this paper would help to ground the complex relationship between migration and the environment in various community contexts, and accommodate variability and diversity across observations. It should be noted that this model is in a simple form of boxes and arrows showing the main linkages from rural out-migration to environmental outcomes.

Although it connects perspectives from multiple areas that are not usually integrated to address this important question, more details and empirical supports need to be gained through further research.

Assessing the complex mediating processes between migration and the environment requires the use of multiple research methods such as secondary socioeconomic and biophysical data analysis, key informant interviews, and household surveys. Mixed methodological research combining both quantitative and qualitative methods can provide a more complete understanding of the ultimate environmental outcomes of rural migration. In addition, given the contextually specific effects of rural migration on the environment, a constructive approach to advance current knowledge is to design innovative comparative research or meta-analyses which investigate patterns of the migration-environment relationship across individual studies. The conceptual framework of rural out-migration and environmental change can inform future research and provide a common scheme for synergizing diverse research findings from varied social, economic, and ecological circumstances.

Further, this work on better understanding the environmental effects of rural migration is also oriented to improving rural environment and development policy. Our conceptual framework highlights important factors that need to be better recognized by decision makers and

practitioners alike in the broad field of migration, development and the environment. Although the environmental consequences of migration are complicated, the two integrative mediating factors between rural migration and environmental outcomes – household livelihoods and community interaction – underscore key areas for policy intervention. Concerning rural labor migrant-sending areas, policies should concentrate on optimizing the environmental outcomes of resulting changes in household livelihood activities and community interaction. Integrated resource management plans capitalizing on labor-migrant households' reduced dependency on agriculture and nature resources (e.g., programs encouraging the conversion of marginal or abandoned farmland to forests) can enhance both rural people's livelihoods and rural environmental sustainability. Also, there is a good opportunity to facilitate community interaction beyond local boundaries (e.g., through strengthening the reciprocal connections between labor migrants and residents remaining in rural areas) to help rural communities better respond to the profound socioeconomic and environmental consequences of labor out-migration. Such types of policy prescriptions are critical for many developing countries' endeavors toward sustainable development of rural areas increasingly involved in labor migration and urbanization development.

References

Adger, W. N., P. M. Kelly, A. Winkels, L. Q. Huy, and C. Locke. 2002. Migration, remittances, livelihood trajectories, and social resilience. *Ambio* 31: 358-366.

Aide, T. M., and Grau, H. R. 2004. Globalization, migration, and Latin American ecosystems. *Science* 305: 1915–1916.

Boserup, E. 1965. *The Conditions of Agricultural Growth*. New York: Aldine.

Boserup, E. 1981. *Population and Technological Change*. Chicago, IL: University of Chicago Press.

Carney, D. (ed.). 1998. *Sustainable Rural Livelihoods: What Contribution Can We Make?* London, UK: Department for International Development (DFID).

Cassels, S., S. R. Curran, and R. Kramer. 2005. Do migrants degrade coastal environments? Migration, natural resource extraction and poverty in North Sulawesi, Indonesia. *Human Ecology* 33: 329-363.

Chambers, R., and G. R. Conway. 1992. Sustainable rural livelihoods: Practical concepts for the 21st Century. Discussion Paper 296, Institute of Development Studies, Brighton, UK.

Conway, D., and P. Lorah. 1995. Environmental protection policies in Caribbean small islands: Some St. Lucian examples. *Caribbean Geography* 6: 16-27.

Cox, K. 1998. Spaces of dependence, spaces of engagement and the politics of scale, or: Looking for local politics. *Political Geography* 17: 1-23.

Curran, S. 2002. Migration, social capital, and the environment: Considering migrant selectivity and networks in relation to coastal ecosystems. *Population and Development Review* 28(Suppl.): 89-125.

Curran, S., and A. de Sherbinin. 2004. Complete the picture: The challenges of bringing "consumption" into the population-environment equation. *Population and Environment* 26: 107-131.

