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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

BY

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## **ABSTRACT**

The relationship between population and the environment holds an important role in research on the linkages between human society and ecological systems. Recent studies on population and the environment have turned research focus toward the more dynamic factor of population processes – migration. The mediating factor approach to population and environment provides a basic theoretical model for understanding the complex relationship between migration and the environment. Thus far, few studies have been conducted on the environmental impacts of migration particularly circular labor migration in the rural communities from which migrants originate. The increasing rural-to-urban labor migration in China since the early 1980's has formed the largest population flow in world history. The primary objective of this doctoral dissertation research project is to obtain a better understanding of how this large-scale circular labor migration movement impacts the rural environment through sociocultural and economic mediating factors.

Major intervening variables identified in recent literature on environmental effects of migration revolve around rural livelihoods and community development. A comprehensive conceptual framework was developed in this study that incorporated the rural livelihoods approach and the interactional theory of community development into analyzing environmental consequences of rural migration. The core assumption was that household livelihoods and community interactional capacity were critical intervening variables between rural out-migration and its subsequent environmental outcomes in rural origin areas.

The analysis drew on empirical data collected from four rural villages in Chongqing Municipality, where the rural-to-urban labor migration rate is currently the highest in China. This

study used a mixed-methods approach in data collection and analysis. Secondary socioeconomic and biophysical data provided contextual information for the study area and guided the selection of study communities. In-depth key informant interviews gathered detailed information about rural livelihoods and community interaction experiences in study communities for the development of survey instrument, and provided a contextualized backdrop for the analysis of survey data. The household survey was conducted using a face-to-face questionnaire interview technique to collect data on household livelihood activities and community participation for statistical analysis.

Results confirm the research hypothesis that labor-migrant and non-labor-migrant households are significantly different in livelihood activities including agricultural practices, income and consumption, and resource use and management. Labor-migrant households differed particularly from those non-labor-migrant households whose members were all mainly engaged in agricultural production, while sharing many similar livelihood characteristics with those which had member(s) holding regular local off-farm work. In addition, this research found that the relationship between rural labor out-migration and community interaction varied across study communities. Findings suggest rural migration presents both detrimental and beneficial potentialities for community development in rural origin areas. Labor migration constrains the participation level of migrants and migrant households for community activities, at the same time that it creates possibilities for constructing a rural community field extending beyond local boundaries. Altogether, these findings have implications for the subsequent environmental outcomes of rural labor out-migration and corresponding natural resource management and policy in rural origin areas.

Dedicated to Yue (Ivy) Guan

My Beloved Wife

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## TABLE OF CONTENTS

<b>LIST OF TABLES</b> .....	<b>ix</b>
<b>LIST OF FIGURES</b> .....	<b>x</b>
<b>CHAPTER 1. INTRODUCTION</b> .....	<b>1</b>
<b>CHAPTER 2. LITERATURE REVIEW</b> .....	<b>7</b>
Migration and the Environment .....	7
The Rural Livelihoods Approach .....	22
Community-based Natural Resource Management .....	25
A Community Perspective for Migration and the Environment .....	29
<b>CHAPTER 3. CONCEPTUAL FRAMEWORK</b> .....	<b>33</b>
<b>CHAPTER 4. NATIONAL CONTEXT AND THE STUDY AREA</b> .....	<b>40</b>
National Context .....	40
Study Area .....	46
<b>CHAPTER 5. RURAL-TO-URBAN LABOR MIGRATION, HOUSEHOLD LIVELIHOODS, AND THE RURAL ENVIRONMENT</b> .....	<b>60</b>
Introduction .....	60
Review of Previous Studies .....	63
Methods .....	69
Results .....	77
Discussion .....	88
<b>CHAPTER 6. RURAL-TO-URBAN LABOR MIGRATION, COMMUNITY DEVELOPMENT, AND RURAL ENVIRONMENTAL CONSERVATION</b> .....	<b>101</b>
Introduction .....	101

Review of Previous Studies.....	103
Methods.....	115
Results.....	120
Discussion.....	127
<b>CHAPTER 7. CONCLUSION.....</b>	<b>138</b>
Conceptual Framework: Findings and Implications.....	138
Household Livelihoods Mediating-factor: Findings and Implications.....	140
Community Interaction Mediating-factor: Findings and Implications.....	143
Closing Thoughts.....	147
<b>REFERENCES.....</b>	<b>153</b>
<b>APPENDIX A: KEY INFORMANT INTERVIEW QUESTIONS.....</b>	<b>173</b>
<b>APPENDIX B: HOUSEHOLD SURVEY QUESTIONNAIRE.....</b>	<b>175</b>
<b>CURRICULUM VITAE.....</b>	<b>183</b>

## LIST OF TABLES

Table 5.1: General Characteristics of Study Communities.....	97
Table 5.2: Descriptive Statistics for Variables in the Analysis (N=345).....	97
Table 5.3: Bivariate Comparisons of Household Groups, Given as Means of Variables.....	98
Table 5.4: Discriminant Analysis of Differences between Labor-migrant and Non-labor-migrant Households, Given as F Values of Variables .....	99
Table 5.5: Discriminant Analysis of Differences among Labor-migrant, Local Off-farm Work, and Farming Households, Given as F Values of Variables .....	100
Table 6.1: Household Sociodemographic Characteristics for the Aggregate Dataset and Study Communities, Given as Means of Variables .....	133
Table 6.2: Community Participation for the Aggregate Dataset and Study Communities.....	133
Table 6.3: Bivariate Comparisons of Household Groups on Community Participation Using the Independent $t$ -Test for the Aggregate Dataset and Study Communities, Given as Means of Variables .....	134
Table 6.4: Bivariate Comparisons of Household Groups on Sociodemographic Variables Using the Independent $t$ -Test for the Aggregate Dataset and Study Communities, Given as Means of Variables .....	135
Table 6.5: Summary of the ANCOVA on Community Participation for the Aggregate Dataset and Study Communities .....	136
Table 6.6: Summary of the MCA of Community Participation for the Aggregate Dataset and Study Communities, Given as Means of Variables .....	137

## LIST OF FIGURES

Figure 2.1: Sustainable Rural Livelihoods Framework .....	32
Figure 3.1: A Conceptual Framework for the Impacts of Rural Migration on the Rural Environment.....	39
Figure 4.1: Map of Chongqing Municipality, Southwest China.....	56
Figure 4.2: Ecological Division of Chongqing Municipality, Southwest China .....	57
Figure 4.3: Economic Division of Chongqing Municipality, Southwest China .....	58
Figure 4.4: Eco-economic Subregions of Chongqing Municipality, Southwest China .....	59
Figure 5.1: Map of Study Communities in Chongqing Municipality, Southwest China.....	96

# CHAPTER 1

## INTRODUCTION

The debate on the relationship between population and the environment has a long history in human society. In recent decades this field has rapidly grown to be a focus of interdisciplinary studies in both natural and social sciences. Pessimistic Malthusian and neo-Malthusian theories suggest simplistic negative relationships between population growth and the natural environment (Ehrlich 1968; Ehrlich and Holden 1971; Malthus 1798; Meadows et al. 1972). Nevertheless, 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 changes can be conceptualized as complex systems (Zaba and Clarke 1994), any assumed simple linear relationship between population and the environment is problematic. A more complicated mediating factor approach focuses on the socioeconomic, institutional, technological, and cultural mediating factors which modify the relationship between population dynamics and the environment (Jolly 1994; Mackellar et al. 1998; Marquette and Bilsborrow 1999).

Population growth is composed 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 (UN/PD 2004), migration movement has become more important in population processes. There is a growing literature on the relationship between migration and the environment. 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 specific mechanisms through which

migration influences the environment. A variety of intervening variables including use of agricultural technologies, resource extraction behaviors, social institutions, social capital, and social resilience are employed to evaluate the environmental impacts of migration (e.g. Adger et al. 2002; Cassels et al. 2005; Curran 2002; Ostrom et al. 1999). Overall, most previous studies concentrate on the effects of migration on the environment in areas of destination, and relative little is known about the environmental effects of migration in areas of origin.

The bulk of contemporary population movement is associated with urbanization development. There has been a rapid urbanization of the world's population in recent decades. According to the projections of the United Nations Population Division, there would be more people living in urban than in rural areas after 2008 (United Nations 2008). The world population data have also shown that developing countries have undergone urbanization much more rapidly than the more developed countries over the past decades (Lucas 2004). Therefore, urban population growth is largely becoming a common phenomenon concentrated in the developing world. It is estimated that the total urban population of the less developed countries will increase from 2.4 billion in 2007 to 5.3 billion in 2050, while the proportion of urban population relative to total population is projected to increase from 44% to 67% in the same period (United Nations 2008).

Major sources of urban population growth are the natural urban population increase, the net in-migration from rural areas, and the expansion of city boundaries to include more rural population (Chen et al. 1998). With the ongoing worldwide process of urbanization, a significant global issue is the huge population shift from rural villages to urban areas. Migration of the labor force from rural to urban areas has been a particularly important component of the urbanization process in developing countries (Saracoglu and Roe 2004). Rural-to-urban migration has

historically accounted for a large part of urban population growth in the developing world (Chen et al. 1998), and continues to rise in scale (Lall et al. 2006).

In addition to permanent migration, much of the rural-to-urban labor flow in the developing world is seasonal or circular (Brown 2002; de Haan 1999; Prothero and Chapman 1985). Seasonal migration refers to temporary migration in search of wage employment according to the agricultural seasons, whereas circular migration is described as repetitive and temporary population movement that does not occur in correspondence to specific agricultural seasonal factors (Ellis 2000). Labor migration is one of the most important strategies for diversifying rural livelihoods (Carney 1998; Stark 1991). A distinct feature of rural-to-urban seasonal or circular labor migration is that migrants leave for work for varying lengths of time and routinely return to their resident households in rural origin areas. These temporary migrants mostly do not intend to settle down permanently in cities, and still consider themselves active members of their rural households and origin communities.

Asia currently has the largest urban population among the major regions of the developing world, and this will remain the case for the coming decades (Montgomery 2008). By the year 2030, 61 percent of the world's population will be concentrated in urban areas, while the Asia-Pacific region will contain about 52.7 percent of the world urban population and will have reached a level of urbanization of nearly 55 percent (UN/ESCAP 2005). An additional 1.1 billion people will be living in the urban centers of the Asia-Pacific region by 2030, making it have the largest urban population in the whole world (UN/ESCAP 2005). As the largest country in the Asia-Pacific region and the most populous in the world, China provides a particularly important case for migration and environment research. It is estimated that China will reach an urbanization level of 60 percent by 2020 (People's Daily 2001). Since the early 1980's, the

migration of rural labor to urban areas in China has been continuously increasing. Rural farmers moving into cities for employment opportunities and higher incomes have formed a tremendous flow of labor migrants. According to the 2000 Census of China, there are more than 100 million rural migrant workers in total, with an annual increase of about 5 million (China Census Office 2000).<sup>1</sup> Since much rural-to-urban labor migration in China is seasonal or circular, its complete dimensions can rarely be captured by census data and other governmental surveys. Therefore, the actual number of rural labor migrants is likely to be even more than official statistics suggest.

The large-scale rural-to-urban migration movement is an inevitable consequence of the rapid economic development in China and brings a range of benefits such as higher labor productivity and larger economics of scale. Yet at the same time, rural areas in China are facing increasingly serious environmental problems including reduction of farmland fertility, soil erosion, water pollution and shortage, and deforestation. In spite of the growing concern about the increased pressure on urban ecosystems caused by the inflow of rural labor, it still remains unclear how labor out-migration affects the rural environment beyond simply accounting for local population decrease. Furthermore, the circular nature of China's labor migration adds an additional level of complexity and dynamism to the relationship between rural migration and the rural environment.

Addressing the environmental impacts of rural-to-urban labor migration in rural origin areas is critical to China's endeavor to achieve its strategic goal of sustainable social, economic, and ecological development. Moreover, as rural-to-urban migration is a common international phenomenon, research on rural labor migration and the rural environment in China has global implications for the promotion of ecological and socioeconomic sustainability of the rural areas

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<sup>1</sup> According to a recent report published by the China Ministry of Human Resources and Social Security and the China Bureau of Statistics, the newest statistic of rural labor migrants in China is about 140.41 million (CMHRSS and CBS 2008).

in many developing countries which are also experiencing increasing rural out-migration and rapid urbanization process. The primary objective of this dissertation was to investigate the complex effects of rural-to-urban labor migration on the rural environment in China, particularly through identifying key mediating variables at both the household and the community levels. This entailed developing a conceptual framework based on literature synthesis and empirically assessing the efficacy of this framework in the setting of rural Chongqing Municipality, where the rural-to-urban labor migration rate is currently the highest in China. The specific objectives of this study were to:

- (1) Examine the differences between rural household groups with different labor migration status in livelihood processes, and explore their implications for subsequent environmental outcomes in terms of land quality, soil erosion, and forest conservation in rural origin areas.
- (2) Analyze the role of community development in modifying the influences of rural labor out-migration on rural environmental conservation.

The structure of this dissertation is as follows. Chapter Two contains an extensive review of recent literature on migration and the environment, the rural livelihoods approach, and community-based environmental conservation. This section develops theoretical and empirical linkages between these relevant research areas and underscores opportunities for productive synthesis across existing literatures. Chapter Three delineates the conceptual framework and research hypotheses guiding this study. Chapter Four discusses the national context of rural-to-urban labor migration and the environment in China, and describes the study area Chongqing Municipality in Southwest China. Chapter Five analyses the impacts of rural-to-urban labor migration on rural household livelihoods and their implications for subsequent environmental

consequences. Chapter Six addresses how rural labor out-migration impacts rural environment conservation through its influence on local community development. Chapter Five and Chapter Six are structured as full journal manuscripts, including introduction, review of previous studies, methods, results, and discussion. Finally, Chapter Seven integrates research findings from previous chapters, and presents implications for theories, research methods, natural resource management, and rural development policy.

## **CHAPTER 2**

### **LITERATURE REVIEW**

This chapter includes a review of literature from three broad research areas: migration and the environment, rural livelihoods, and community-based environmental conservation. Thus far, migration and environment research has not been systematically connected to the other two relevant literatures. A synthesis of common concepts and perspectives across these fields of study is essential to refining the mediating factor theoretical framework of migration and the environment.

#### **Migration and the Environment**

There is a growing literature on the mutual relationships between migration and the environment. Recent studies examine the effects of environmental factors on migration on the one hand, and the environmental consequences of migration on the other. These two aspects of the general migration-environment question are closely interrelated. A clear understanding of the environmental causes of migration is helpful and necessary in identifying important pathways for the environmental consequences of migration. Therefore, although this research focuses on the impacts of rural labor out-migration on the rural environment, the literature review here contains both approaches to the reciprocal migration-environment relationships.

#### ***Theories of migration***

An investigation of the effects of environment on migration naturally begins with theories of migration. Theorists from a wide range of disciplines have developed analytic models to

explain human migration with specialized perspectives and knowledge. Early empirical research on migration decisions focused on the individual level of migration behavior. The neoclassical microeconomic model of individual migration choice views migration behavior as an outcome of a rational calculation of the costs and benefits associated with the movement (Sjaastad 1962; Todaro 1969). This theory emphasizes the roles of wage differentials and expected employment opportunities in the migration decision-making process, and conceptualizes migration as an investment in human productivity. For the rational actor to make the decision to migrate, the expected earnings from migration have to surpass the expected gains in the locations of origin and the costs of migration, thus making the net expected return to migration positive. The neoclassical microeconomic model was complemented by the new economics of labor migration (Stark 1984; Stark and Bloom 1985), which stresses the role of relative deprivation in the migration decision making process. According to the relative deprivation approach, a prospective rural labor migrant compares his current income not to the expected earnings in the urban area, but instead to those of other persons in the origin area.

Based on choice theory in economics, sociology and psychology, and key behavioral migration concepts, De Jong (1999) proposed a broad micro-level model of migration decision-making. Its major proposition is that migration intentions are the most proximate determinant of migration behavior, along with migrant networks, family norms and gender roles, residential satisfactions, behavioral constraints and facilitator factors, and the background social, economic, and demographic structures. This model also asserts that values and expectations combine to produce the motivation to move, which in turn is a direct determinant of migration intentions.

At the macro level, a well-know explanation of migration is Lewis' dual economy model, which is composed of a stagnated rural subsistence sector and a dynamic urban sector, thus

leading to the flow of surplus labor migration from the former to the latter (Lewis 1954). Ranis and Fei (1961) extended the Lewis model and considered migration as an equilibration force which results in equality between the urban and rural sectors in terms of labor distribution and wage levels. With a mostly aggregate level perspective, Lee (1966) categorized factors that affect migration as “push” factors in the area of origin and “pull” factors in the area of destination in his well-known article “A Theory of Migration”, which echoes the classic work “The Laws of Migration” by E. G. Ravenstein (1885). Based on the “push-pull” model, the decision to migrate does not simply depend on the evaluation of push and pull factors, as there are usually intervening obstacles such as distance, money to move, and immigration laws which complicate or block migration paths. Personal characteristics (age, sex, education, etc.) may also have selective effect on the migration flow.

Combining theories at different levels of analysis is needed for a thorough understanding of the human migration process. An interactive contextual model of migration was presented by Findley (1987) in an agrarian developing country setting of the Philippines. Findley argued that there are three processes by which community-level features influence individual and household migration decisions. The first type of contextual effect is a simple additive one which increases the probability of migration uniformly for all members of the community. Apart from this additive effect, community features may also operate by either intervening or interacting with individual and household characteristics in determining migration decisions. In the intervening process, the community context increases the number of actors with a greater propensity to migrate. In the interactive process, the community context changes the pattern of relationships between individual or household characteristics and migration decisions. Interactive effects play a fundamental role in this multi-level contextual model of migration. They include both inter-

level interactions (e.g. community socioeconomic development and family class interaction) and intra-level interactions (e.g. community socioeconomic development and community accessibility interaction).

Instead of building a specific model of migration, Massey (1990) provided a comprehensive framework for migration studies based on a synthesis of multiple migration literatures. Using the concept of “circular and cumulative causation”, Massey analyzed the migration process in the interconnections among individual behavior, household strategies, community structures, and national political economics. This suggests that to provide a complete accounting of migration process, theories of migration must combine individual and family decisions with social structures, encompassing micro and macro levels of analysis, and connect causes and consequences over space and time. Like Findley, Massey also put special emphasis on the interactive effects between community variables and individual or household characteristics on migration decision, and considered these inter-level interactions as a basic connection between micro and macro migration models.

In summary, although migration decisions are usually made by individuals within households as strategies of income earning and risk diversification, this process is undoubtedly influenced by local community contexts, which in turn are structured by regional, national, and even global social, economic, and political factors. Therefore, neither the individual nor the aggregate level theory alone could offer a scientific explanation of the migration decision making process. Also, migration decisions vary from setting to setting due to interactions among factors both within and across different levels. It is thus essential to incorporate interactive effects in a multilevel framework of migration decision making.

### *Effects of the environment on migration*

An important aspect of migration and environment research is how environmental factors fit into general theories of human migration. Generally speaking, environmental variables may act as either “push” or “pull” factors of migration. On one hand, both acute natural disasters (such as flooding, earthquakes, and hurricanes), and gradual deterioration of the environment (such as soil degradation, deforestation, and desertification) may motivate people to move.<sup>2</sup> On the other hand, productive farmland, natural amenities, or pleasant living environments may attract in-migration flows.

In recent decades, there has been an increasing emphasis on “environmental refugees” in the migration-environment literature. This special group of displaced people can be further classified by the environmental causes of migration: (1) those who are forced to move by acute natural disasters; (2) those whose migration are triggered by the gradual and cumulative degradation of the environment; and (3) those whose displacement involves appropriation of the environment for uses such as economic development or warfare (Bates 2002; Westing 1992). Westing (1992) suggested that continued increases in displaced persons did not result from worsening persecution or increasing natural disasters, but from transgressions of the carrying capacity. Additionally, according to Suhrke (1994), it is important to distinguish “environmental refugees” from “environmental migrants” in a broader development perspective. People who are compelled to move by environmental changes which completely destroy their economic foundation are refugees, whereas those who migrate mostly voluntarily before the environmental deterioration becomes too desperate are more ordinary migrants. This implies that the concept of environmental refugee remains somewhat obscure and that current refugee policies should be

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<sup>2</sup> For a systematic review of the association between migration and environmental hazards, see Hunter (2005).

modified to address the needs of those directly or indirectly forced to move by environmental factors.