Davis, J., and D. Lopez-Carr. 2010. The effects of migrant remittances on population-environment dynamics in migrant origin areas: International migration, fertility, and consumption in highland Guatemala. *Population and Environment* 32: 216-237.

de Sherbinin, A., L. K. VanWey, K. McSweeney, R. Aggarwal, A. Barbieri, S. Henry, L. M. Hunter, W. Twine, and R. Walker. 2008. Rural household demographics, livelihoods and the environment. *Global Environmental Change* 18: 38-53.

de Sherbinin, A., D. Carr, S. Cassels, and L. Jiang. 2007. Population and environment. *Annual Review of Environment and Resources* 32: 345-373.

Dietz, T., E. A. Rosa, and R. York. 2007. Driving the human ecological footprint. *Frontiers of Human Ecology* 5: 13-18.

Ehrlich, P. R. 1968. *The Population Bomb*. New York, NY: Ballantine Books, Inc.

Ehrlich, P. R., and J. P. Holdren. 1971. Impact of population growth. *Science* 171: 1212-1217.

Ellis, F. 2000. *Rural Livelihoods and Diversity in Developing Countries*. Oxford: Oxford University Press.

Flint, C. G., A. E. Luloff, and J. Finley. 2008. Where is community in community-based forestry? *Society and Natural Resources* 21: 526-537.

Freudenburg, W. R. 1986. The density of acquaintanceship: An overlooked variable in community research? *The American Journal of Sociology* 92: 27-63.

Granovetter, M. 1973. The strength of weak ties. *The American Journal of Sociology* 78: 1360-1380.

Heemskerk, M., K. Wilson, and M. Pavao-Zuckermann. 2003. Conceptual models as tools for communication across disciplines. *Ecology and Society* 7: 8. [online] URL: <http://www.consecol.org/vol7/iss3/art8/>.

Jolly, C. L. 1994. Four theories of population change and the environment. *Population and Environment* 16: 61-90.

Kaufman, H. F. 1959. Toward an interactional conception of community. *Social Forces* 38: 8-17.

Le, X. 2004. The impacts of rural lifestyles on the rural environment in China. *Agricultural Environment and Development* 21(4): 42–45 (in Chinese).

Liu, J., G. C. Daily, P. R. Ehrlich, and G. W. Luck. 2003. Effects of household dynamics on resource consumption and biodiversity. *Nature* 421: 530-533.

López, E., Boccoa, G., Mendoza, M., Velázquez, A., and J. Aguirre-Rivera. 2006. Peasant emigration and land-use change at the watershed level: A GIS-based approach in central Mexico. *Agricultural Systems* 90: 62–78.

Malthus, T. R. 1798. *Population: The First Essay*. Ann Arbor, MI: The University of Michigan Press, 1960.

Marquette, C. M., and R. Bilsborrow. 1999. Population and environment relationships in developing countries: Recent approaches and methods. In *People and Their Planet*, ed. B. Sundberg and W. R. Moomaw, pp. 29-44, New York, NY: St. Martin's Press.

Merton, R. K. 1967. *On Theoretical Sociology: Five Essays, Old and New*. New York, NY: Free Press.

Moran-Taylor, M. J., and M. J. Taylor. 2010. Land and leña: Linking transnational migration, natural resources, and the environment in Guatemala. *Population and Environment* 32: 198-215.

Naylor, R. L., K. M. Bonine, K. C. Ewel, and E. Waguk. 2002. Migration, markets, and mangrove resource use on Kosrae, Federated States of Micronesia. *Ambio* 31: 340-350.

Ostrom, E., J. Burger, C. B. Field, R. B. Norgaard, and D. Policansky. 1999. Revisiting the commons: Local lessons, global challenges. *Science* 284: 278-282.

Qin, H. 2009. The impacts of rural-to-urban labor migration on the rural environment in Chongqing Municipality, Southwest China: Mediating roles of rural household

livelihoods and community development. Doctoral Dissertation, University of Illinois at Urbana-Champaign, Urbana, Illinois.

Radel, C., B. Schmook, and S. McCandless. 2010. Environment, transnational labor migration, and gender: Case studies from southern Yucatán, Mexico and Vermont, USA. *Population and Environment* 32: 177-197.

Robson, J. P., and P. K. Nayak. 2010. Rural out-migration and resource-dependent communities in Mexico and India. *Population and Environment* 32: 263-284.

Rudel, T. K., O. Coomes, E. Moran, F. Achard, A. Angelsen, J. Xu, and E. Lambin. 2005. Forest transitions: Towards a global understanding of land use change. *Global Environmental Change* 15: 23-31.