Hugo (1996) described a simple continuum of environmental migration ranging from completely voluntary migration to totally forced movement, which echoes Richmond's concepts of proactive and reactive migration (Richmond 1994). In essence, proactive migration is voluntary, while reactive migration is forced. Richmond (1994) also conducted an informative typology of reactive migration by political, economic, environmental, social, and bio-psychological causes of migration. Environmental determinants are included in nine of the total twenty categories. This conceptualization of environmentally induced migration as a subset of forced migration draws attention to the complex interaction between environmental factors and social, economic, or political contexts in determining the decision to migrate.

Environmental factors are intertwined with social, economic, and political conditions in determining migration process. Richmond (1994) stressed that environmental factors related to social, economic, and political activities might lead people to migrate. He illustrated how environmental variables are linked with predisposing factors, structural constraints, precipitating events, enabling circumstances, and system feedbacks of environmentally induced migration. For instance, some ecologically fragile areas are more likely to result in out-migration than others. Reactive migration may also be precipitated by naturally, technologically, economically, politically, and socially induced environmental disasters. In these cases, environmental factors mainly act as a proximate cause of migration while the root causes lie in social, economic, and political dimensions. However, there are also circumstances where people appear to migrate because of economic or other problems, while the underlying real cause is mainly environmental (Bilsborrow 2002).

The most systematic studies of the role played by the environment in the migration decision-making process have been those of Richard Bilborrow and his colleagues, who have conducted a series of migration-environment studies especially in low-income developing countries (Bilborrow 1987; Bilborrow 1992; Bilborrow 2002; Bilborrow and DeLargy 1991; Bilborrow et al. 1984). Bilborrow (1987) formulated a broad multi-phasic migration decision-making model that viewed out-migration as only one possible response to the growing population pressures on a rural household's standard of living. In case studies from Guatemala, Ecuador, Indonesia, and Sudan, Bilborrow (1992) specified three main environmental effects that may induce out-migration: (1) declining income; (2) increased risk of income instability; and (3) a less pleasant and healthful environment. He suggested that the influence of environmental factors on migration decisions might operate either at the household level via reduced income, increased risk or degraded environmental qualities, or as a community-level contextual factor through effects of reduction in income-earning opportunities and declining "place utility".

A large body of recent research on the environmental influences on migration has focused on the effects of land resources on migration decision. Land resource factors can be included in the analytic model of migration behavior either as a household-level land ownership variable or as a community-level land distribution contextual factor. Previous studies provide contradictory findings regarding the effects of land resources on migration. The simplest result is a negative linear relationship where increased farmland size reduces a household's likelihood of engaging in labor migration (e.g. Zhao 1997). However, some researchers found a more complicated U-shaped relationship, suggesting that households with below or above average landholding size are more likely than those with average landholding size to participate in labor migration (Peek and Antolinez 1980; Vanwey 2003). Yet others asserted an inverted U-shaped

relationship and revealed a completely reverse relationship between household land assets and migration propensity (Bilsborrow et al. 1987; Yao 2001). At the community level, according to the relative deprivation theory (Stark 1984; Stark and Bloom 1985), households in rural communities with higher inequality of land distribution should be more likely to engage in labor migration. However, previous research generally reaches inconsistent conclusions as regards this supposition (Vanway 2003; Wang 2003; Yao 2001). All these studies demonstrate important influences of land landholdings and distribution on migration, and possible interaction effects between land resource factors and other household characteristics or community features on migration decisions.

A subset of recent studies on land resources and migration has specifically examined the effects of land ownership on different migration streams. For example, Vanway (2003, 2005) found that internal and international migration decreased with household land size in Mexico, while internal migration was least likely for households with intermediate land holding size in Thailand. In contrast, Mendola (2008) showed that household land holdings reduced temporary and internal migration but increased international out-migration in Bangladesh. In a study from the southern Ecuadorian Andes, Gray (2008) also confirmed that internal and local migration decreased but international migration increased with household land assets. These studies show that the effects of household land ownership on migration differ largely between migration streams and across different areas of origin.

In addition, previous studies have also investigated the effects on migration of other environmental factors, such as precipitation, temperature, and drought (Gutmann et al. 2005; Henry 2005; Henry et al. 2004), fodder and firewood collection (Massey et al. 2007; Shrestha and Bhandari 2007), land cover (Entwistle et al. 1998; Massey et al. 2007; Rindfuss et al. 2007),

and farmland quality (Gray 2008). To sum up, recent literature reveals that there is an increasing research interest on the role of environmental determinants in the migration process. Overall, previous studies in this area have shown important but inconsistent environmental influences on migration. The advancement of research on the effects of the environment on migration has been hindered for the most part by the lack of appropriate datasets and methodologies. More empirical studies with better data and methods are needed to improve our understanding of the environmental causes of migration.

### ***Environmental effects of migration in areas of destination***

Because migration studies focus more on the determinants of migration than the consequences, research on the environmental effects of migration is relatively limited as compared to research on the environmental causes of migration. Migration brings subsequent environmental changes in both destination and origin areas. The impacts of migration on the environment in areas of destination can be studied at different levels. At the global level, the environmental consequences of international migration have gained much attention in recent migration and environment research. O'Lear (1997) conducted a useful literature review on the environmental effects of international immigration in more developed countries, particularly the United States. Immigration is considered a critical component of population growth in the United States. The Population-Environmental Balance organization (1992) argued that the uneven geography of carrying capacity limits the number of people any given country can sustainably support. Redistributing people to relatively unpopulated areas is not realistic, because those areas do not provide sufficient carrying capacity nor employment opportunities. Using the case of Australia, Hugo (1996) discussed the environmental effects of international migration on

traditional immigration receiving nations, and suggested that high levels of immigration exacerbated environmental pressures. Nevertheless, limiting population growth or immigration was not a “panacea” to such problems. What was needed was the development and enforcement of policies which reduced per capita consumption levels and ensured sustainable development.

At the regional or local level, of increasing concern in recent migration and environment literature is migration to environmentally sensitive areas such as coastal zones, rainforests, wetlands, and deserts, and the subsequent environmental consequences. There is general consensus that destructive resource-use behaviors of migrants in tropical rainforests often lead to widespread deforestation and resource depletion (e.g. Bilsborrow 2002; Perz 2003; Pichon 1997). The main effects of rural-to-rural migration are the result of land extensification, which generally involves clear-cutting and deforestation of marginal areas, drainage of wetlands, or use of steep slopes for the expansion of agricultural production. Rural migration to rainforest areas in many Latin American developing countries has led to further deforestation (Bilsborrow 1992). In sub-Saharan Africa, population growth due to both natural growth and in-migration has been linked to serious vegetation loss in dryland areas (Bilsborrow 2002). However, consistent support for the negative environmental effects of migrants is not always found in previous studies (Sierra 1999). The puzzle of contradictory findings highlights the importance of exploring specific contexts in which social, economic, and cultural factors modify the impacts of migration on the environment.

Migrants and non-migrants are often viewed to be quite different regarding resource use strategies, resource extraction technologies, consumption preferences, and knowledge about local ecosystems (Browder 1995; Perz 2003; Pichon 1997). Pichon (1997) found that due to their shorter time horizon, recent migrants in the Amazon frontier had an expansionist attitude toward

new areas which failed to consider the long-term preservation of natural resources. In addition, these recent settlers brought in simple agricultural technologies they were familiar with, but which were destructive to local landscape ecology. Another key difference found between indigenous and non-indigenous people is the value and benefits that each group places on given resources. Migrants have been known to disrupt the natural environment through resource overexploitation because of their lack of specific knowledge about local ecological and social systems (Browder 1995).

Nevertheless, some empirical research disputed the asserted differences between migrants and non-migrants in natural resource use and management. In a multiethnic region in North-west Ecuador, Sierra (1999) found no evidence that recent deforestation was particularly associated with new migrants. A household survey in coastal fishing villages of Indonesia also revealed that although migration was linked with lower environmental quality, there was no significant difference between migrant and non-migrant households with respect to destructive fishing behavior, use of technology, and investment in more sustainable fishing (Cassels et al. 2005). Instead, social institutions and local assimilation of migrants were found to be more important in explaining the relationship between migration and environmental outcomes.

Resource exploitation in forest, grazing land, and marine ecosystems in less developed contexts are often managed by common property systems. Typically, migration is presumed to disrupt social bonds and trust within local communities which are fundamental to the regular function of common resource management institutions (McCay and Jentoft 1998; Ostrom et al. 1999). Migrants often do not understand the rules and norms of indigenous resource management and do not invest in long-term community well-being enhancement. Common property resource systems are thus at risk of collapse, with initial members of the community feeling threatened

and either failing to continue to enforce their own self-restraint, or simply joining in the race to use up the resource (Ostrom et al. 1999). However, the “tragedy of the commons” (Hardin 1968) may be avoided if the community successfully regulates access to resources and create incentives for collective and sustainable use (Cassels et al. 2005). For instance, government organized migrants in Indonesia have less destructive effects on the environment compared to spontaneous migrants because they have greater collective action through greater incorporation into political and social systems at all levels (Bilsborrow 1992). According to Singleton and Taylor (1992), whether or not a group of users of a common property resource is able to resolve their collective action problems is directly related to the level of community (defined as shared beliefs, stable membership, continuing interaction, and direct relations) that exists among them.

In addition, social capital has been employed as a key mediating factor between migration and the environment (Curran 2002; Katz 2000; Pretty and Ward 2001). Basically defined as social resources including social networks, trust and norms (Flora 1998), social capital is considered to be particularly important to understanding variable impacts of migration on local ecosystems. Katz (2000) contended that traditional norms and institutions built on sustained social interactions among resource users would secure private property boundaries and promote sustainable resource management. These local-level interaction processes also generated shared environmental knowledge which could be used to adapt natural resource management practices to the local ecosystem. A social capital model of migration impacts on the environment focuses on how migrants are incorporated in social relations defining access to and use of resources in destination areas (Curran 2002).

### *Environmental effects of migration in areas of origin*

Compared with the environmental effects of migration in areas of destination, those in areas of origin remain understudied. Migration has diverse and complicated impacts on the natural resource base of migrant sending communities. Empirical evidence from South America and Africa suggests that migration may positively or negatively affect the environment of origin places depending on specific social, economic, and biophysical circumstances (Bilsborrow 2002). In areas with high population-land ratios, out-migration can reduce demands on food and water resources, and lead to less intensive farming or grazing. But in places with no excessive population pressure relative to carrying capacity, the loss of productive labor may disrupt the preceding human-nature balance and lead to serious environmental degradation.

Migration can produce environmental feedback effects in origin areas via factors such as remittances (income and goods sent or brought back by migrants to family members staying in origin areas), return migration, and changes in the labor force activity of people left behind (Bilsborrow 1992). The selective nature of migration and migrant social networks may also have some environmental impacts at places of origin (Curran 2002). Migrant selectivity in age, gender and education may result in different environmental outcomes through influences on the agricultural production patterns. In addition, the development of migrant networks is likely to interact with the original social institutions governing natural resource use and management in sending areas.

The role of remittances should be especially noted in considering household migration strategies and their relationships with the environment in areas of origin. On one hand, remittances may relieve pressure on natural resources by allowing households to substitute purchased goods for locally produced goods, or by investing in environmentally-friendly

production or resource conservation projects. On the other hand, remittances may result in negative environmental impacts by increasing investment in environmentally destructive livelihood activities or deteriorating the indigenous knowledge systems that have traditionally guided the management of natural resources (de Sherbinin et al. 2008).

The mediating variable approach to migration and the environment is also appropriate for analyzing the environmental consequences of migration in areas of origin. Adger et al. (2002) argued that the effects of migration on the environment at origin places were mediated by social resilience. As a natural analogy of ecological resilience, social resilience is defined as the ability of groups or communities to cope with external social, economic, and environmental disturbances without significant upheaval (Adger 2000).<sup>3</sup> Out-migration affects the social resilience of origin areas by altering the economic well-being and community structure, and eventually influences the environmental health through the effects on natural resource use. The influences of migration on social resilience are mixed. The diversification of livelihood activities and remittance income are beneficial for social resilience, though it can be undermined by increasing economic inequality (Adger et al. 2002; Locke et al. 2000).

Given the important environmental consequences of agricultural activities, research on the environmental impacts of migration in rural origin areas is closely related to the literature on rural migration and agricultural development. There is a conceptual debate on the effects of rural labor migration on agricultural production in migrant sending communities (Jokisch 2002; Mazambani 1990). Two polarized views exist. One is that out-migration leads to labor shortage and thus threatens agricultural production (e.g. Black 1993; Collins 1988; Zimmerer 1993), while the other argues that remittances generated from migration can compensate for reduction

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<sup>3</sup> Since greater social resilience leads to more sustainable resource use, this concept also relates to the sustainable rural livelihoods framework discussed in the following section.

of labor input and provide capital resources for agricultural improvement and land purchases (e.g. Durand et al. 1996; Stark 1980; Taylor 1999). However, a “middle-path” finding from South America showed that small landholding agricultural systems were not disturbed by labor out-migration, nor were remittances invested in agricultural cultivation or farm expansion (Jokisch 2002). These inconsistent findings suggest that the impacts of labor migration on agriculture are conditioned by the socioeconomic and environmental context in origin communities.

In summary, three main points of recent literature on the environmental consequences of migration are noteworthy. First, there is a considerable body of literature on the environmental impacts of migration in areas of destination, but relatively fewer studies have been conducted in areas of origin. One possible reason for this imbalance is the simple assumption that out-migration has positive effects on the environment of origin areas due to the reduction of population pressure on local natural resources, while increased population tends to threaten the environment of destination areas. However, little evidence has been found to support this supposition. Both aspects are equally important in the study of the environmental effects of migration. In future research, especially in the matter of seasonal or circular rural labor migration in developing countries, more attention should be focused on environmental outcomes in migrant sending communities.

Second, previous studies have shown that migrants to rural areas usually differ from long-term residents regarding agricultural technology use, resource extraction behaviors, and consumption patterns. These activities compose major aspects of rural people’s daily livelihoods and have important environmental consequences. However, research in this area has not been connected to established theories of livelihoods such as the sustainable rural livelihoods

framework (Carney 1998; Ellis 2000). Incorporating the rural livelihoods approach into migration and environment research can help diminish the gap between these two relevant fields.

Third, the mediating factor approach to population and the environment provides a broad theoretical framework for analyzing the environmental impacts of migration. Community-relevant concepts such as common property resource institution, social capital, and social resilience are employed as major intervening variables in explaining the complex and dynamic relationship between migration and the environment. These factors, however, have not been explicitly connected to key theories of community studies. This literature review has not revealed any systematic studies of how migration affects ecological systems through its influence on local community. The level of community in a place can be incorporated as an important mediating variable into the migration and environment framework.

### **The Rural Livelihoods Approach**

The concept of “sustainable rural livelihoods” is increasingly used in research on rural development, poverty reduction, and natural resource management in rural areas. Livelihoods can have different meanings and emphases in different fields. A widely accepted definition is that “a livelihood comprises the capabilities, assets (natural, physical, human, financial and social), and activities required for a means of living (Chambers and Conway 1992; Scoones 1998). The sustainable rural livelihoods framework defines a livelihood as sustainable “when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base” (Chambers and Conway 1992).

The primary unit of analysis for the framework of sustainable rural livelihoods is the household. The livelihoods framework also emphasizes the links across multiple levels as household livelihoods are not isolated from the context of the community, region, nation or even the globe. The local and broader social, economic, and environmental contextual factors, in conjunction with capital asset status, help define rural households' livelihood options and decisions (Carney 1998).

As illustrated in Figure 2.1, rural people draw on a range of livelihood strategies to maintain or improve their livelihoods: natural resource based activities (e.g. agriculture production, livestock, and wild product collection), non-natural resource based activities (e.g. non-farm labor, small enterprises, and rural services), and migration (Carney 1998; Ellis 2000). Although migration was often perceived as a destabilizing process for normal patterns of society in the traditional development literature, it is currently recognized as a critical element in the livelihood strategies of rural households (de Haan 1999). Four major types of rural migration are specified in the livelihoods framework: seasonal, circular, permanent, and international (Ellis 2000). An important feature of rural migration in the developing world is that much of the migrations are for temporary work in other places and hence circular in nature. This migration process usually only involves one or more members rather than a whole household. Most rural migrants maintain close links with their communities of origin and routinely return to the home households. In many instances these are “multi-spatial households” as migration is essentially a series of reciprocal supports across places (Tacoli 1998).

Potential outcomes of migration and other livelihood strategies include enhanced livelihood security and more sustainable use of natural resources. The normative and optimistic outcomes in the original sustainable rural livelihoods framework need to be kept neutral when it

is applied to academic research. The concepts of social and ecological resilience<sup>4</sup> (Adger 2000; Holling et al. 1995) are central in assessing livelihood outcomes since both livelihood security and environmental sustainability stress the ability to cope with and recover from disturbing forces (Scoones 1998). The outcomes of livelihood strategies also feed back into natural capital and other assets of rural households, which in turn influence future household livelihood activities.

As one of the main livelihood strategies for rural households, migration has a direct impact on livelihood outcomes. The role of remittances is particularly important in analyzing the effects of migration on rural livelihoods. Distinct views exist with regard to the impacts of migration and remittances on rural livelihoods. In the traditional “dependence and underdevelopment” view, rural out-migration exacerbates social and economic inequalities and creates an ever increasing dependency on labor migration, thereby undermining local livelihoods and social structure (Lipton 1980; Reichert 1981). By contrast, the “new economics of labor migration” view contends that migration and concomitant remittances can improve rural livelihoods through loosening production constraints, diversifying income sources, and providing financial capital for investment (Stark 1991; Taylor 1999). Based on an extensive literature review on the relationship between migration and rural development, de Haan (1999) concluded that the effects of migration on rural livelihoods were context-dependent and no easy generalizations could be made.

In summary, the overlap between the rural livelihoods framework and the migration-environment literature provides a solid base for productive synthesis. The livelihoods framework

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<sup>4</sup> Here ecological resilience is defined as the buffer capacity or the ability of an ecosystem to absorb perturbations, or the magnitude of disturbance that can be absorbed before an ecosystem change its structure by changing the variables and processes that control behavior (Holling 1986; Holling et al. 1995). Analogously, social resilience refers to the ability of groups or communities to cope with external social, economic, and environmental disturbances without significant upheaval (Adger 2000).

is mainly applied at the household scale. Also, household is the primary unit of analysis of migration studies as labor migration is often used as a family strategy for survival and risk reduction (Bilborrow et al. 1984; Massey 1990). Therefore, the household should be an appropriate level of analysis for merging the research on the dynamic interactions among migration, rural livelihoods, and the environment. Additionally, most studies on migration and the environment were conducted in rural areas where natural resources such as farmland and forests are abundant. In the rural livelihoods framework, migration is viewed as an important livelihood strategy, while the environment and natural resources are incorporated into the context, assets, strategies, and outcomes of livelihoods. The livelihood outcomes section of this framework in particular has important application in analyzing the environmental consequences of migration in rural areas. Therefore, rural household livelihoods can be conceptualized as an integrative mediating factor into the migration and environment model.

### **Community-based Natural Resource Management**

The past few decades have witnessed the increasing application of community in environmental conservation, especially the management of renewable resources such as forests, fisheries, grazing lands, and wildlife in rural areas. Despite its popularity and widespread use in natural resource management, there is no shared conceptual understanding of this core concept – *community* (Flint et al. 2008; Kumar 2005; Luloff et al. 2004). An extensive review of studies from previous International Symposia on Society and Resource Management and the *Society & Natural Resources* journal examined the use of community in natural resource management (Luloff et al. 2004). The authors found that the term has been employed as both unit and level of

analysis, as both a central and peripheral concept, and as both an independent and dependent variable.

Community in the context of natural resource conservation is imagined differently by different actors (Brosius et al. 1998). Given the complexity and diversity of communities in natural resource conservation settings, Kumar (2005) argued that it is extremely difficult, or almost meaningless, to define the concept of community in natural resource management. Nevertheless, a coherent definition and understanding of community is critical for the continuing advancement of community-based natural resource management research and practices.

A major line of thoughts on community in natural resource management concentrates on the role of institutions within communities. This focus has been generally paralleled with the social institution perspective of common property resource management (e.g. Berkes and Folke 1998; Ostrom 1990). Institutions are normally defined as formal or informal constraints that structure human interaction (North 1990). Diverse intra-community institutions operating at multiple-scale levels assume the central role in mediating the relationships between different social actors, and different components of the natural environment (Leach et al. 1999). Agrawal and Gibson's conceptual framework for community and environmental conservation emphasizes three core aspects of community: multiple interests and actors, local interaction processes, and institutional arrangements (Agrawal and Gibson 1999). They argued that a focus on institutions rather than "community" is likely to advance community-based natural resource management. However, the organization of social institutions only constitutes one key element of community, the "local society", which is a comprehensive system of associations among local people for meeting common needs and expressing shared interests (Wilkinson 1991).

Almost all types of community definitions involve social interaction among people, common ties, and shared place (Hillery 1955). From an interactional perspective, community is an emergent process among people who share a common territory and regularly interact with one another, and plays a critical role in local ecological well-being (Kaufman 1959; Wilkinson 1991). Typically, there are three basic elements of any community: (1) a shared territory where people live and meet their daily needs, or “locality”; (2) the “local society” including the institutions and associations among local people; and (3) the “community field” which is composed of a process of locally orientated collective actions (Wilkinson 1991).

Using the interactive theory of community, Flint et al. (2008) analyzed the conceptualization of community in community-based natural resource management. Drawing upon research experience with the Ford Foundation’s community-based forestry initiative, this study underscored the importance of solidly framing community in successfully linked natural resource management with community development. Community is characteristic of multiple and conflicting perspectives. Of particular significance to the success of community-based resource management projects are the dialogue, interaction and inclusion of diversified and complex interests. Bring together people who previously have no communication for the benefit of the community and the environment is a critical reason for the use of community-based approach (Flint et al. 2008). In this sense, community is considered as both a means and a goal of community-based natural resource management.

Community is often assumed to be a unified group of people with common interests. Agrawal and Gibson (1999) provided a thorough analysis of the weakness of flawed assumptions of communities as a spatial unit, as a homogenous social structure, and as a set of shared norms. Communities in reality can rarely be described as such ideal images. An inaccurate

conceptualization of community leads to the marginalization of subordinate people within communities. Community is not composed of homogenous groups of like-minded people, and there inevitably are conflicts of values and goals among members. However, there are potential areas of common ground which provide a starting point for discussion and communication that strengthen the community field (Bridger and Luloff 1999). The ultimate goal of community-based natural resource management is to broaden the decision making structure to include those with relevant local ecological knowledge (Flint et al. 2008). Only through a substantial integration of community and the natural environment can we achieve sustainable development.

An important concept derived from the interactional perspective of community-based natural resource management is the community resource dimension. Based on the interactional definition of community, the community dimension of natural resources consists of three key elements. First, community resource dimension includes the place-based natural resources (such as lands, water, and forests) that are shared by the people living in a common territory. Second, community resource dimension is a system of local-level interaction processes and institutional arrangements among people regarding natural resource use and management. Third, community resource dimension is a process of interrelated collective actions through which local residents come together to address common needs and problems in utilizing and conserving local natural resources. However, such actions do not always take place and often depends on the interactional capacity of local residents to work together on community issues (Flint and Luloff 2005).

To summarize, community plays a critical role in environmental conservation. Community-based natural resource management embraces the dual objectives of environmental conservation and community well-being. The concept of community is a central theme in community-based natural resource management. A coherent theoretical framework of

community is needed for a proper understanding of the role of community in natural resources and environmental issues. Community interaction and capacity for collective action are essential for improving local social, economic, and ecological well-being (Wilkinson 1991). The promotion of community-based natural resource conservation benefits substantially from the interactional conception of community.

### **A Community Perspective for Migration and the Environment**

The preceding review of recent migration–environment literature shows that the effects of migration on the environment are contingent upon specific contextual factors. There is an increasing demand for understanding the mediating mechanisms between migration and environmental outcomes. Common property resource institution, social capital, and social resilience are identified as important intervening variables in explaining the complicated and dynamic relationship between migration and the environment. Although these factors have not been systematically connected to the community concept, they all show a logic connection with the interactional theory of community, thus providing a good prospect for productive literature synthesis.

Community-based natural resource management is a natural extension of the line of critical thoughts about the commons (McCay 2001; Ostrom 1992; Singleton and Taylor 1992). In the community dimension of natural resources, resource management institutions and social interactions are tightly related to each other. On one hand, resource institutions establish sets of formal and informal rules that regulate the interaction among people in the use and conservation of natural resources. Community resource interaction would be almost impossible without the facilitation of specific institutions and associations. On the other hand, individuals continue to

negotiate and reframe resource institutions through their interactions in the community resource field. Moreover, social institutions and interactions in the community resource dimension are also interrelated with other diverse social and economic fields in the community.

Social capital is often viewed as an important resource to further community well-being (Flora 1998). Although discussions of community sometimes refer to social capital and vice versa, these two concepts are not equivalent. Community is an important form of social organization that influences the development and maintenance of the local stock of social capital. The main components of social capital such as trust, norms, and networks can facilitate collective action of community residents. However, these important features of social capital all emerge from repeated and regularized interactions among people sharing a common place over a period of time (Bridger and Alter 2006). Any simplistic reduction of community to social capital demeans the value of local people interacting over common concerns on a daily basis (Flint et al. 2008). After all, social capital is just a necessary but not sufficient condition for the emergence of community. Although considered useful in understanding the relationships between migration and the environment, this concept still requires a more precise definition and needs to be situated within the interactional theoretical perspective of community (Bridger and Luloff 2001).

Additionally, the interactive conceptualization of community is logically linked with the concept of social resilience. Social resilience relates to the structure and dynamics of communities as it is normally defined at the community level (Adger 2000). Social interaction among local people and their collective actions to address common needs constitute the essence of community (Flint and Luloff 2005). Community interaction plays an essential role in determining whether or not human, natural, and economic resources will be effectively mobilized for community action (Flint and Luloff 2005; Luloff and Swanson 1995; Luloff and

Wilkinson 1979). When high community interaction leads to collective actions, greater social, economic and ecological community well-being can be achieved (Wilkinson 1991). Given an increased collective experience of solving common problems, those communities with higher levels of interaction and capacity are more likely to act in response to external disturbances or perceived risks (Flint and Luloff 2005; Luloff and Swanson 1995). Thus, the social resilience of communities is greatly influenced by the level of local social interaction and capacity for collective action.

In summary, common resource management institutions, social capital, and social resilience are all conceptually related to the interactional definition of community. An opportunity exists for linking these major intervening variables in the extant migration and environment literature with the interactional theory of community in environmental conservation. Migration normally brings forth changes in community interaction and capacity, which in turn contribute to subsequent environmental outcomes. Community is a more holistic concept than social institution, social capital, and social resilience, and can hence serve as another central mediating factor between migration and the environment. Integrating community into the migration and environment framework has the potential to enhance our understanding of the environmental impacts of migration.

**Figure**

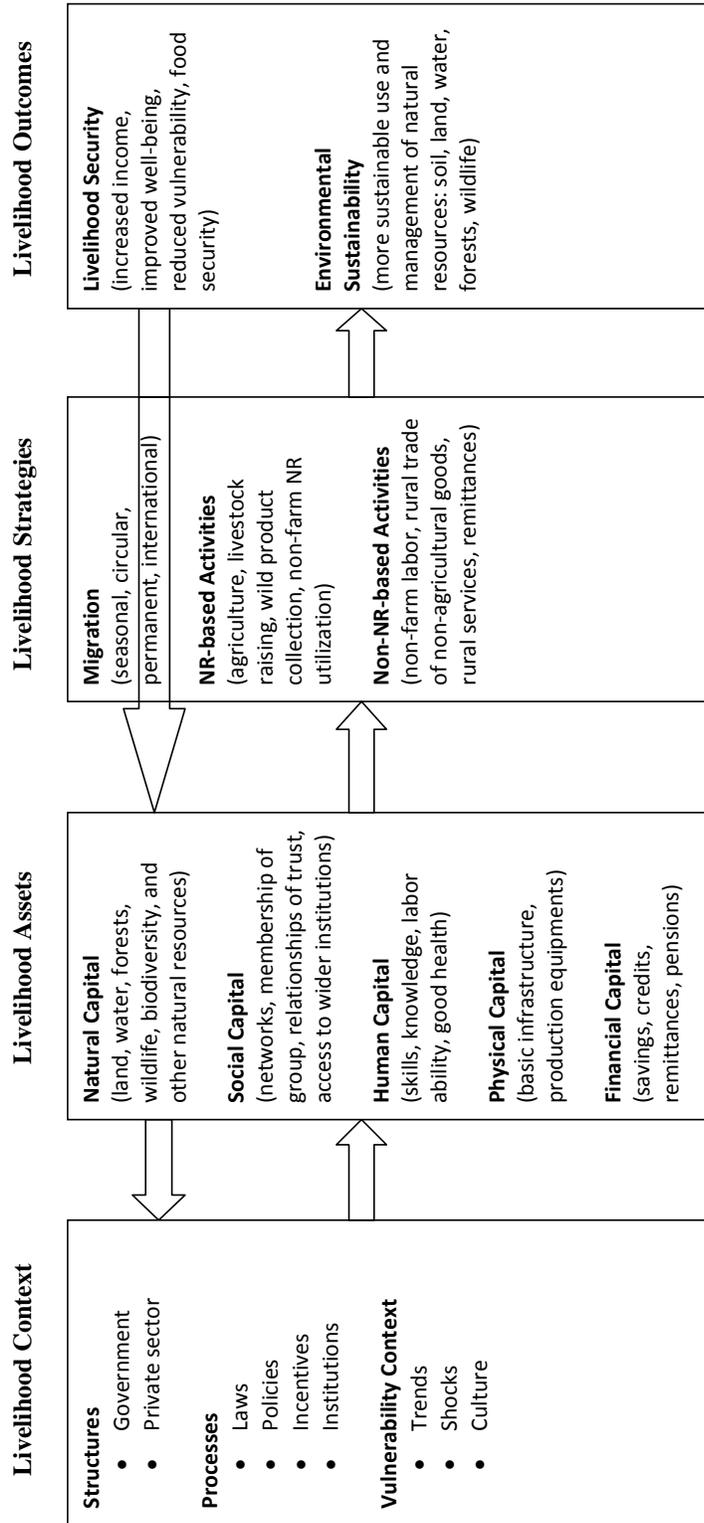


Figure 2.1: Sustainable Rural Livelihoods Framework, Compiled from Carney (1998) and Ellis (2000).

## **CHAPTER 3**

### **CONCEPTUAL FRAMEWORK**

Early population and environment theories may predict that migration environmentally benefits the origin areas and threatens ecosystems at places of destination. However, there is no simple linear relationship between migration and the subsequent environmental outcomes. Previous research on the environmental impacts of migration highlights the roles of mediating factors and the imbalance of attention to destination and origin areas. Much rural migration in developing countries is seasonal or circular, which emphasizes the importance of the effects of migration on the environment in rural origin areas. Based on the key theoretical approaches identified in the literature review, I have developed an explanatory model of the impacts of rural out-migration on the rural environment. Figure 3.1 illustrates the conceptual linkages hypothesized as important in understanding the relationship between rural migration and the rural environmental changes.

Both migration and environmental changes can be described as varied and complex processes at multiple levels. The conceptual framework above concentrates on the environmental impacts of migration in rural areas, which are also the settings in which sustainable livelihoods and community-based natural resource management are usually studied. As shown in Figure 2, rural out-migration has a direct impact on the rural environment due to the reduction of population pressure on local natural resources. More important, it also results in other indirect environmental effects through mediating factors at both the household and the community levels.

The literatures of migration studies and rural livelihoods have shown that household is the primary unit of analysis in both fields. 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. The impacts of rural household population dynamics on the rural environment are mediated by rural household livelihoods. Since this conceptual framework is for investigating how out-migration affect the rural environment through its resulted changes in household livelihoods, the conceptualization of livelihoods here focuses on those aspects which link migration and the environment in the rural livelihoods framework.

The adoption of migration strategy also influences other livelihood activities, particularly natural resources oriented activities, of rural households. The decline in labor availability may lead to a shift from labor-intensive agricultural strategies to labor-saving ones, or the abandonment of some agricultural activities. Remittances generated from migration usually contribute to increased income, improved well-being, and increased household consumption. The diversification of livelihood strategies and improved livelihood security may reduce rural households' dependency on the natural resource base and lead to more sustainable use of natural resources. Furthermore, migration and the associated livelihood outcomes cause changes in rural households' natural, human, social, and financial capitals. These can in turn affect rural households' pursuit of natural-resource-based, non-natural-resource-based, and/or migration livelihood strategies. Previous studies often suggest that migrants (or migrant households) and long-term residents (or non-migrant households) in areas of destination are substantially different in many ways. Likewise, the differences found between migrant and non-migrant households in rural origin areas with respect to livelihood processes, or the lack thereof, should provide important implications for ultimate environmental outcomes such as changes in land quality, soil erosion, and forest conservation in rural areas.

Beyond the household level, rural out-migration may produce environmental impacts across the entire migrant sending area through its influences on community interactional capacity, particularly in natural resource use and management. Community interactional capacity is the ability of community residents to work together in a collective community response to common problems (Flint and Luloff 2005). Community social interaction and capacity for collective action are the central elements of community and provide the foundation for community-based natural resource management. Therefore, in general, higher community interactional capacity can contribute to better environmental conservation. The impact of rural migration on local community interactional capacity can be used as a good predictor of the ultimate environmental outcomes in rural origin areas.

Analysis on the potential influence of out-migration on community should focus on the resulted changes in local social interaction and capacity for collective action in rural origin communities. Rural migration has a direct impact on the population size of home communities, and hence is indirectly linked to community interaction processes. Declined population caused by out-migration may increase the extent of population dispersion and restrict the kinds of social contacts in community relations. The absence of community members reduces the magnitude of community activities and the density of social interaction. In addition, due to the selectivity of migration by sociodemographic characteristics such as age, sex, and marital status, migration may dramatically change the demographic structures of origin communities. Such changes in population composition can influence community structure and organization, and eventually contribute to shifts in community interaction and affect levels of community capacity for collective action. 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 at the early stage (Taylor et al. 1996). The uneven distribution of income is expected to create barriers to social interaction and communication among people with different capital assets, and in turn undermine collective action capacity. 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 (Massey 1990).

From another point of view, rural out-migration may have positive effects on community through its influences on other 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 (Green and Mayo 1953; 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 the increased identification with locality and enhanced awareness of action. For example, a case study of migrant sending communities in the Ecuadorian Amazon region suggested that the out-migration of male labor might enhance the social cohesion of remaining residents (often women) and promote community activities in pursuing sustainable livelihoods (Rudel 2006).

Additionally, rural population dispersion constitutes a barrier to the emergence of community by restricting rural social contacts to be primarily in close and intimate relationships (Wilkinson 1991). The social network developed in rural migration should 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 (Granoveter 1973). This tends to improve

the overall level of social interaction and community well-being in rural origin areas. 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 in areas of origin. In essence, it is the locality of an origin community that provides a common field for the continuing communication and social interaction among people across places.

In this conceptual framework for rural migration and environment, household livelihoods and community interactional capacity are two interrelated components. The capital assets and livelihood activities of rural households are embedded in the broader context formed by community interactions. Household livelihood security is also influenced to a large extent by community well-being. When higher community interactional capacity leads to improved community well-being, household livelihood security is more likely to be achieved. 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. Since community is suggested as more likely to emerge when the basic needs of community residents are satisfied (Wilkinson 1991), increased living standards and well-being of rural households may promote the occurrence of community on a broader scale.

This conceptual framework suggests mediating factors at the household and the community levels should be stressed in examining the environmental effects of rural migration at places of origin. Specifically, two core hypotheses can be derived based on the potential impacts of rural migration on household livelihoods and community interactional capacity. First, it is hypothesized that rural migrant and non-migrant households differ significantly in livelihood

activities including agricultural production, agricultural technology use, income and consumption, and resource use, and that these household-level differences are expected to lead to distinctive environmental outcomes in terms of changes in land quality, soil erosion, and forest conservation in rural origin areas. Second, it is hypothesized that rural labor out-migration has mixed impacts on rural environmental conservation at the community level, depending upon its influence on the community interactional capacity in migrant sending communities. Whether the net effect of rural migration on local community is positive or negative is largely an empirical question, and cannot be determined a priori.

**Figure**

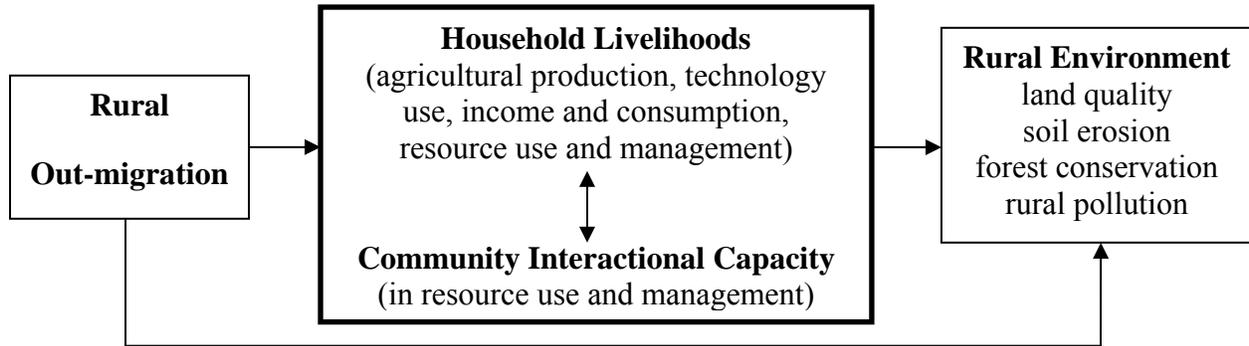


Figure 3.1: A Conceptual Framework for the Impacts of Rural Migration on the Rural Environment

## CHAPTER 4

### NATIONAL CONTEXT AND THE STUDY AREA

#### National Context

As the most populous country in the world, China holds a critical role in the global urbanization process. China's urban population is expected to increase from 561 million in 2007 to 1 billion in 2050, a huge growth accounting for about 15% of the total increase in the world urban population over this period (United Nations 2008). Rural-to-urban migration is currently the main driving factor of urbanization in China (McGranahan and Tacoli 2006). Given the relatively low urban fertility level in China, the contribution of rural-to-urban migration to urbanization is much higher in China than in other developing countries (Montgomery 2008). Rural-to-urban migration issues in China have generated a large body of literature in the past decades. To provide a relevant broader context for this study, the rest of this section focuses on the causes and consequences of the large-scale population movement from rural areas to cities in China, with particular attention to the environment factors and effects.

The economic reform and the transition from a planned to market economy initiated in China in the early 1980's loosened the constraints that earlier prevented rural residents from working and living in the cities. Large economic disparities between urban and rural areas and among regions have generated a huge wave of rural migration labor to urban areas, especially from less-developed inland provinces to more developed coastal regions. The 2000 China Census data shows that the population flows from the western and central regions to the eastern region account for 60% of the inter-provincial migration (Fan 2005). There are substantial variations in rural-to-urban labor migration patterns across different parts of the interior regions.

Large-scale rural labor migration started much earlier in central provinces (e.g. Jiangxi, Anhui, and Henan) and some provinces in the southwest region (e.g. Sichuan and Chongqing) than in those northwestern provinces (e.g. Gansu and Ningxia). Several provinces in western China with large minority populations such as Yunnan and Qinghai have never experienced high level of rural labor out-migration to the more developed eastern provinces (Huang and Zhan 2005).

The “push” and “pull” migration model (Lee 1966) is widely used in research on determinants of the rural-to-urban labor migration in China (Hare 1999; Li 1996; Li 2003). Most of the “push” and “pull” factors are economic or social in nature: rural population increase, rural labor surplus, rural-urban and regional income disparity, and the high demand of cities for low-wage labor, just to name a few. However, some influencing factors of rural labor out-migration are directly or indirectly related to disadvantageous rural environmental conditions, such as the shortage of farmland due to the high population-land ratio, the rapid loss of arable land caused by serious desertification, environmental pollution of rural enterprises, and the conversion of farmland into industrial or commercial use (Li 1996). These environmental factors are often overlooked in research on rural-to-urban labor migration decisions in China. However, economic, social, and environmental factors are closely interrelated with each other in the determination of rural labor migration. For instance, the problem of surplus rural labor is greatly aggravated by population growth and farmland scarcity. Any research that fails to address all these dimensions of causal factors is unable to provide an accurate account of this large-scale population movement.

A significant characteristic of rural-to-urban labor migration in China that has to be considered with respect to causes of migration is the itinerant nature of labor migrants. Given the strict governmental constraints on permanent migration from rural to urban areas, much of the

rural-to-urban labor migration movement in China is seasonal or circular. Temporary labor migration has been adopted as a household strategy to raise income levels and diversify income sources for risk prevention in rural China (Hare 1999). Survey results in Hubei Province showed that permanent and temporary migrants differed considerably in socio-economic characteristics, reasons for moving, decision-making process, and levels of satisfaction with destination places (Goldstein and Goldstein 1996). Li (2003) also contended that the rigid household residence registration system might make “push” and “pull” factors lose their effects in the rural-to-urban migration process.