Rudel, T. K. 2006. After the labor migrants leave: The search for sustainable development in a sending region of the Ecuadorian Amazon. *World Development* 34: 838-851.

Saracoglu, D. S., and T. L. Roe. 2004. Rural-urban migration and economic growth in developing countries. Paper presented at the *Society for Economic Dynamics 2004 Annual Meeting*, Florence, Italy, 1-3 July 2004.

Scoones, I. 1998. Sustainable rural livelihoods: A framework for analysis. Working Paper 72, Institute of Development Studies, Brighton, UK.

Simon, J. 1981. *The Ultimate Resource*. Princeton, NJ: Princeton University Press.

Sutton, W. A., and J. Kolaja. 1960. The concept of community. *Rural Sociology* 25: 197-203.

Taylor, J., J. Arango, G. Hugo, A. Kouaouci, D. Massey, and A. Pellegrino. 1996. International migration and community development. *Population Index* 62: 397-418.

Thomas-Hope, E. 1999. Return migration to Jamaica and its development potential. *International Migration* 37: 183-207.

Wilkinson, K. P. 1991. *The Community in Rural America*. Middleton, WI: Social Ecology Press.

York, R., E. A. Rosa, and T. Dietz. 2003. STIRPAT, IPAT and ImPACT: Analytic tools for unpacking the driving forces of environmental impacts. *Ecological Economics* 46: 351-365.

Zaba, B., and J. Clarke (ed.). 1994. *Environment and Population Change*. Belgium: International Union for the Scientific Study of Population.

Figure

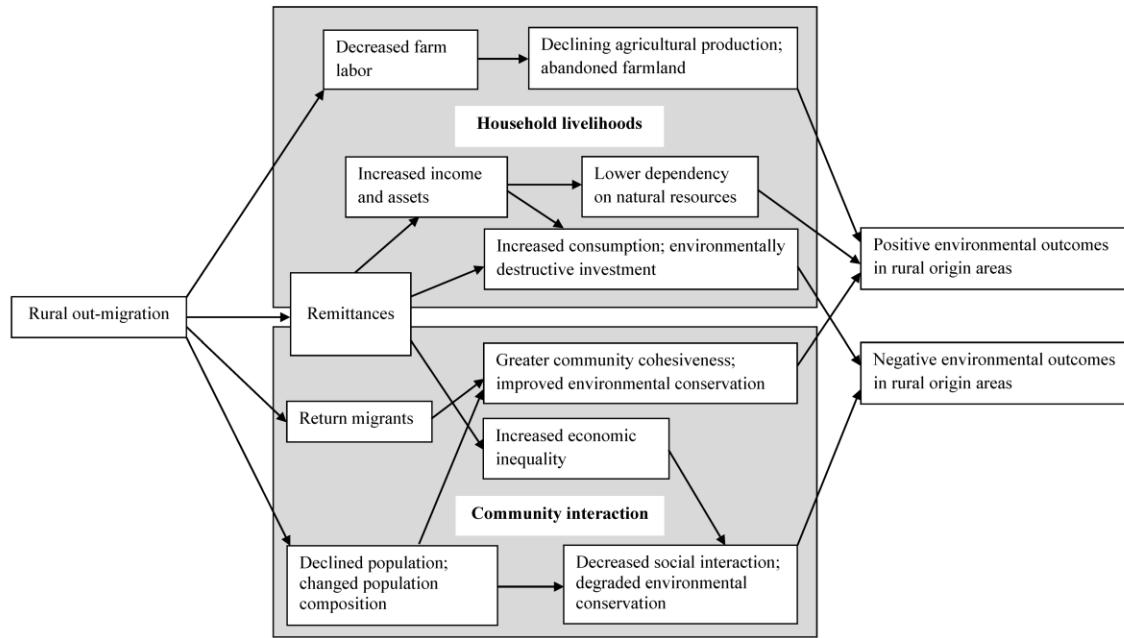


Figure 1. A conceptual framework of rural out-migration and environmental outcomes in developing countries. This framework focuses on the mediating roles of household livelihoods and community interaction in the impacts of rural out-migration on the rural environment. It should be noted that rural environmental changes can feed back to rural out-migration through its counter effects on the mediating factors.