Environmental factors play a key role in the rapidly increasing rural-to-urban labor migration in China. In rural areas of China and many other developing countries, land is the most important natural resource that sustains various types of human activities. Limited rural land endowment is a main factor contributing to rural labor out-migration in China. Due to the huge agricultural population base, land scarcity continues to be a most serious environmental problem in rural China. The per capita farmland size of China in 2005 was only 1.4 *mu* (1 hectare = 15 *mu*), which is far below the world average of 3.5 *mu* (Central People’s Government Website 2006).

Previous research has shown complicated effects of land resources on rural-to-urban labor migration in China. Zhao (1997) found a negative linear relationship between household farmland endowment and labor migration decisions. Increased farmland size tends to reduce a rural household’s likelihood of engaging in labor migration. Nevertheless, rural household survey data from Hunan and Guizhou provinces revealed an inverted U-shaped relationship between land resources and rural-to-urban labor migration, suggesting that households with below or above average landholding size were less likely than those with average landholding

size to participate in labor migration (Yao 2001). These seemingly contradictory findings reveal interactive effects between household landholding size and other household characteristics or community features on rural labor migration. In addition, rural land distribution can be viewed as a community contextual factor for rural household labor migration decision. Researchers found that households in villages with higher equality of land distribution were more likely to engage in labor migration (Wang and Yao 2001; Yao 2001).

Apart from the severe population pressure on farmland, other major environmental problems faced in rural areas include water and soil erosion, decrease in soil productivity, deforestation, and grasslands degradation (Qu and Li 1994). The deteriorating environmental conditions can act as a strong motivating factor for migration out of rural places. On some occasions, rural-to-urban labor migration is also mingled with environmental involuntary migration in China. China has a large population dislocated by natural disasters and environment-related development projects (Hugo 1996). In 1994, serious floods and drought idling nearly one-fifth of China's croplands resulted in much larger than usual rural labor migration to eastern coastal cities (Kaye 1994).

Rural-to-urban labor migration has generated profound social and economic impacts in both the destination cities and the sending rural villages. Rural labor migrants have greatly contributed to the economic development of urban areas. Most rural-urban labor migrants take up low-wage and hard jobs in the construction, manufacture, and service sectors which are vacated by local urban residents (Roberts 2001). Rural labor migrants constitutes a major force in stimulating the expansion of urban manufacturing industries and services (Fan 2008). By transforming the urban labor force, rural labor migrants have also changed the social structure of urban areas (Huang and Zhan 2005). The bulk of rural migrants is socially marginalized and

locates at the lowest social and occupational hierarchies of urban society (Fan 2002). Despite rural labor migrants' contribution to urban economic growth, they are often blamed for overloaded transportation and housing infrastructure, increased criminal activities, and exacerbated unemployment rates in urban areas (Cai 2002; Solinger 1999). Overall, even though research has shown that the effects of rural-to-urban labor migration in cities are mixed, there is a general consensus that the positive migration impacts outweigh the negative ones (Jiao 2002).

That labor migration contributes to rising rural household income and reduced rural poverty is widely acknowledged (Fan 2008; Huang and Zhan 2005). Migrant remittances have become an essential income source of rural migration households in contemporary China. Research has found that remittances account for a much higher proportion of rural household incomes in China than in other developing countries (Li 2001). Much of remittances are used for daily living expenses, children's education, house construction, wedding finance, and even for investment in production activities (Davin 1999; Huang and Zhan 2005). Rural labor migration to more developed urban centers has not only contributed to increasing rural income and living standards, but has also facilitated the diffusion of new technologies, knowledge, and business practices to rural sending areas. Successful return migrants in rural areas often create small businesses with their savings and skills gained in cities, therefore boosting rural industrialization and economic growth (Murphy 2002).

Although the overall impacts of labor out-migration on rural society and economy are viewed to be positive, it is not without problems. Given the migration selectivity in age and education, labor migration can cause serious "brain drain" from the already deprived rural areas (Huang and Zhan 2005). Rural-to-urban migration also has diversified effects on agricultural production in sending areas. Croll and Huang (1997) found that migration and remittance

incomes supplemented or subsidized agriculture in mid-income and richer regions, but substituted for agriculture in poor and remote areas. Rural labor migration accelerated the devaluation of agriculture, which posed a serious threat to the sustainability of agricultural development in China. In addition, some researchers argued that migrants returned to rural areas because their migration experiences were unsuccessful, and thus their potential contributions to local development were largely suspect (Wang and Fan 2006).

The environmental impacts of the huge rural-to-urban labor migration flow in both destination and origin areas have long been understudied in China. Since rural-to-urban labor migration in China concentrates people to the east coastal regions which are highly ecologically sensitive and already heavily populated, it is likely to bring serious adverse environmental consequences in urban destination areas (McGranahan and Tacoli 2006). Song et al. (2008) suggested that rural-to-urban migration had negative impacts on vegetation growth in destination provinces in China. In the past decades, urbanization-induced environmental problems such as air pollution, water shortage, and solid waste in cities have begun to receive growing attention in China (e.g. Chen 2007; Cheng and Bao 1994; Liu et al. 2005; Wang and Dai 1998). Nevertheless, research in this area still remains limited, and specific environmental impacts from rural-to-urban migration are relatively ignored due to the overemphasis on industrial and technological effects.

The seasonal or circular feature of rural-to-urban labor migration in China highlights the great importance of its environmental consequences in rural origin areas. Due to the high population pressure on natural resources in China, rural labor out-migration may have beneficial effects for the environment in the sending areas. Disturbances and damages to the rural environment may be reduced or mitigated because of increased rural household income and more diversified income sources (Tan and Wang 2004). Given the existence of rural labor surplus and

the shortage of farmland, rural labor migration is unlikely to lead to idle cultivatable land or to dramatic declines in the land productivity and agricultural outputs (Davin 1999). However, some regional survey results showed that more farmlands were abandoned in villages with higher labor migration rates (Zhu and Xu 2000).

Rural-to-urban labor migration is expected to produce mixed effects on land resources in rural China through its influence on the collective land ownership system. Under the household contract system in China, farmers own the farmland in the name of local village community and do not have individual land property rights. Thus, a migrant household cannot sell its farmland even if all of its labor members move to urban areas for nonagricultural jobs. Meanwhile, labor migrants are unwilling to give up their contracted land because it is seen as a safety net against insecure urban employment. As a consequence of household labor shortage, farmlands of migrant households are often under-cultivated or even left uncultivated (Feng and Ma 2001), which may cause reduction in agricultural production and land degradation. On the other hand, labor migration provides opportunities for freer farmland transfer among rural households (Nai 2000; Shao et al. 2007). The concentration of farmlands can lead to the improvement of agricultural production scale and result in benign impacts on land resources in the long run.

### **Study Area**

This section introduces the study area of the dissertation research – Chongqing Municipality of Southwest China. The description addresses the social, economic, and physical environments of Chongqing, and its regional context of rural-to-urban labor migration. The purpose of this section is to provide a structural backdrop for the whole study and to illustrate the rationale behind study site selection and data collection.

### ***Location and general characteristics***

Chongqing is located on the edge of Yungui Plateau in Southwestern China between longitudes 105°11' – 110°11' East and latitudes 28°10' – 32°13' North (see Figure 4.1). It covers an area of 82,400 square kilometers, bordering on Hubei and Hunan provinces to the east, Guizhou Province to the south, Sichuan Province to the west, and Shanxi Province to the north. Chongqing is the largest and most populated of China's four provincial level municipalities (the other three are Beijing, Shanghai, and Tianjing). The present total population of Chongqing is 32.4 million, with 23.6 million having rural registered permanent residence (Chongqing Bureau of Statistics 2009a). The municipality is centered on the city of Chongqing, and governs 19 districts and 21 counties (or autonomous counties). A distinct difference between Chongqing and the other three municipalities is that Chongqing has a large hinterland and much of its population is rural. Therefore, it is often described as a “megacity with vast countryside” (Shao et al. 2007).

### ***Physical environment***

The topography of Chongqing is characterized by numerous hills and mountains. It is intersected by the upper reaches of the Yangtze River and the Jialing River, while the center of Chongqing City is located at the confluence of the two rivers. Overall, the landscapes in this region represent a gradual transition from the higher southern and northern mountainous areas to the lower river valleys. Chongqing has a humid subtropical climate with four distinct seasons. Average temperatures in Chongqing range from 29°C (84°F) in the summer to 9°C (48°F) in the winter, while the annual average temperature is around 18°C (64°F). With an average annual sunshine time of 1000 – 1200 hours, this region has one of the lowest sunshine totals annually in

China. Chongqing has regular and plentiful rainfall, which averages from 1000 to 1400 mm annually.

In a region as large as Chongqing Municipality, local topographic and climatic factors are expected to vary remarkably across the whole area. These distinct spatial variations of environmental conditions within Chongqing give rise to its regionalization of ecological functions and systems. Based on the official ecological zoning of Chongqing (Luo et al. 2006), five major ecological subregions can be identified: the metropolitan core zone, the western hilly agricultural zone, the middle parallel-valley agricultural and forest zone, the soil-erosion sensitive Three Gorges Reservoir zone<sup>5</sup>, and the southeastern evergreen broad-leaved forest zone (Figure 4.2).<sup>6</sup>

The metropolitan core zone is comprised of the nine urban and suburban districts: Yuzhong, Dadukou, Jiangbei, Shapingba, Jiulongpo, Nan'an, Beibei, Yubei, and Banan. The topography of this ecological subregion is characterized by low hills and plains. It has a humid subtropical climate, with an average annual precipitation of 1100 – 1200 mm and a forest cover rate of 14.6%. The western hilly agricultural zone is situated to the west of Huaying, Yunwu, and Bayue mountains, and contains two districts (Hechuan and Shuangqiao) and four counties (Tongnan, Tongliang, Dazu, and Rongchang). This area has humid subtropical and seasonally dry climates. Its landscapes are dominated by hills, with a low forest cover rate of 8%. Average rainfall in this subregion ranges from 800 – 1000 mm annually. The middle parallel-valley agricultural and forested district is located among the Huaying, Yunwu, and Bayue mountains and covers the areas of Yongchuan, Jiangjin, and Wansheng districts and Bishan and Qijiang

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<sup>5</sup> The Three Gorges Dam that spans the Yangtze River is located in the bordering area of Chongqing Municipality and Hubei Province. Since Chongqing is in the upper reaches of the Yangtze River, most of the Three Gorges Reservoir Area is situated in this region.

<sup>6</sup> The discussion in the rest of this subsection draws on Chongqing Environmental Protection Bureau (2006) unless specified otherwise.

counties. This subregion is featured by hills and low mountains and a subtropical climate. It has an average annual precipitation varying from 900 – 1150 mm, and a relatively higher forest cover rate of 24% than the previous two zones. The soil-erosion sensitive Three Gorges Reservoir zone is the largest of the five ecological subregions, and includes the three districts and nine counties which are located in the reservoir area: Changshou, Fuling, and Wanzhou districts, and Liangping, Dianjiang, Fengdu, Zhongxian, Kaixian, Yunyang, Fengjie, Wushan, and Wushi counties. This subregion also has a subtropical climate and topography characterized by hills and low mountains. Spatial variations of rainfall are large in this area, with an average annual precipitation ranging from 1000 – 1500 mm. Overall, 34.5% of the land in this subregion is forested. The southeastern evergreen broad-leaved forest zone is situated in the southeastern mountainous areas of Chongqing and contains the rest of its subordinate districts and counties: Qianjiang and Nanchuan districts and Shizhu, Wulong, Pengshui, Youyang, and Xiushan counties. Its landscapes are very diversified and characterized by hills and low-medium mountains. This subregion has 1100 – 1400 mm of rainfall per year and a forest cover rate of 30%.

### ***Socioeconomic context***

Chongqing is the largest industrial and commercial center in western China. Its municipality status was established in 1997 as part of China's strategic plan to stimulate the development of the relatively deprived western regions. Since then, Chongqing has experienced rapid economic growth. Chongqing's GDP increased from 118.7 billion RMB in 1996 to 509.7 billion RMB in 2008, with an annual growth rate of about 13%.<sup>7</sup> In addition to serve as the flagship of China's western development, Chongqing has undertaken the extraordinary task to

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<sup>7</sup> This calculation is based on various issues of Chongqing Economic and Social Development Report.

coordinate the resettlement of population for the Three Gorges Dam Project. The majority of the one million relocated people have been accommodated within the reservoir area in Chongqing (Sigurdson and Palonka 2008). Therefore, it can be foreseen that Chongqing will continue to play a critical role in the social and economic development of the whole country, particularly its western interior.

The 40 districts and counties under Chongqing's jurisdiction display significant variability in social and economic conditions. In Chongqing's 10th and 11th Five-Year Plans, the municipality is divided into three economic subregions according to the geographic characteristics and socioeconomic development levels: the more-developed metropolitan area, the western economic corridor, and the Three Gorges Reservoir economic zone (Figure 4.3).<sup>8</sup> The more-developed metropolitan area is situated at the confluence of the Yangtze River and the Jialing River and the adjacent river valleys. This economic subregion encompasses the nine urban and suburban districts of Chongqing, overlapping exactly with the metropolitan ecological zone discussed earlier. The metropolitan economic area is in the lead in socioeconomic development in the western part of China. Its overall economic performance is close to that of the more developed east coastal provinces. The western economic corridor covers areas along the Chongqing-Chengdu (the capital city of Sichuan Province), Chongqing-Guizhou, Chongqing-Suining (a major city in Sichuan Province), and Chongqing-Hechuan transportation arteries. It contains the 11 districts and counties located in the western hilly agricultural zone and the middle parallel-valley agricultural and forest zone, and Nanchuan District within the

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<sup>8</sup> Chongqing Municipality has also begun to implement its "one-circle and two wings" development strategy since 2007. The "one-circle" refers to the economic core area within a radius of an hour's driving distance from the city center. The "two-wings" refer respectively to the northeastern part of Chongqing which constitutes the bulk of the Three Gorges Reservoir Area, and the southeastern economically deprived region that is centered on Qianjiang District. The "one-circle and two wings" development plan generally inherits the principles behind the division of three economic subregions in Chongqing.

southeastern evergreen broad-leaved forest zone. In general, the socio-economic development level of this economic area is comparable to the average of western China. The Three Gorges Reservoir economic zone is located to the east of the metropolitan economic area, and largely corresponds to the combination of the soil-erosion sensitive Three Gorges Reservoir zone and the southeastern evergreen broad-leaved forest zone. Natural conditions in this area are spatially variable but generally marginal for economic development. Overall, its socioeconomic development level is similar to that of the poverty-stricken regions in western China.

### ***Eco-economic subregions of Chongqing***

The description in previous sections shows that the ecological zoning and the socioeconomic regionalization of Chongqing are highly interrelated. By overlaying the five ecological subregions with the three economic areas, the 40 subordinate districts and counties of Chongqing can be organized into four subregions in terms of social, economic, and ecological characteristics: the Metropolitan Eco-economic Core Area, the Western-middle Eco-economic Corridor, the Three Gorges Reservoir Eco-economic Zone, and the Southeastern Eco-economic District (see Figure 4.4). This regional division provides a basic frame for the selection of study communities for my dissertation research.

### ***Chongqing context of rural-to-urban labor migration***

High political status notwithstanding, Chongqing Municipality is generally less developed than the other three municipalities and the east coastal provinces of China. The deteriorating population-land pressure has led to a huge rural labor surplus in Chongqing. Chongqing has been nationally recognized as one of the most important centers of rural-to-urban

labor migration. The number of rural labor migrants from Chongqing increased from 3.5 million in 1997 to 7.8 million in 2008 (Guangming Daily 2009), which accounted for about 55.8% of Chongqing's rural labor force. Although the sheer size of rural labor migrants from Chongqing is still smaller than those of several other inland provinces such as Henan and Sichuan, the extremely high rural labor migration rate of Chongqing is noteworthy.<sup>9</sup>

Rural labor out-migration has been taken up as an effective strategy to reduce rural poverty by local governments in Chongqing and other provinces in western China (Huang and Zhan 2005). However, only a very small proportion of the rural labor out-migration in Chongqing is organized by relevant governmental agencies (Chongqing Rural Survey Team 2005; Ouyang and Zhou 2002). Most labor migrants find their first job in destination cities with the help of relatives, friends, or employment agencies. Overall, rural labor migrants of Chongqing are characterized by young and middle-aged populations with higher than rural average educational attainment. A majority of these migrants (53.7% in 2008) depart to urban destinations outside of Chongqing, while the rest move to cities of different scales within the municipality (Chongqing University of Arts and Sciences 2009). Although Chongqing's rural labor migration to external destinations has mainly concentrated on the more developed east coastal regions, the western interiors are attracting more labor migrants in recent years. In the urban destination areas, Chongqing rural migrants primarily work in the sectors of service, manufacturing, and construction. In addition, the average migration duration of Chongqing's rural labor migrants is increasing, which represents a trend of shifting from short-term seasonal migration to longer term circular migration. In 2004, the average annual length of migration time

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<sup>9</sup> Rural-to-urban labor migration rate is here defined as the proportion of rural labor migrants relative to the total number of rural laborers.

for rural labor migrants of Chongqing exceeded eight months (Chongqing Rural Survey Team 2005).

According to the statistics provided by the Chongqing Bureau of Human Resources and Social Security, Chongqing's average rural per capita income from labor migration in 2008 was 1,761 RMB,<sup>10</sup> which accounted for 42.6% of the rural per capita annual net income. In spite of the significant contribution of labor migration to improved rural incomes, it is thought that the large-scale out-migration of rural laborers in Chongqing have “two-edge” effects on rural economy and society. Findings from surveys conducted by the Chongqing Rural Survey Team suggested that labor migration improved rural people's living standard at the same time that it constrained agriculture and rural development (Chongqing Rural Survey Team 2004).

Nevertheless, most studies conclude that the overall impacts of rural-to-urban labor migration on rural origin areas are positive.

Given the notable spatial variations of socioeconomic and biophysical environments within Chongqing, the propensity for rural labor out-migration is expected to vary across its subregions. Using rural survey data from the three economic areas of Chongqing, Zhang et al. (2007) found that the rural-to-urban labor migration rate of the Three Gorges Reservoir economic zone in 2004 (47.3%) was similar to that of the western economic corridor (43.3%), but higher than that of the more-developed metropolitan area (38.9%). This suggests that lower socioeconomic development level may contribute to more rural labor out-migration. However, this result is inconsistent with findings based on the data from the Chongqing Agricultural Bureau, which showed that the rural labor migration rate of the Three Gorges Reservoir economic zone in 2006 (49.6%) was slightly lower than those of the western economic corridor

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<sup>10</sup> The average rural per capita income from labor migration was obtained through dividing the total income from labor migration by the total rural population.

(54.9%) and the more-developed metropolitan area (52.5%). Despite these discrepancies, it is clear that as Chongqing has experienced a long period of high rural-to-urban labor migration, the magnitude of labor out-migration is consistently high across its whole rural areas.

In summary, Chongqing Municipality is a major origin area of rural-to-urban labor migrants in China. It currently has the highest percentage of rural work force as labor migrants among China's municipalities and provinces. Additionally, Chongqing is a hilly-mountainous region characterized by typical ecological problems such as lower land fertility, soil erosion, and deforestation (Chongqing Environmental Protection Bureau 2006). Demographic and accompanying socioeconomic changes usually have profound and complex impacts on the fragile ecosystems in mountainous areas of developing countries (Templeton and Scherr 1999). Therefore, the combination of the high magnitude of rural-to-urban labor migration and special biophysical conditions makes Chongqing an important study area for examining the influences of rural-to-urban labor migration on the rural environment in China.<sup>11</sup> It should be noted that the ultimate environmental consequences of labor out-migration in rural origin areas may vary across different geographic regions in China. For instance, the labor migration impacts to the rural environment in mountainous southwest China may be relatively different from those in arid northwest China and south-central China with mild climate and ample rainfall. Given the specific labor migration and environmental context of Chongqing, the findings of this dissertation are unlikely to be generalizable outside of the southwest region of China to other areas with different rural-to-urban labor migration rates and environmental characteristics. Nevertheless, since this research focuses on the household livelihoods and community interaction mediating factors that are applicable to all rural areas, findings from Chongqing can help to pinpoint some potential

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<sup>11</sup> The choice of Chongqing as the study area for this research was also partly because of my familiarity with the socioeconomic, cultural, and biophysical background of this region.

trends of the impacts of rural labor out-migration on the rural environment in other regions of China.

## Figures

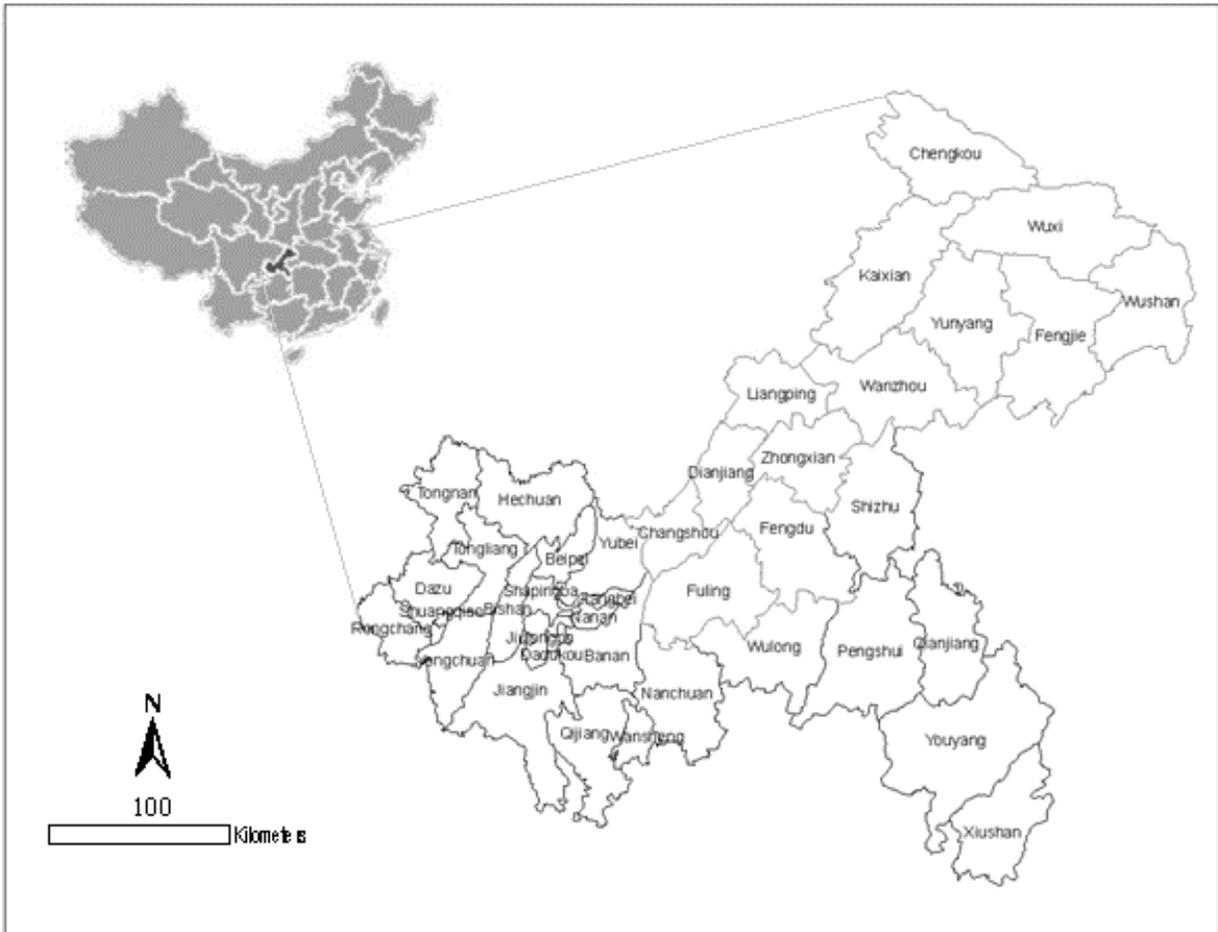


Figure 4.1: Map of Chongqing Municipality, Southwest China

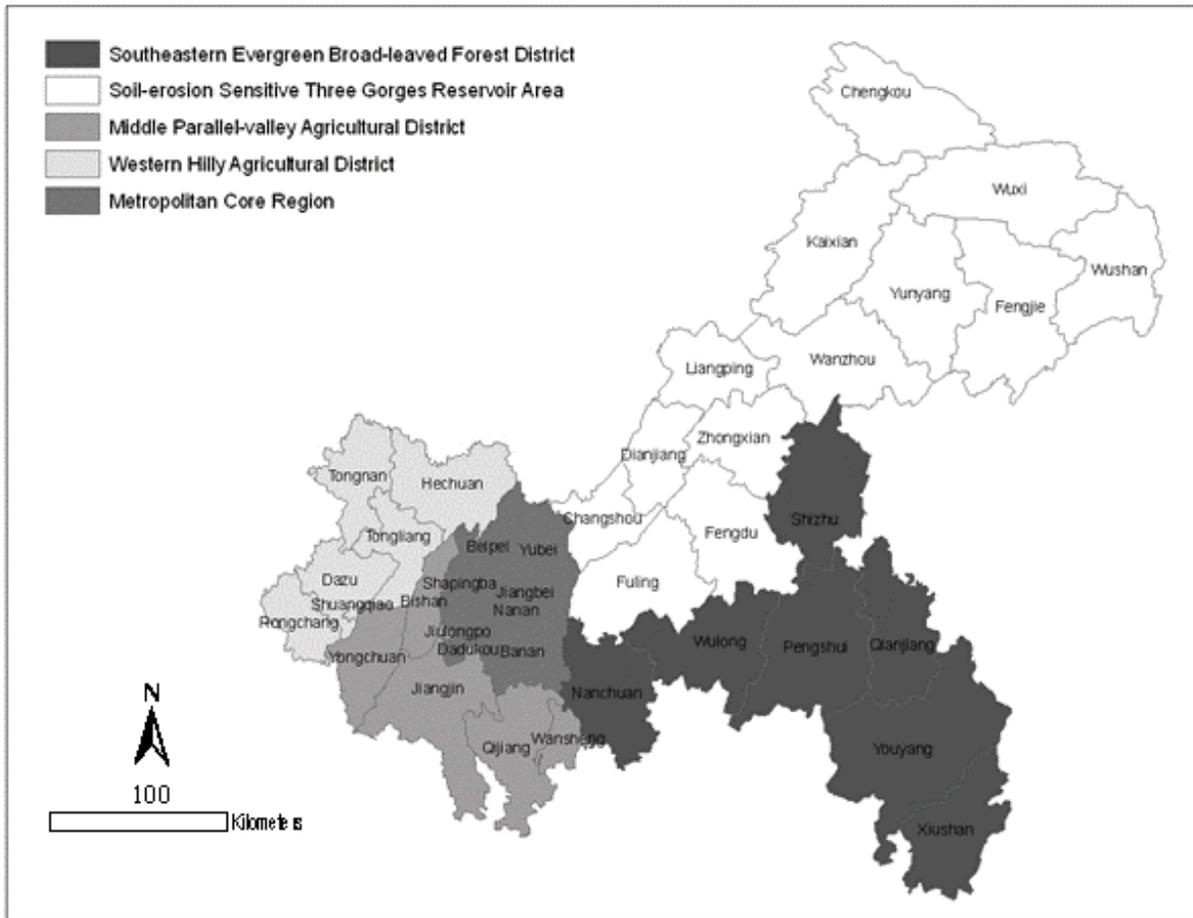


Figure 4.2: Ecological Division of Chongqing Municipality, Southwest China

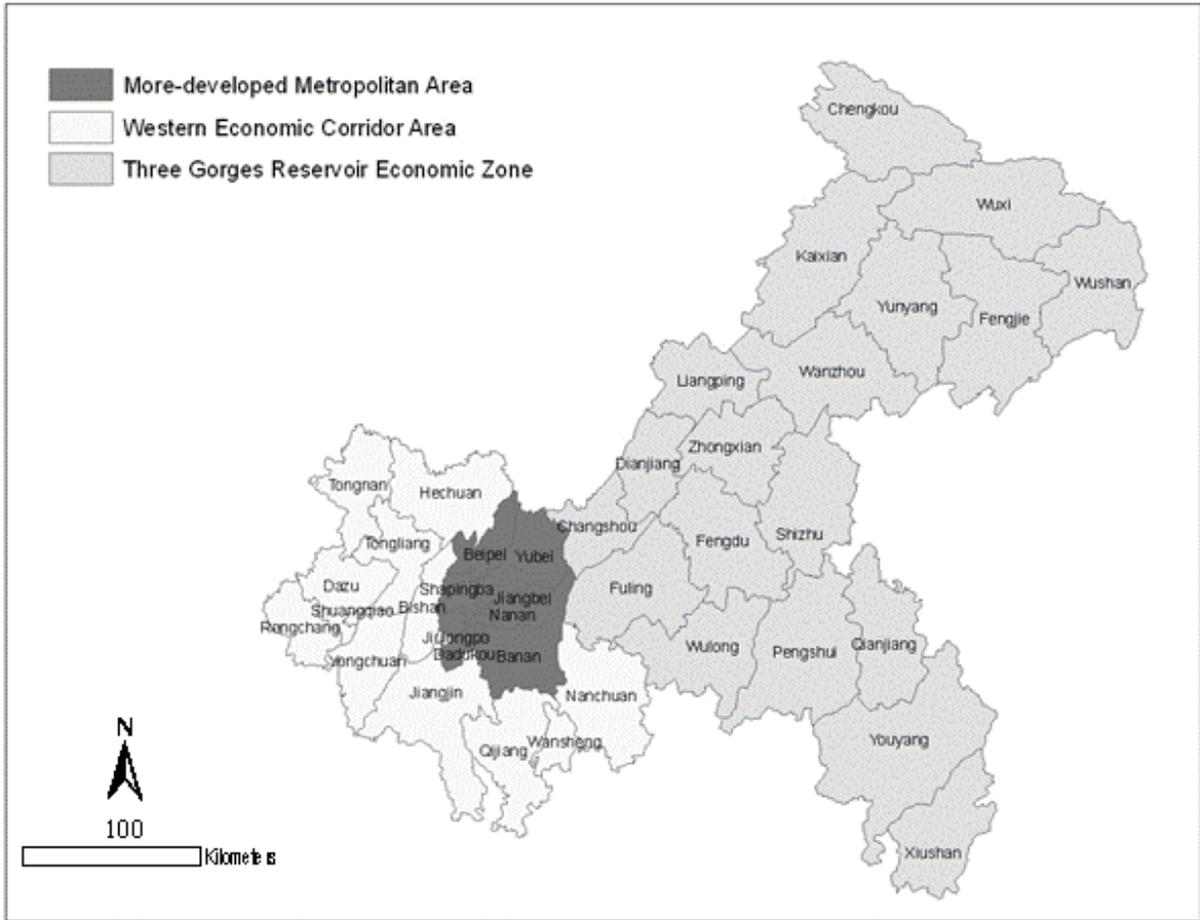


Figure 4.3: Economic Division of Chongqing Municipality, Southwest China

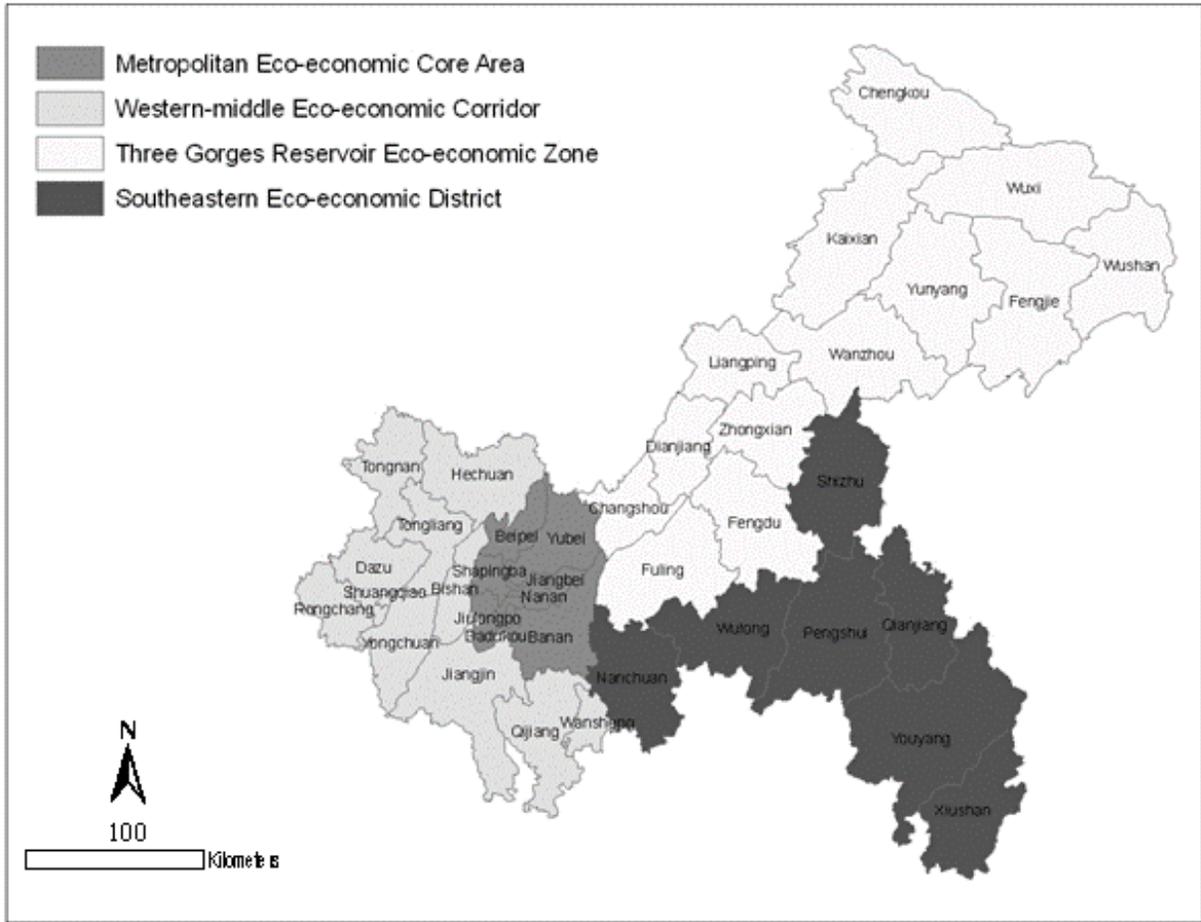


Figure 4.4: Eco-economic Subregions of Chongqing Municipality, Southwest China

## **CHAPTER 5**

# **RURAL-TO-URBAN LABOR MIGRATION, HOUSEHOLD LIVELIHOODS, AND THE RURAL ENVIRONMENT**

### **Introduction**

Over the past two decades, there is a rapidly growing literature on the relationship between migration and the environment. Since rural migration (to urban or rural areas, permanent or temporary, internal or international) constitutes a key component of human population movement, and rural places contain most of the world's natural resources such as land and forests, the area of rural migration and the environment is attracting increasing research interest in recent years (Bilsborrow 2002). Studying rural migration and its relationship to the environment is essential for a more complete understanding of the population-environment linkages (Carr 2009).

There is a long-running debate on the relationships between population and the environment. Early simplistic views of negative linear relationships between population growth and the natural environment have been replaced by a more complicated mediating factor framework (Jolly 1994; Mackellar et al. 1998; Marquette and Bilsborrow 1999). This approach incorporates socioeconomic, institutional, technological, and cultural contextual factors which modify the relationships between population dynamics and environmental changes. The mediating factor perspective is especially important in investigating the specific mechanisms through which migration affects the natural environment.

The effects of migration on the environment are often complex. An accurate examination of the environmental consequences of migration requires comparing the biophysical situation

before and after migration. However, such longitudinal data are usually not available at most places especially in rural areas of developing countries. Moreover, environmental changes in this situation can be attributable to a wide range of factors beyond migration. Therefore, a reasonable and efficient research strategy of differentiating environmental impacts of migration is to compare migrants (or migrant households) and non-migrants (or non-migrant households) with respect to those aspects that have important environmental consequences, such as resource use behavior and resource extraction technologies.<sup>12</sup> Many recent studies have used this approach to assess the environmental effects of migration, most often in areas of destination (e.g. Browder 1995; Cassels et al. 2005; Garland 1995; Perz 2003; Pichon 1997; Sierra 1999). In contrast, there have been few studies examining the impacts of migration on the environment in areas of origin.

There is a large literature on the impacts of migration on agricultural production, use of agricultural technologies, and income and consumption in rural sending areas. Comparing migrant households and non-migrant households regarding these aspects is also employed as a common method to examine the influences of migration in this area of study. Given the environmental consequences of these factors, this line of inquiry has direct implications for the subsequent environmental outcomes of migration in rural areas of origin. However, few previous studies have addresses such connections. Agriculture practices, incomes and assets, and consumption patterns are all critical elements of rural people's livelihood strategies. Livelihood comprises the capabilities, assets (natural, physical, human, financial, and social), and activities required for a means of living (Carney 1998). The rural livelihoods framework provides a solid

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<sup>12</sup> Rural migrants and non-migrants in a specific study are exposed to the same social, economic, and biophysical environments. The method of comparing these two groups is largely equivalent to a pseudo-experiment research design in which non-migrants are employed as a control group so that the impacts of migration on migrants can be assessed relative to those which do not participate in migration. This is not to say migration has nothing to do with the non-migrants since they are also undoubtedly affected by the migration process. The fact that both groups generally live in the same context provides a methodological base for such a research strategy.

base to synthesize the literature on migration and rural livelihoods with the research on the environmental impacts of migration in rural origin areas. In the rural livelihoods framework, migration is considered as one of the most important livelihood strategies, while the environment and natural resources are incorporated into the context, capital assets, strategies, and outcomes of livelihoods. The relationship between rural household-level population dynamics and the environment has formed a major area of recent population-environment research (de Sherbinin et al. 2008). The household is also the primary scale of analysis in the rural livelihoods framework. Therefore, the household is an appropriate level of analysis for synthetic research on migration, rural livelihoods, and the environment. Rural household livelihoods can be conceptualized as an integrative mediating factor into the migration and environment model.

The impacts of rural migration on the rural environment are mediated by the intervening household livelihood factors including agricultural production, use of agricultural technologies, income and consumption, and resource use and management. Chapter 3 describes a conceptual framework that emphasizes the mediating role of rural household livelihoods in studying the impacts of rural migration on the rural environment. It is hypothesized that rural migrant and non-migrant households differ significantly with respect to these four livelihood constructs. Such differences are expected to lead to distinctive environmental outcomes in terms of changes in land quality, soil erosion, and forest re-growth. In the present study, we empirically evaluate this conceptual framework in the context of rural-to-urban labor migration in Chongqing Municipality of Southwest China, a hilly-mountainous region currently having the highest rural labor out-migration rate in China. The study draws on field data collected through rural household surveys and key informant interviews in four rural communities of Chongqing. The results confirm the research hypothesis that rural labor-migrant and non-labor-migrant

households are significantly different in livelihood activities. The implications of these findings for the subsequent environmental outcomes of rural labor out-migration and natural resource management in rural origin areas are also discussed.

### **Review of Previous Studies**

One of the key areas of recent literature on the comparison of rural migrants (migrant households) and non-migrants (non-migrant households) has focused on their differences in agricultural production. A popular view on the impacts of migration on agriculture is that rural labor out-migration leads to a decline in agricultural cultivation and production. Case studies from Zimbabwe found labor migrant households had less average farm labor input and lower production efficiency than non-migrant households, and suggested that in general labor migration was detrimental to communal land agriculture (Mazambani 1990). In Northeast China, Rozelle et al. (1999) showed that rural households with labor migrants had lower agricultural productivity than those without migratory workers. Also, a recent rural household survey in the southern Yucatán peninsular region of Mexico found that labor migrant households cultivated significantly less farmland and were more likely to invest in pasture development on extant land than non-migrant households (Schmook and Radel 2008).

Nevertheless, an opposite view contends that remittances generated from labor migration increase rural household incomes and enable rural households to make agricultural improvements. Abundant empirical evidence from different regions has also been found to support this argument. Taylor and colleagues (2003) for rural China showed that the differences between labor migrant and non-migrant households in agricultural productivity were offset by the effects of migrant remittances, thus mitigating the potential negative influences of lost

household labor. In rural Albania, McCarthy et al. (2006) found that households with international labor migrants had smaller land area planted in staples, fewer agricultural labor hours, and lower crop diversification index than non-migrant households. However, the results also suggested that the loss of household agricultural labor was compensated by increased access to capital and overall migration led to improvements in both agricultural and total household incomes. de Haas (2006) showed that international migration remittances enabled migrant households to invest more than other households in water pumps, farmland reclamation, and hiring agricultural labor in Southern Morocco, and thus contributed to increased agricultural production. Finally, Hull (2007) found that migrant households with remittances in rural Northeast Thailand were more likely than non-migrant households and households with migrants but no remittances to engage in traditional rice cultivation because of their enhanced capabilities to hire paid farm labor.

In addition to the two polarized views discussed above, a “middle-path” finding from south-central Ecuador showed that smallholder agriculture was not threatened by rural labor out-migration, nor were remittances invested in agricultural production and improvement (Jokisch 2002). No significant difference in agricultural productivity was found between migrant and non-migrant households, or between different categories of migrant households (i.e. international and domestic). This argument is also supported by a recent survey-based study in the southern Ecuadorian Andes, which suggests that migrant-sending households do not differ from non-migrant-sending households regarding the area cultivated in subsistence crops (Gray 2008). Altogether, the inconsistent findings discussed above reveal that rural labor migration has complicated and diverse effects on agricultural production practices.

Beyond agricultural cultivation and productivity, a number of studies have examined the influence of migration on rural household agricultural technology use. There are again opposing opinions concerning this aspect. The pessimistic view argues that labor scarcity resulted from rural out-migration leads to the decay and abandonment of traditional labor-intensive agricultural technologies by migrant households (Garcia-Barrios and Garcia-Barrios 1990; Zimmerer 1993). Temporary labor migration may also prevent the adoption of new agricultural technologies of rural households due to the absence of key labor members and the reduced importance of farming for household livelihoods. For example, Black (1993) found that in Northern Portugal non-migrant households were more likely than migrant households to employ innovative technologies such as mechanized farming and improved seeds. Non-migrant households in rural Zimbabwe also tended to use more chemical fertilizers and pesticides per unit of farmland than migrant households (Mazambani 1990).

By contrast, the optimistic view on the impacts of migration to agricultural technologies asserts that migration leads to technological improvement in rural areas through investment of remittances in more modern technologies and the stimulating effects of the new ideas and knowledge brought back by labor migrants (Oberai and Bilsborrow 1984). This argument is partially confirmed by empirical evidence from a case study of labor migration in rural southern Swaziland. Simelane (1995) found that present and return labor migrants were more likely than non-migrants to own agricultural tractors. Remittances from male migrant workers to South African mining areas were also used by women to hire tractors, thus compensating for the shortage of labor and increasing agricultural production. In addition, a household survey in rural Bangladesh showed that households with international migrants were more likely than non-migrant households to use modern farming technologies to improve agricultural productivity,

though households with temporary or permanent domestic migrants had lower propensity to adopt such techniques (Mendola 2008).

Furthermore, many studies on migration and rural livelihoods have examined the effects of migration on household income and expenditure. There is a general consensus that migration and remittances reduce rural poverty and contribute to the improvement of household living standards. Overall, migrant households (especially those receiving remittances) have higher levels of income and consumption than non-migrant households (Airola 2007; Schmook and Radel 2008; Taylor and Mora 2006; Wouterse and Taylor 2008). These two groups of households are also quite different in terms of consumption patterns. Ariola (2007) found that international migrant households in Mexico had a smaller share of household expenditure on food but a larger proportion on durable goods, healthcare, and housing. Other household survey based studies also showed that migrant households with remittances tended to spend more than non-migrant households on productive activities and investment goods (Adams 2006; Taylor and Mora 2006; Zarate-Hoyos 2004).

Some studies on the impacts of migration on household income and consumption have assessed the effects on rural asset accumulation. Survey data collected from rural Pakistan found that households with international remittances owned more farmland assets than others (Adams 1998). Several studies for rural Thailand have compared asset status of migrant and non-migrant households by using household asset indices that were created based on a methodology proposed by Filmer and Pritchett (2001). In the Nang Rong District, Entwisle and Tong (2005) found that households with more migrant members had fewer productive assets, but this deficit was compensated by the increased consumer assets brought by remittances incomes. Another study in the same region showed that the effect of migration on rural assets was contingent upon

households' initial economic status (Garip 2007). For rich households, those with migrant members but receiving no remittances were worse off than those without migrants. However, poor migrant households obtained more productive assets than their non-migrant peers. In a different and more economically diversified area of Thailand, Ford et al. (2007) found that migrant households in general owned fewer assets than non-migrant households in the rice growing and plantation communities, but not in the semi-urban, upland, and mixed ones.

Finally, there is a popular view that migrants differ significantly from non-migrants in terms of resource use behavior, resource extraction technologies, and knowledge about local ecosystems. Garland (1995) showed native residents and recent migrants in the Peruvian Amazon Basin were substantially different regarding production strategies and management of natural resources. The shifting agricultural system of the indigenous populations was less integrated to the market economy and caused a significant lower rate of deforestation. Also in the Amazon region, Pichon (1997) found that recent farming settlers were far more market-orientated in agricultural production and resource use than those long-standing forest residents. In addition, these recent migrants brought resource extraction technologies that were destructive to local landscape ecology (Perz 2003). Another major difference between indigenous people and migrants in the Amazonian forests is their respective knowledge about the local natural environment and their utilization of tropical forest resources. Recent colonists converted much more forested area for farmland and pasture and depended less on non-timber forest products than did native residents. While the forest-based indigenous communities established unique and complex ecological knowledge systems, migrants were just beginning to develop rudimentary knowledge about local natural resources, and many of them even held negative perceptions and fear of forests (Browder 1995).

Migration of agricultural settlers into and near many environmentally sensitive areas such as rainforest and wetlands are often thought to lead to serious deforestation and environmental degradation (Bilsborrow 2002; Bilsborrow and Ogenido 1992). However, consistent support for the negative environmental effects of migrants is not always found in empirical research. Sierra (1999) found that although recent migrant households in Ecuador differed much from indigenous and long-term forest-based households in agricultural practices and resource use, there were no significant differences in the relationships between these three household groups and recent deforestation. Using household survey data about migration and coastal ecosystems in 17 fishing villages of Indonesia, Cassels et al. (2005) also showed that there was no significant difference between migrant and non-migrant households with respect to destructive resource extraction behavior and techniques.

While most of previous studies on the differences, or lack thereof, between rural migrants and non-migrants in resource use strategies and behavior focused on the environmental consequences of migration in areas of destination, the impacts of out-migration on the environment in origin areas are understudied. Nevertheless, findings in the former area can serve as a guide for research in the latter. Furthermore, several studies revealed that rural out-migration led to local labor shortage, which in turn disrupted traditional resource conservation practices (Collins 1988; Garcia-Barrios and Garcia-Barrios 1990; Zimmerer 1993). Thus, we may also expect to find significant differences between migrant and non-migrant households regarding resource use and management in rural origin areas.

In summary, the migration and rural livelihood literature revolves around comparing the agricultural production, agricultural technology use, income and consumption, and asset accumulation of migrant and non-migrant households in migrant sending areas. Meanwhile,

migration and environment research focuses on the differences between migrants and non-migrants in resource use and conservation in areas of destination. This study contributes to the extant migration and environment literature by examining the differences between migrant and non-migrant households regarding all these livelihood aspects simultaneously in rural areas of origin.

## **Methods**

### ***Study area and study site selection***

Given the huge population size and the vast resource base, China is an ideal place to study the population-environmental relationships. During the past thirty years, China has seen a large-scale flow of labor migrants from rural to urban areas. It is estimated that presently there are about 140 million rural migrant workers in the cities of China, and the rural labor migrant population has been continuously growing (CMHRSS and CBS 2008). Chongqing Municipality in Southwest China was selected as the key study area because it currently has the highest percentage of rural work force as rural-to-urban labor migrants in China.<sup>13</sup> In addition, Chongqing is a hilly-mountainous region characterized by typical ecological problems such as lower land fertility, soil erosion, and deforestation. Demographic and accompanying socioeconomic changes have profound and complex impacts on the fragile ecosystems in mountainous areas of developing countries (Templeton and Scherr 1999). Therefore, the combination of the high magnitude of rural-to-urban labor migration and special biophysical conditions makes Chongqing an important study area for assessing the effects of rural migration on the rural environment.

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<sup>13</sup> Based on relevant statistics provided by the Chongqing Municipal Government, the current rural-to-urban labor migration rate of Chongqing is 55.8%. This means that of every 100 rural laborers in Chongqing, about 56 are rural-urban migrant workers.

The study communities were selected through a two-stage process. First, based on the official ecological zoning of Chongqing (Luo et al. 2006), five major ecological subregions of Chongqing were identified: the metropolitan core zone, the western hilly agricultural zone, the middle parallel-valley agricultural and forest zone, the soil-erosion sensitive Three Gorges Reservoir zone, and the southeastern evergreen broad-leaved forest zone. By overlaying these five ecological subregions with the three economic subareas of Chongqing (the more-developed metropolitan area, the western economic corridor area, and the Three Gorges Reservoir economic zone), the 40 subordinate districts and counties of Chongqing were grouped into four subregions in terms of socio, economic, and ecological characteristics: the metropolitan eco-economic core area, the western-middle eco-economic corridor, the Three Gorges Reservoir Eco-economic zone, and the southeastern eco-economic district (see Figure 5.1).

In the second stage, one village from each eco-economic subregion was purposively selected according to two criteria: (1) high magnitude of rural-to-urban labor migration; and (2) abundance of natural resources such as farmland and forests. These two criteria magnify the connection between rural labor out-migration and the rural environment, and thus can facilitate the study on how rural-to-urban labor migration affects rural natural resource conservation. In sum, this two-stage selection procedure ensures heterogeneity among the final set of study communities, and helps capture the social, economic, and biophysical diversity across rural Chongqing. Through this process, four rural communities were selected for this study: Bailin Village (Baipei District) in the Metropolitan Eco-economic Core Area, Banliao Village (Wansheng District) in the Western-middle Eco-economic Corridor, Dacao Village (Kaixian County) in the Three Gorges Reservoir Eco-economic Zone, and Tuanjie Village (Qianjiang District) in the Southeastern Eco-economic District (see Figure 5.1). Basic characteristics of

these four study villages are summarized in Table 5.1, which shows community variations in labor migration rates, income levels, and natural resource endowments. Aggregately, these communities provide a representative sample of the whole rural areas in Chongqing.

### ***Data collection***

The complexity of population-environment relationships necessitates the combination of multiple research methods. This study uses a mixed-methods approach to combine quantitative and qualitative methods (Tashakkori and Teddlie 1998). Analysis of secondary socioeconomic and biophysical data from statistic bureaus, environment protection agencies, and forestry administrations at different levels of government in Chongqing provided a structural context for the study area. Key informant interviews, conducted both before and at the same time with rural household surveys, gathered detailed information about rural livelihood experiences in study communities for the survey questionnaire development, and provided a contextualized backdrop for the analysis of survey data. A total of forty-one key informant interviews were conducted using a multiple-group and modified snowball sampling procedure (Luloff 1999). To embrace broad interests and perspectives in study communities, key informants were selected from a range of categories: village leaders, school administrators or teachers, senior residents, natural resource management staff, and agricultural extension workers. In most cases, informants represented more than one category. All in-depth interviews were taped, transcribed, and qualitatively analyzed to identify common themes (Dunn 2000). Key findings from these interviews are included in the discussion section to facilitate the interpretation of survey results.

To empirically evaluate the efficacy of the rural migration–household livelihoods–rural environment conceptual model, a household survey was conducted in the study communities to

collect information about household livelihood activities. Household is defined here as a domestic unit consisting of all the family members who live together in the same house. The sample of households for the survey was obtained using a stratified random sampling procedure (Singleton and Straits 2005). In each study community, a list of names of all households was compiled based on the household registration records. These households were then subdivided into two groups according to their labor migration status with the assistance of village leaders. Rural households with at least one member working in an urban area for most of the time during the recent two years of survey were classified as labor-migrant households, and non-labor-migrant households otherwise.<sup>14</sup> Finally, 45 households were randomly chosen from each category for survey sampling. Requests for participating in the survey were made in person, and all the households contacted agreed to complete the survey. Whenever possible, households that could not be reached after repeated attempts were replaced by randomly selecting other households from the corresponding group. Consequently, a total of 345 households (179 labor-migrant households and 166 non-labor-migration households) from the four study villages were surveyed using a face-to-face questionnaire interview technique.

It is noteworthy that the non-labor-migrant households are an internally diverse population rather than a homogenous group. This category includes households whose members are all mainly engaged in agricultural production, as well as those which have at least one member holding a regular job in local manufacturing enterprises or other non-farm industries. Thus, the surveyed rural households for this study can be further divided into three subgroups: 79

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<sup>14</sup> Since the household survey collected information about household livelihood activities in the previous and the current years of survey, the period of the last two years at the time of survey was chosen for determining the labor migration status of households.

labor-migrant households, 76 local off-farm work households, and 90 farming households.<sup>15</sup> All three types of households are involved with agriculture to different extents.

### ***Measurement of variables***

The survey addressed the four components of rural household livelihoods identified in the conceptual framework: (1) agricultural production; (2) use of agricultural technologies; (3) household income, expenditure, and assets; and (4) resource use and management. All of these livelihood constructs were measured by multiple variables. In addition, a number of sociodemographic characteristics of households were included in the survey.

Four variables measured the agricultural production practices of rural households. Farmland use is the most important aspect of agricultural production. It was measured by the size of per laborer cultivated land (*mu*) in the survey year 2008. The respondents were also asked to indicate whether or not their households were engaged in a list of nine types of agricultural production in the year of survey: (1) grain crops; (2) potatoes; (3) beans; (4) vegetables; (5) fruits; (6) oil plants; (7) commercialized poultry feeding; (8) aquaculture; and (9) livestock breeding. A measure of production diversity (total number of types of agricultural production involved) was created by summing up the dichotomous responses (0 = no, 1 = yes). Two other variables were included pertaining to the production of major grain crops in the year of survey: yield of rice (kg) and yield of corn (kg).

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<sup>15</sup> Households having both labor migrant and local off-farm work members were classified as labor migrant households. Ten households in the dataset did not have any labor migrant member at the time of survey but had someone with labor migration experience in the past. I grouped them as non-labor-migrant households (six farming households and four local off-farm work households) in this study, but acknowledge the heterogeneity within this household group. The effect of this factor on the analysis should be limited due to the relatively small size of this subgroup of non-labor-migrant households.

Rural household use of agricultural technologies was measured by three variables. The first is the expense for farming chemicals including fertilizers, pesticides, and herbicides in the previous year of survey (2007), measured in Chinese currency RMB. The other two are constructed composite variables indicating the levels of employment of different types of agricultural technologies. Respondents were asked to identify in the most recent year whether or not their households used 14 different agricultural techniques. The traditional farming technology category includes five practices: (1) tilling farmland before cultivating crops; (2) applying organic fertilizer as base manure before planting; (3) intercropping; (4) multiple cropping; and (5) fixed crop rotation. The modern farming technology category includes nine practices: (1) using a large amount of chemical fertilizer; (2) applying chemical fertilizer according to the agricultural extension office's suggestions; (3) applying pesticide in farmland; (4) applying herbicide in farmland; (5) using plastic farming; (6) irrigating farmland with water pump; (7) using sowing machine; (8) using harvesting machine; (9) using no-tilling farming technique. Dichotomous responses (0 = no, 1 = yes) across these items were summed up as two new variables: the total number of traditional agricultural techniques used and the total number of modern agricultural techniques used.

Research has shown that household income and expenditure are especially difficult to measure in the setting of rural areas of developing countries. To reduce measurement error, the survey focused on the monetary components of rural household incomes and expenses. Household income was measured as a household's annual cash income from both farming and non-farming sources in the previous year 2007. Household living expenditure referred to a household's annual monetary spending on regular consumption goods and services in rural areas in the year 2007, excluding special large expenses (e.g. house construction) and the living costs

of labor migrants or student members in urban areas. In addition, an index variable was included as an indicator of household consumer assets. This index variable was created using a method described in Filmer and Pritchett (2001). The approach used principle component analysis to derive weights for constructing a linear index of a group of asset variables. The asset indicators in this survey include household ownership of 19 different durable consumer goods<sup>16</sup>, building materials and style of the household dwelling, and the household's drinking water sources. For the ease of interpretation, the index was rescaled to a range from 0 to 5.

Three variables were included pertaining to rural households' resource use and management activities. The proportion of firewood and crop stalks in the total fuels of a household indicated its dependency on biophysical resources for cooking and heating. Use of general forest resources was measured by asking respondents to identify whether or not their households regularly utilize any types of timber and non-timber forest products listed in the survey, including trees, mushroom and fungi, medicinal materials and herbs, wild edible vegetables, wild fruits and nuts, non-protected wild animals, and grazing for livestock. A new variable (total number of types of forest products or services regularly used) was created based on the sum of dichotomous responses (0 = no, 1 = yes) across these seven items. Respondents were also asked to indicate whether or not their households took any of the following natural resource improvement activities in the past twelve months: (1) planting trees or hedges in household farmland and/or forested land; (2) protecting trees in household farmland and/or forested land; (3) building stone or soil ridges on sloping farmland to prevent soil erosion; (4) mending terrace ridges to prevent soil erosion; (5) maintaining and improving the irrigation condition of farmland; (6) converting sloping farmland into terraces; (7) increasing the use of

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<sup>16</sup> These durable consumer goods included bicycle, sewing machine, black/white television, color television, tape recorder, stereo, washing machine, electric fan, refrigerator, camera, VHS/DVD players, telephone, mobile phone, air conditioner, electric cooker, water heater, microwave oven, induction cooker, motorcycle, and automobile.

organic farm fertilizer; (8) reducing the use of fertilizer and other farm chemicals; (9) planting legumes and other kinds of green manure crops; (10) practicing fallowing; (11) manually weeding household farmland and/or forested land; and (12) getting information on natural resource and the environment through sources such as television, newspaper, and magazine. Dichotomous responses (0 = no, 1 = yes) to these questions were summed up to create another composite variable as the total number of resource improvement activities taken in the past year.

Furthermore, five sociodemographic variables were included in the analysis to account for the effects of basic household characteristics on a rural household's livelihood activities. The use of these control variables allows for a more accurate evaluation of the differences between labor-migrant households and non-labor-migrant households regarding livelihood variables. The household sociodemographic characteristics included in this study were years of residence, household size, number of laborers in a household (including labor migrant members), mean age of laborers, and mean educational level of laborers. Educational attainment was measured by eight different levels in the survey: (1) illiterate or semi-illiterate; (2) less than an elementary school degree; (3) elementary school degree; (4) junior high school degree; (5) senior high school degree; (6) middle level professional, technical or vocational school degree; (7) two year associate degree; (8) four year college degree or above.

### ***Analytic methods***

The statistical analysis of the rural household survey data contained three phases. First, descriptive analyses of the data were used to describe survey sample characteristics and aggregate patterns of rural household livelihoods in the study area. Next, variations between different household groups regarding household livelihood variables and sociodemographic

characteristics were explored with simple bivariate comparison statistics (the independent  $t$ -test and one-way ANOVA).<sup>17</sup> Finally, multivariate discriminant analysis was used to compare the differences between household groups in livelihood activities. This technique was particularly suitable here because it allowed for the comparison of two or more groups on multiple variables simultaneously. The bivariate and multivariate analyses included both the comparison of labor-migrant and non-labor-migrant households and the comparison of labor-migrant, local off-farm work, and farming households.

## **Results**

### ***Descriptive statistics of major variables***

Simple descriptive analyses were first conducted for each of the key variables in the household survey. These analyses delineate major dimensions of rural household livelihoods in the study area and provide contexts for further bivariate and multivariate analyses. Table 5.2 presents basic descriptive statistics for sociodemographic control variables and livelihood measures for the aggregate dataset (N=345). The results for each aspect are briefly discussed in turn.<sup>18</sup>

On average, surveyed households lived in the study villages for nearly 29 years. The average rural household in the survey had about 5 members and 3 laborers. The mean age of household labor members was around 42, and the mean educational level of household laborers was slightly higher than elementary school completion. Of the 345 surveyed households, 52%

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<sup>17</sup> Levene's test was used to assess the equality of variance in different household groups before running the independent  $t$ -test and one-way ANOVA. When the Levene statistic was significant, modified procedures in SPSS ( $t$  statistic with equal variances not assumed for the independent  $t$ -test and Welch statistic for ANOVA) were used for the comparison of means.

<sup>18</sup> Most of these variables indicated significant differences across study communities. Full discussion of community variations is beyond the scope of this chapter, and will be addressed in Chapter 6.

(N=179) had at least one member as urban labor migrant, 22% (N=76) did not have labor migrants but had at least one member regularly participating in local off-farm work, and the rest (26%, N=90) were typical agricultural households. Therefore, there are 179 labor-migrant households and 166 non-labor-migrant households (local off-farm work households and farming households together) in the final dataset. An important note is that a considerable proportion (45%) of the total 143 off-farm workers (all currently non-labor-migrant members) from the local off-farm work households had had labor migration experience before the time of the survey.

Rural households in the study area normally farmed multiple spatially scattered land plots. The average rural household in the survey had access to 4 *mu* of farmland in about 12 parcels, of which 40% of the area (1.6 *mu*) was irrigated land. In general, nearly 75% of the average 4 *mu* household land was in cultivation, 6% abandoned, 17% converted to forests under the national afforestation program (the Green for Grain Program), and 2% lent to other households living in the same village. In addition, 54% of households accessed 1.35 *mu* of land on average through borrowing or renting. Overall, the sample households cultivated 0.9 *mu* of farmland on a per laborer basis. A majority of an average household's farmland (66%) was used for food grain crop production. On average, surveyed households were engaged in six types of agricultural operations in the year of survey. The most frequently selected activities were grains (99% of surveyed households), potatoes (95%), vegetables (92%), and livestock (74%). The average reported rice and corn harvests per *mu* of farmland were 414 and 426 kg respectively, which were higher than the values from the agricultural census of Chongqing.<sup>19</sup>

All rural households in the survey applied chemical fertilizer and some other types of agricultural chemicals on their farmland. The average surveyed household spent 265 RMB on

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<sup>19</sup> The rice and corn harvests per *mu* of farmland from the 2006 Agricultural Census of Chongqing were 342.31 kg and 301.15 kg respectively.

farm chemicals for each *mu* of land in the previous year of the survey. On average, the sample households used about four types of traditional agricultural technologies and four types of modern agricultural technologies in the twelve months prior to the survey. At least 75% of surveyed households reported use of four of the five traditional farming practices: tilling farmland before crop cultivation (97%), applying organic fertilizer as base manure (81%), intercropping (94%), and multiple cropping (77%). Among the nine listed modern agricultural technologies, plastic farming film (89%), herbicide (85%), pesticide (86%), and heavy application of chemical fertilizer (55%) were the most frequently used by surveyed households.

The survey collected data on household cash income from multiple sources and household expenditure for various categories. The values of agricultural production for household consumption were excluded from the calculation. Major cash income sources included agricultural product sales, local off-farm wages, labor migrant remittances, and village collective or central government subsidies. The average per capita cash income of surveyed households was 3,127 RMB in the previous year of the survey (the average household cash income was 9,318 RMB). In general, urban remittances accounted for a large proportion of rural income (40%) of the labor migrant households, while income of local off-farm work households was primarily from local non-agricultural wages (84%).

Household cash living expenditure only included monetary expenses on daily consumption goods and services in rural areas. The average per capita rural cash living cost of surveyed households was 2,603 RMB in the previous year 2007 (the average household cash expenditure was 8,193 RMB). Overall, rural household living expenditure mainly consisted of expenses on food (29%), education (15%), medical care (12%), durable goods (9%), and transportation and communication (7%). On average, the household consumer index was 2.25 on

a scale ranging from 0 to 5 across the sample households. 52% of surveyed households lived in storied brick houses, 23% in single-floor brick houses, and 25% in adobe or wood structured houses. As for the drinking water sources, 47% of households had tap water, 25% used well water, 16% got water from open sources such as river and stream, and the rest (12%) used rain water stored on the concrete roof. The average surveyed household had 8 durable consumer goods. At least half of surveyed households owned 6 of the 19 types of listed durable goods: electric cooker (91% of households), color television set (85%), electric fan (81%), mobile phone (63%), local line phone (57%), and washing machine (53%).

Rural households in the study area largely depended on biophysical sources for cooking and heating. On average, around 50% of household fuels were from firewood and crop stalks, 23% from coal, 20% from electricity, 5% from liquefied petroleum gas, and only 1% from marsh gases. In general, the sample households' use of timber and non-timber forest products was quite low. The average rural household in the survey used less than one type of forest products at the time of survey. The more frequently used forest resources were medicinal materials or herbs (17% of surveyed households) and grazing land (16%). Natural resource improvement activities are another important component of rural resource use and management. Surveyed households on average took five types of resource conservation practices during the most recent twelve months prior to the survey. Among the eleven listed activities, the top five most common were mending terrace ridges to prevent soil erosion (72%), protecting trees on household contracted farmland and forested land (59%), improving irrigation condition of farmland (57%), building stone or soil ridges on steep farmland (54%), and getting information on natural resource and the environment through multiple sources (51%).

### *Bivariate comparisons of household groups on major variables*

As a preliminary step for the multivariate data analysis, bivariate statistical tests were conducted to identify differences between household groups in sociodemographic characteristics and livelihood activities. Results of bivariate comparisons of labor-migrant and non-labor-migrant households are shown in Table 5.3. Those variables that were significant in distinguishing between the two groups are highlighted in the table. In sum, labor-migrant households differed significantly from non-labor-migrant households in all the five household sociodemographic characteristics. On average, labor-migrant households lived longer in the village, and had more members and labor force than non-labor-migrant households. In general, laborers of labor migrant households tended to be younger and more educated than those of non-labor-migrant households.

In addition, these two groups were significantly different regarding some of the livelihood variables. The survey results indicated that non-labor-migrant households cultivated more land than labor-migrant households on a per laborer basis. As expected, labor-migrant households on average enjoyed a higher per capita cash income and more consumer assets than non-labor-migrant households. Households with labor migrants also depended less on firewood and crop stalks for fuels.

Table 5.3 also summarizes results of bivariate comparisons of labor-migrant, local off-farm work, and farming households. Similarly, a number of variables were statistically significant in distinguishing among the three household groups. All the household sociodemographic variables again indicated significant differences among different household groups. Labor-migrant households and farming households in general lived longer in the village than local off-farm work households. On average, labor-migrant households were the largest in terms

of household size and labor pool, followed by local off-farm work households, with farming households being the last. The labor members of farming households also tended to be older and less educated than those of the other two groups.

Compared to the two-group comparisons, one more livelihood variable (per capita annual cash consumption expenses) demonstrated significant difference among household groups in the three-group comparisons. As shown in Table 5.3, farming households differed significantly regarding five livelihood indicators from the other two household groups. They cultivated more farmland on a per laborer basis, had lower per capita cash income, cash living expense and consumer assets, and relied more on forests and crop stalks for cooking and heating. Overall, there was no significant difference between labor-migrant and local off-farm work households in these aspects.

In summary, the bivariate analyses of survey results showed that in general rural labor-migrant households differed significantly from non-labor-migrant households in sociodemographic characteristics and measures for three of the four livelihood constructs in the conceptual model: agricultural production, income and consumption, and natural resource use. Moreover, the differences between these two groups were largely attributed to the differences between labor-migrant households and the farming household subgroup of non-labor-migrant households.

### ***Multivariate block discriminant models: analysis for labor-migrant and non-labor-migrant households***

The bivariate comparisons above suggest that significant differences exist between labor-migrant and non-labor-migrant households in rural livelihood activities. However, these simple

analyses did not account for the effects of household sociodemographic characteristics and the interrelations among livelihood indicators. Multivariate discriminant function analysis was used to compare different household groups on multiple livelihood and sociodemographic variables simultaneously. This technique allows for differentiating the unique effect of a specific variable by controlling for the influences of other variables included in the analysis. Discriminant analysis is usually used to classify known and unknown cases into categories. Nevertheless, the purpose of using this tool here is to examine the multivariate differences between household groups, instead of maximizing the odds of correctly predicting the class of a particular case.

As noted earlier, multivariate discriminant analysis was conducted both for the comparison of labor-migrant and non-labor-migrant households and for the comparison of labor-migrant, local off-farm work, and farming households. In each phase, the analysis used a procedure of adding blocks of variables to build multiple models to examine interactions among variables measuring different livelihood constructs, and to assess the extent to which different sets of livelihood variables distinguishing between household groups. A final reduced model was estimated by systematically removing non-significant variables from the full model until all the variables remaining in the model had significant effects.

The results of discriminant analysis of differences between labor-migrant and non-labor-migrant households in livelihood activities are presented in Table 5.4.<sup>20</sup> The first model only included the four agricultural production variables. The size of per laborer cultivated land and the yield of rice per unit of land had statistically significant effects in differentiating the two household groups (though only marginally significant for rice production). On average, household with labor migrants cultivated less farmland on a per laborer basis and had lower rice

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<sup>20</sup> Because of the exploratory nature of this research, the analysis here set a .10 significance threshold instead of the more conventional .05 significance level.

production for each *mu* of farmland than those without migrant members. In Model 2, variables measuring the use of technologies were introduced into the discriminant analysis. The size of per laborer cultivated land remained statistically significant in distinguishing between household groups, but the yield of rice per unit of land was no longer significant. None of the three technological use indicators had significant effects in the model.

Model 3 added the three income and consumption variables. The size of per laborer cultivated land remained a powerful differentiator between labor-migrant and non-labor-migrant households. The yield of rice per unit of land became marginally significant again in the analysis. Variables measuring the use of technologies were still not statistically significant in distinguishing between household groups. Of the three newly introduced income and consumption indicators, only the per capita annual rural cash income had a significant effect. Controlling for the effects of other variables in the model, labor-migrant households had higher levels of rural cash income than non-labor-migrant households on a per capita basis. The measures of natural resource use and management were introduced in Model 4, which included all the thirteen livelihood variables. None of the newly added indicators showed significant effects in the model. However, the three key differentiators in Model 3 (size of per laborer cultivated land, yield of rice per unit of land, and per capita annual rural cash income) retained their statistical significance.

The full model (Model 5) added household sociodemographic characteristics to the discriminant analysis. All the five household sociodemographic measures except household size showed significant differences between the two household groups. Labor-migrant households lived longer in the village and had more laborers than non-labor-migrant households. Their labor members also tended to be younger and more educated. With the inclusion of sociodemographic

characteristics, the size of per laborer cultivated land and the yield of rice per unit of land were no longer statistically significant in distinguishing labor-migrant households from non-labor-migrant households. Per capita annual rural cash income remained statistically significant, but with weaker effect than in the previous models. Two other livelihood variables, the household consumer asset index and the proportion of firewood and crop stalks in total fuels, became significant in the full model. Non-labor-migrant households on average owned fewer consumer assets and depended more on natural resources for fuel use than labor-migrant households.

Finally, a reduced model was obtained by systematically eliminating non-significant variables from Model 5. As shown in Table 5.4, the final model for multivariate comparison of labor-migrant and non-labor-migrant households included the yield of rice per unit of land, per capita annual rural cash income, consumer asset index, proportion of firewood and crop stalks in total fuels, and four household sociodemographic characteristics (length of residence, number of laborers, mean age of laborers, and mean education level of laborers). Although the size of per laborer cultivated land attained statistical significance in the first four models, it did not have a significant effect in the full and the reduced models. This change suggests that the difference between labor-migrant and non-labor-migrant households in per laborer cultivated farmland is explained away by the differences of these two groups with respect to sociodemographic variables.

***Multivariate block discriminant models: analysis for labor migrant, local off-farm work, and farming households***

In order to enhance our understanding of the impacts of rural migration on household livelihoods, block discriminant models were also used to analyze differences among the three

more narrowly-defined subgroups in the survey sample: labor-migrant households, local off-farm work households, and farming households (results shown in Table 5.5). When the model only contained the four agricultural production variables (Model 1), the size of per laborer cultivated land was statistically significant in distinguishing among household groups. Farming households in general cultivated more land than the other two groups on a per laborer basis. On average, each labor member of a local off-farm work household farmed approximately the same amount of land with that of a labor migrant household. All the other three variables were not significant in Model 1.

Model 2 added agricultural technological use measure to the multivariate analysis. The significant effect of the size of per laborer cultivated land remained unaffected. Expense on farming chemicals per unit of land was also found to be a statistically powerful differentiator of household groups. Controlling for the effects of other variables in this model, farming households tended to spend the largest amount of money on fertilizers and plant pesticides for each unit of farmland, followed by labor-migrant households and local off-farm work households in turn.

In Model 3, the three rural income and consumption indicators were included as additional independent variables in the discriminant model. The size of per laborer cultivated land and the expense on farming chemicals per unit of land remained statistically significant. Additionally, per capita annual rural cash income and household consumer asset index joined these two variables as significant in their effects of differentiating household groups. Overall, farming households had substantially lower per capita rural income and fewer consumer assets than local off-farm work households and labor-migrant households, which had very close average values on these two variables. Model 4 introduced measures of household natural

resource use and management. None of these three variables had a statistically significant effect in discriminating among household groups, but all the four significant variables in Model 3 retained their statistical significance. The yield of rice per unit of land also showed marginal significance in this model. On average, farming households had the highest production of rice for each *mu* of farmland, followed by local off-farm work households, with labor migrant households having the lowest.

Household sociodemographic characteristics were added to the analysis in Model 5. With their presence, per capita annual rural cash income and the yield of rice per unit of land were no longer statistically significant in distinguishing among the three household groups. All the other three previously significant variables remained significant, but the effects of the size of per laborer cultivated land and the household consumer asset index were weaker than in the previous models. In addition, the proportion of firewood and crop stalks in total fuels became marginally significant in the full model. Local off-farm work and labor-migrant households had similar levels of dependence on forest and crop stalks for fuels, which were substantially lower than that of farming households. All the sociodemographic measures except household size were also found to be statistically significant differentiators of household groups. In general, labor-migrant households lived slightly longer than farming households in the village, while both of these two groups had much longer length of residence than the local off-farm work household group. Labor-migrant households on average had the largest size and labor force, followed in turn by local off-farm work households and farming households. In addition, farming households tended to have elder and less educated laborers than the other two household groups, which had almost the same aggregate results in this regard.

The reduced model (Model 6) included six livelihood variables and four household sociodemographic characteristics. Per capita annual rural cash income and the yield of rice per unit of land showed significant effects again in the final analysis. As compared with the final reduced model for the multivariate comparison of labor-migrant and non-labor-migrant households, two more livelihood variables (the size of per laborer cultivated land and the expense on farming chemicals per unit of land) became significant differentiators in the final model for the comparison of labor-migrant, local off-farm work, and farming households.

### **Discussion**

This study empirically assesses the proposed conceptual model incorporating household livelihoods as a key mediating factor between rural migration and the rural environment. Results showed that with the exception of use of agricultural technologies, at least one variable measuring each livelihood construct in the conceptual model had a statistically significant effect (albeit marginally significant in some cases) in differentiating rural labor-migrant households from non-labor-migrant households. In the discriminant analysis of differences among labor-migrant, local off-farm work, and farming households, all livelihood constructs had at least one measure with significant effect in distinguishing among different household groups. These findings confirm the research hypothesis that labor-migrant and non-labor-migrant household are significantly different with respect to livelihood activities including agricultural practices, income and consumption, and natural resource use.

Moreover, this study showed that rural non-labor-migrant households were more heterogeneous than what the extant literature often suggested. The comparison of labor-migrant, local off-farm work, and farming households found more significant differences among

household groups than the comparison between labor-migrant and non-labor-migrant households in both the bivariate and the multivariate analyses. In sum, results showed that differences between labor-migrant and non-labor-migrant households in livelihoods were largely ascribed to the differences between labor-migrant and farming households. Labor-migrant households particularly differed from farming households in rural livelihood activities, while sharing many similar livelihood characteristics with local off-farm work households. An appreciation of the variations within the non-labor-migrant household group can improve our understanding of the impacts of labor out-migration on rural livelihoods and the rural environment.

The differences between rural labor-migrant and non-labor-migrant households regarding livelihood processes have important implications for the ultimate environmental outcomes of labor out-migration in rural origin areas. First, in developing countries rural poverty is often closely linked to environmental degradation, because the economically disadvantaged primarily live in rural areas and directly depend on local natural resources for their livelihoods (Bilsborrow 1992). When rural population growth and poverty leads to the overexploitation and deterioration of natural resources, which further threaten food security and rural livelihoods, a “vicious circle” between rural poverty and environmental degradation comes into being (Reardon and Vosti 1995). Based on this study, one of the largest differences between these two household groups was in income, assets, and consumption. Controlling for the variations in other livelihood measures and sociodemographic variables, labor-migrant households in general had higher rural cash income and consumer assets than non-labor-migrant households. Therefore, labor migration appears to provide increased capital assets and improved material well-being of participating households, and potentially reduce the overall poverty level in these rural origin areas. Given the costs and risks associated with migration, early migrants tend to come from more affluent

households, and thus migration and remittances are likely to exacerbate income inequality and relative poverty in rural communities (Taylor et al. 1996). However, this initial unequalizing effect is eliminated over time as more rural households gain access to labor migration through the development of migrant networks (Massey 1990). To the extent that labor migration relieves poverty in rural areas, it may reduce pressure on local natural resources and promote sustainable rural development in the long run. Further, higher income from labor migration may also induce positive ecological changes by enabling rural households to self-finance natural resource improving investments (Templeton and Scherr 1999).

Rural poverty alleviation and increased household income are naturally related to changes in rural household consumption. No significant difference was found between rural labor-migrant and non-labor-migrant households with respect to rural cash living expenses. This is probably due to the fact that remaining members of rural migrant households are mostly elders and children, who generally have relatively lower levels of consumption than labor migrants. Another explanation for the seemingly limited impact of migration on rural consumption is that rural migrant households consider income from labor migration only as temporary and hence do not increase consumption proportionally with enhanced income (Zhao 1999). Overall, rural labor out-migration has mixed impacts on rural consumption. On one hand, labor migration reduces the aggregate rural household consumption needs because of the absence of labor migrants for varying lengths of time. Even if labor migrants do not remit, their absence alone can contribute to household economic well-being due to the relief of the overall consumption demands. In addition, labor migration tends to check the increase of household numbers in rural areas because rural migrant households are more likely than non-migrant households to maintain a multi-

generational family structure.<sup>21</sup> Since the rapid increase in the number of households resulting from reduction in average household size causes serious challenges for environmental conservation (Liu et al. 2003), labor migration may contribute to higher efficiency of rural household resource consumption. The combination of reduced absolute consumption demands and increased consumption efficiency can in turn lead to lower pressure on the rural environment. On the other hand, labor migration enhances the consumption level of rural migrant households. Key informant interviews revealed that labor migration and remittances generally improved the standard of living of rural households. One Banliao resident explained, “When people go to work in city and earn higher income, their families’ food, clothing, and other living conditions will certainly get better. They have more money now, so they will consume more.” In the bivariate comparisons involving the two subgroups of non-labor-migrant households, labor-migrant households on average had significantly higher per capita annual cash living expenditure than farming households. Both the bivariate and multivariate discriminant analyses also showed that labor-migrant households had significantly more consumer assets than non-labor-migrant households (particularly farming households). In consideration of the lack of efficient garbage and waste disposal in most rural areas of China, increased household consumption accompanying labor migration may worsen the already serious residential pollution problems in rural villages (Le 2004).

Second, the analysis found that rural labor-migrant and non-labor-migrant households were significantly different with respect to agricultural practices. The smaller cultivated land size per laborer and lower rice yield and farming chemical expense per unit of land all showed that labor-migrant households used land less intensively than non-labor-migrant households,

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<sup>21</sup> This was the primary reason that on average labor-migrant households had larger size and more laborers than non-labor-migrant households in the survey.

particularly farming households. Additional analyses and comments of key informants revealed that labor shortage resulting from the absence of key household laborers, combined with the unprofitability of agriculture, led to increasing abandonment of previously cultivated farmland that were distant from people's houses. To the extent that most of the abandoned land is located on steep hillsides and of poor quality, the less intensive cultivation should reduce pressure on local land resources. Many key informants also commented on the natural re-growth of vegetation cover on recently abandoned farmland. As one Tuanjie Village informant described:

After those fields near the hill sides were left idle, grasses and trees grow up naturally there. Over time these fields largely become forested land. In a sense, abandoning farmland is just like reforesting the cultivated land. This should be good for reducing landslide and soil erosion.

Labor scarcity and land abandonment caused by rural labor out-migration have complex effects on land quality and soil erosion, especially in hill-mountain areas that have been substantially transformed by human settlement and maintained with labor-intensive production practices. Previous studies provide conflicting findings about the ecological impacts of labor migration and reduced agricultural intensity. It was found that migration-induced land abandonment contributed to less environmental degradation and more vegetation regeneration in the Swiss mountain area, central Mexico, southern Bolivia, and many other countries throughout Latin America (Aide and Grau 2004; Gellrich et al. 2007; López et al. 2006; Preston 1998; Preston et al. 1997), but accelerated rainfall runoff and soil erosion in the Ecuadorian Andes, Spanish Pyrenees, and Himalaya mountain regions as well (Garcia-Ruiz et al. 1995; Harden 1993, 1996). In addition, labor shortage brought by labor migration may have negative effects on agricultural biodiversity and sustainable agricultural practices (Hyden et al. 1993; Turner 1999;

Zimmerer 1991). Therefore, the impacts of rural migrant households' withdrawal from agricultural production on land quality and soil erosion largely depend on local ecological and socioeconomic characteristics of sending areas. Although analysis of the in-depth interviews and the survey data suggested that rural labor migration led to a decline in cultivated farmland area and some land improvement in the study villages, systematic biophysical assessment is still needed for a more complete understanding of actual changes in the conditions of land resources.

Next, while uses of traditional and modern agricultural technologies were not statistically significant in distinguishing between rural labor-migrant and non-labor-migrant households, discriminant analysis showed that labor-migrant households tended to spend less on agricultural chemicals than farming households. This finding appears to be inconsistent with the New Economics of Labor Migration proposition that migration income is used to compensate for labor shortfalls and make agricultural improvement (Stark 1991; Taylor 1999). However, it should not be surprising given the low returns of smallholder farming and the devaluation of agriculture in rural migrant households' diversified livelihood portfolios. Since overfertilization runoff is a major contributing factor to nonpoint source pollution in rural China (Zhang et al. 2004), the reduction of farming chemical use by labor migrant households may to some extent mitigate agricultural production pollution.

Finally, the results of both bivariate and multivariate analyses show that labor migration leads to reduced household dependency on forest resources for fuel use, which should contribute to better land and forest conservation as firewood collection is a major cause of soil erosion and deforestation in rural areas of developing countries.<sup>22</sup> Detailed comments of older informants

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<sup>22</sup> Key informant interviews also suggested that the difference in firewood use among labor migrant, local off-farm work, and farming household groups would be even more salient due to the sharp increase in coal price.

about the changes in forest cover around study communities suggest an emerging trend of forest recovery. As one resident from Dacao Village said:

When the farmland was contracted to individual households in 1981, these hills were almost bald. There was nothing on them. Now things are getting better. They are nearly all covered by trees. The mountain forests have been restored. The forests are so thick that people even can't go inside them.

Findings from the household survey and key informant interviews provide some support for the forest transition theory in ecological studies. Forest transition refers to a long-term sequence from initial deforestation due to human settlement to eventual forest recovery (Mather 1992). Rudel and colleagues (2005) identified two major pathways of forest recovery after agricultural expansion ends: (1) economic development path and (2) forest scarcity path. In the first trajectory, urbanization and economic development lead farmers to leave rural areas for better paying non-agricultural jobs. Labor loss increases farming worker wages in rural origin areas, which makes agricultural production even less profitable. Marginal farm lands are then abandoned and eventually return to forests. In the second path, increasing deforestation raises the prices of forest products, which in turn drive the trend of reforestation. States are usually critical actors in this type of forest recovery because they create forestation programs in response to forest scarcities. In the study of Rudel et al. (2005), China was assigned to the “forest scarcity” category. However, this study shows that the case of rural Chongqing also fits well with the “economic development and labor migration” path. The proportion of forested land in Chongqing declined from 19% in the early 1950s to less than 10% in the 1960s and 1970s, but has maintained a constant increase since the 1980s and reached 34% in 2008 (Chongqing Bureau of Statistics 2009b). These figures demonstrate that Chongqing is experiencing an upward forest

transition. Although the bulk of this substantial increase in Chongqing's forest cover is brought by government-organized tree plantations and the Grain for Green Program in China, the analysis herein suggests an association between rural labor out-migration and ongoing forest recovery in the study area.

## Figure and Tables

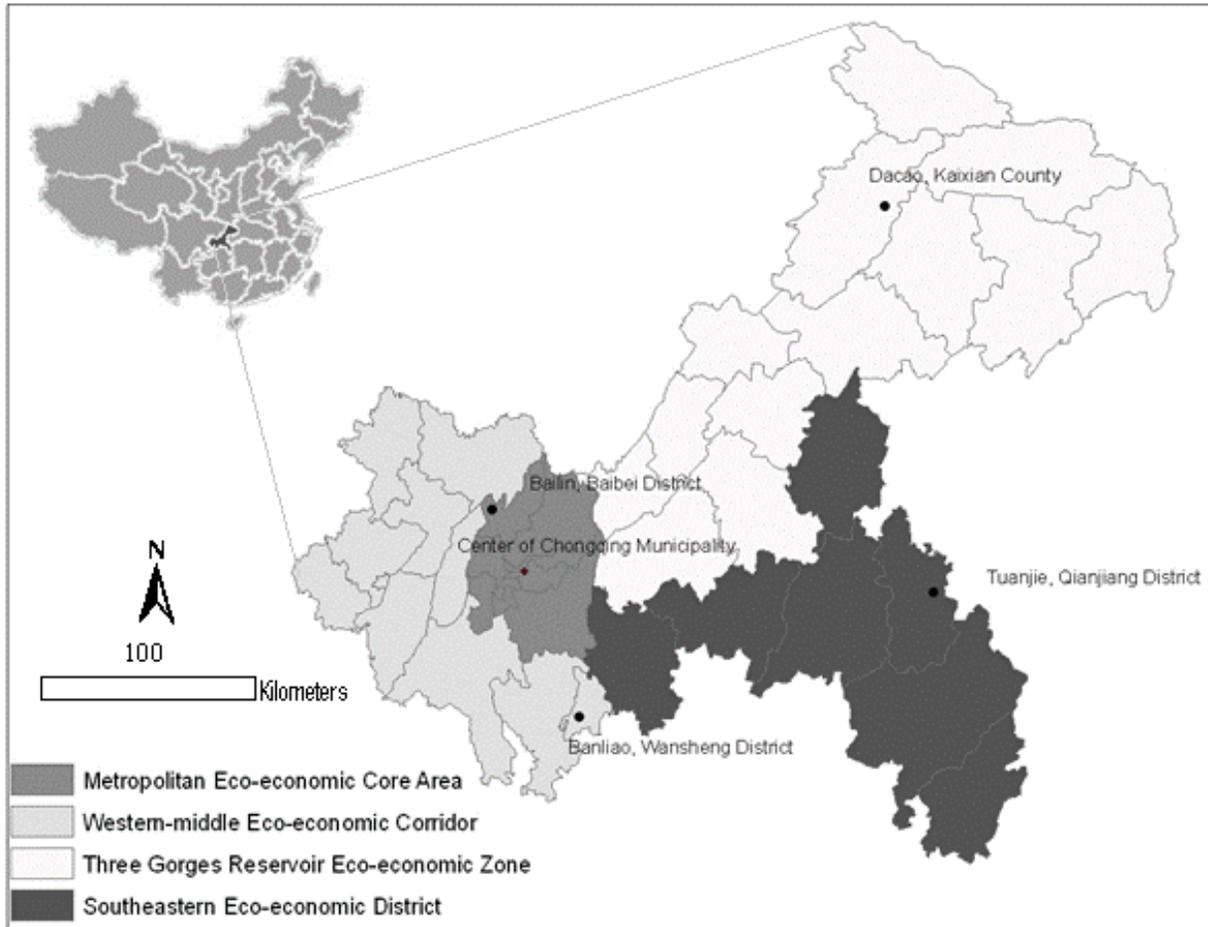


Figure 5.1: Map of Study Communities in Chongqing Municipality, Southwest China

Table 5.1: General Characteristics of Study Communities

Study Villages	Number of Households	Population	Number of Labor Migrants	Per Capita Annual Income (RMB)	Farmland Size (mu)	Forested Land Size (mu)
Bailin (Beipei)	843	2320	680	4000	2215	2770
Banliao (Wansheng)	819	3080	900	2500	2482	7590
Dachao (Kaixian)	728	3016	800	3200	1298	2258
Tuanjie (Qianjiang)	647	2328	500	2200	1982	5900

Notes: (1) 1 mu = 0.165 acres; (2) The exchange rate for US dollar to RMB was approximately 1:6.8 at the time of the survey (2008).

Source: Filed data collected from administration committees of study communities.

Table 5.2: Descriptive Statistics for Variables in the Analysis (N=345)

Variables	Mean	Standard Deviation	Range
Years of residence	28.8	11.8	3 – 72
Total number of household members	4.5	1.6	2 – 11
Number of household laborers	3.1	1.2	1 – 7
Average age of laborers in a household	42.4	9.1	25.0 – 76.5
Average educational level of laborers	3.1	0.8	1.0 – 5.5
Size of per laborer cultivated land ( <i>mu</i> )	0.9	0.9	0.1 – 12.0
Total number of types of agricultural production involved	5.6	1.3	1 – 9
Yield of rice (kg) per unit of land	414.2	230.0	0.0 – 909.1
Yield of corn (kg) per unit of land	425.8	230.5	0.0 – 900.0
Expense on farming chemicals per unit of land	265.4	130.9	0.0 – 745.0
Total number of traditional agricultural technologies used	3.7	1.0	0 – 5
Total number of modern agricultural technologies used	4.1	1.4	0 – 7
Per capital annual rural cash income (RMB)	3126.6	3863.0	15.0 – 33835.0
Per capital annual rural cash living expenditure (RMB)	2602.6	2133.6	108.0 – 14115.0
Household consumer asset index (rescaled to 0-5)	2.3	1.0	0.0 – 5.0
Proportion of firewood and crop stalks in total fuels (%)	50.3	37.5	0.0 – 100.0
Total number of types of forest products used	0.6	0.9	0 – 4
Total number of resource improvement activities taken	5.4	2.2	1 – 12

Table 5.3: Bivariate Comparisons of Household Groups, Given as Means of Variables

Variables	Two Household Groups		Three Household Groups		
	Non-labor-migrant (N=166)	Labor-migrant (N=179)	Farming (N=90)	Local Off-farm Work (N=76)	Labor-migrant (N=179)
<b>Sociodemographic Characteristics</b>					
Years of residence	27.0**	30.5**	29.4***	24.2***	30.5***
Total number of household members	3.9***	5.0***	3.5***	4.4***	5.0***
Number of household laborers	2.5***	3.7***	2.2***	2.8***	3.7***
Average age of laborers in a household	44.6***	40.4***	48.0***	40.5***	40.4***
Average educational level of laborers	2.9***	3.2***	2.6***	3.2***	3.2***
<b>Agricultural Production</b>					
Size of per laborer cultivated land ( <i>mu</i> )	1.7***	1.1***	2.1***	1.2***	1.1***
Total number of types of agricultural production involved	5.5	5.6	5.6	5.4	5.6
Yield of rice (kg) per unit of land	433.7	396	447.9	416.9	396.0
Yield of corn (kg) per unit of land	420.6	430.5	422.4	418.6	430.5
<b>Use of Agricultural Technologies</b>					
Expense on farming chemicals per unit of land	268.3	262.6	282.9	251.0	262.6
Total number of traditional agricultural technologies used	3.7	3.7	3.8	3.7	3.7
Total number of modern agricultural technologies used	4.2	4.1	4.2	4.1	4.1
<b>Household Income, Expenditure, and Assets</b>					
Per capita annual cash income (RMB)	2534.7**	3675.5**	1560.9***	3688.0***	3675.5***
Per capita annual cash living expenditure (RMB)	2485.1	2711.6	2037.6**	3015.1**	2711.6**
Household consumer asset index (rescaled to 0-5)	2.1*	2.4*	1.8***	2.5***	2.4***
<b>Resource Use and Management</b>					
Proportion of firewood and crop stalks in total fuels (%)	54.6*	46.2*	62.0**	45.9**	46.2**
Total number of types of forest products used	0.7	0.6	0.8	0.6	0.6
Total number of resource improvement activities taken	5.5	5.3	5.5	5.5	5.3

Notes: (1) \*\*\*sig. at the .001 level; \*\* sig. at the .01 level; \* sig. at the .05 level; (2) The independent *t*-test was used for the comparison of non-labor-migrant and labor-migrant households; (3) One-way ANOVA was performed for the comparison of farming, local off-farm work, and labor migrant households.

Table 5.4: Discriminant Analysis of Differences between Labor-migrant and Non-labor-migrant Households, Given as F Values of Variables

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Final Model
<b>Agricultural Production</b>						
Size of per laborer cultivated land (mu)	<b>6.86**</b>	<b>7.81**</b>	<b>6.12*</b>	<b>5.25*</b>	0.58	
Total number of types of agricultural production involved	0.72	0.57	0.61	0.50	0.31	
Yield of rice (kg) per unit of land	<b>2.67(*)</b>	2.31	<b>2.72(*)</b>	<b>3.17(*)</b>	1.85	<b>2.69(*)</b>
Yield of corn (kg) per unit of land	0.02	0.10	0.10	0.09	0.02	
<b>Use of Agricultural Technologies</b>						
Expense on farming chemicals per unit of land		1.34	0.69	0.54	0.88	
Total number of traditional agricultural technologies used		0.07	0.04	0.04	0.31	
Total number of modern agricultural technologies used		0.00	0.03	0.01	0.17	
<b>Household Income, Expenditure, and Assets</b>						
Per capita annual cash income (RMB)			<b>5.18*</b>	<b>5.56*</b>	<b>2.73(*)</b>	<b>3.70*</b>
Per capita annual cash living expenditure (RMB)			0.55	0.70	0.17	
Household consumer asset index			1.65	0.98	<b>4.19*</b>	<b>5.31*</b>
<b>Resource Use and Management</b>						
Proportion of firewood and crop stalks in total fuels				0.73	<b>3.47(*)</b>	<b>3.99*</b>
Total number of types of forest products used				0.50	0.28	
Total number of resource improvement activities taken				0.76	0.08	
<b>Sociodemographic Characteristics</b>						
Years of residence					<b>5.85*</b>	<b>6.81**</b>
Total number of household members					0.47	
Number of household laborers					<b>47.61***</b>	<b>64.70***</b>
Average age of laborers in a household					<b>9.13**</b>	<b>10.83**</b>
Average educational level of laborers					<b>2.65(*)</b>	<b>3.01(*)</b>

Note: \*\*\*sig. at the .001 level; \*\* sig. at the .01 level; \* sig. at the .05 level; (\*) marginally sig. at the .1 level.

Table 5.5: Discriminant Analysis of Differences among Labor-migrant, Local Off-farm Work, and Farming Households, Given as F Values of Variables

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Final Model
<b>Agricultural Production</b>						
Size of per laborer cultivated land (mu)	10.78***	13.94***	10.77***	9.84***	3.76*	5.61**
Total number of types of agricultural production involved	0.47	0.50	0.76	0.82	0.85	
Yield of rice (kg) per unit of land	1.63	1.41	1.91	2.20(*)	1.42	2.38(*)
Yield of corn (kg) per unit of land	0.12	0.05	0.07	0.07	0.01	
<b>Use of Agricultural Technologies</b>						
Expense on farming chemicals per unit of land		4.34*	3.24*	3.09*	4.48*	5.29**
Total number of traditional agricultural technologies used		0.58	0.59	0.52	0.35	
Total number of modern agricultural technologies used		0.01	0.12	0.07	0.28	
<b>Household Income, Expenditure, and Assets</b>						
Per capita annual cash income (RMB)			3.77*	3.97*	1.90	2.84*
Per capita annual cash living expenditure (RMB)			0.64	0.64	0.26	
Household consumer asset index			6.94**	5.42**	3.05*	3.87*
<b>Resource Use and Management</b>						
Proportion of firewood and crop stalks in total fuels			0.57	0.57	2.42(*)	3.11*
Total number of types of forest products used			0.26	0.26	0.26	
Total number of resource improvement activities taken			0.44	0.44	0.08	
<b>Sociodemographic Characteristics</b>						
Years of residence					3.36*	3.27*
Total number of household members					0.25	
Number of household laborers					28.28***	38.70***
Average age of laborers in a household					6.30**	6.91**
Average educational level of laborers					3.52*	3.95*

Note: \*\*\*sig. at the .001 level; \*\* sig. at the .01 level; \* sig. at the .05 level; (\*) marginally sig. at the .1 level.

## **CHAPTER 6**

# **RURAL-TO-URBAN LABOR MIGRATION, COMMUNITY DEVELOPMENT, AND RURAL ENVIRONMENTAL CONSERVATION**

### **Introduction**

The relationship between population and the environment constitutes a major field in the study of societal-environmental interactions. As one of the key components of population dynamics, migration has become increasingly important in recent population and environment research. A key subset of the migration and environment literature has focused on the environmental consequences of migration, most often in rural destination areas of developing countries. The mediating factor perspective of population and the environment (Jolly 1994; Mackellar et al. 1998; Marquette and Bilsborrow 1999) provides a theoretical foundation for examining migration impacts on the environment. This approach emphasizes the intervening sociocultural, economic, and technological contextual variables between population/migration and environmental outcomes. There is a growing demand for better understanding the mediating mechanisms through which migration affects the natural environment in recent migration and environment literature. Common property resource institutions, social capital, and social resilience are identified as important mediating variables in explaining the complex and contextually specific effects of migration on the environment (e.g. Adger et al. 2002; Curran 2002; Ostrom et al. 1999). All these factors are logically related to the concept of community. However, the extant migration and environment literature has not systematically incorporated relevant theoretical perspectives on community into its conceptual framework.

Although migration and community are intuitively viewed as reciprocally related research areas, the theoretical and empirical linkages between the two remain understudied (Brown 2002). There is a call in the literature for a further synthesis of migration and community studies. Incorporating a community perspective into the migration scholarship should advance our understanding of the social, economical, and environmental causes and consequences of migration. In addition, community has been increasingly employed in the use and management of natural resources in the settings of small towns and rural areas (Flint et al. 2008). The importance of the community concept in both migration and environmental conservation literatures enables a good opportunity for productive synthesis.

Perspectives on the concept of community in the fields of migration studies and environmental conservation are quite diverse. From an interactional perspective, community is an emergent process among people who share a common territory and interact with one another on various matters reflecting common needs and interests (Wilkinson 1991). Social interaction in communities plays a critical role in improving local social, economic, and ecological well-being. The process of building local capacity for community actions orientated to common interests constitutes community development (Wilkinson 1991). This interactional conceptualization of community provides a coherent theoretical framework for synthesizing research on migration, communities, and the environment. Community interactional capacity can be conceptualized as a key mediating variable in the migration and environment model (Figure 3.1).<sup>23</sup> The impact of migration on community social interaction and the capacity for collective action can serve as a good predictor of the subsequent positive or negative environmental outcomes of migration.

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<sup>23</sup> Community interactional capacity refers to the ability of community residents to work together for their own and common well-being (Flint and Luloff 2005). For a detailed discussion of the migration and environment conceptual model incorporating community international capacity as a key mediating factor, see Chapter 3.

The effects of migration on community in both areas of destination and areas of origin are often complex. The impacts of migration on community interaction are expected to vary depending on different community contexts. This article evaluates the mediating role of community interaction in the migration-environment relationship in the setting of rural-to-urban labor migration in Chongqing Municipality of Southwest China. The main purpose of this study is to provide empirical evidence for understanding the mixed influences of rural migration on local community development and their consequences for environmental conservation in rural origin areas. Following an overview of previous studies in relevant areas, I examine the relationship between rural labor out-migration and local community interaction by comparing community participation and involvement of household groups with different labor migration status. The statistical analysis draws on field data collected through rural household surveys in four rural communities of Chongqing. Finally, this chapter discusses survey findings and their implications for environmental conservation in rural origin communities in China.

### **Review of Previous Studies**

This section includes a review of literature from two areas of study: migration and community, and community in environmental conservation. Although thus far there has been little systematic research on how migration affects the environment through its influence on local community development, previous studies in these two areas suggest useful directions and strategies for further investigation.

### *Migration and community*

Although migration and community are closely interrelated, the synthesis of research in these two areas is limited (Brown 2002; Paerregaard 1997; Schwarzweller 1979). Studies on the causes of migration typically incorporate community as a set of contextual factors rather than directly examining community effects on migration. Likewise, studies on the consequences of migration often frame community as the research setting, but rarely explicitly analyze the direct impacts of migration on community at places of origin and destination. Moreover, although the concept of community is widely used in the migration literature, there is a lack of clarity in the definition of this term. Community is intuitively conceptualized by migration scholars as many things: social networks, social relations, social institutions, social capital, and social interaction.

Migration decisions are typically made jointly by members within households, while household decisions are influenced by social, economic, and political conditions from the local community to higher aggregate levels (Massey 1990). Community-level characteristics are usually included as contextual variables in the statistical analysis of migration decision making (Bilsborrow et al. 1987; Findley 1987; Vanwey 2003; Zhao 1999). However, migration can also be considered as a direct outcome of changes of local community. The migrant network linking family, relatives, and friends across origin and destination areas forms a critical element of the local community structure. This social network greatly influences migration decision-making by reducing both the cost and the potential risk of migration (Massey 1990). The social interaction among migrant members is a cumulative causal factor in further migration (Brown 2002).

For the purposes of this study, the rest of this subsection focuses on the effects of migration on community. Migration is affected by community structure and organization, and it in turn directly or indirectly changes community in areas of origin and destination. The most

straightforward impact of migration on community is through the demographic changes caused by migration. Migration has a direct effect on both the size and composition of populations at origin and destination places. Migration is thus linked to community through the fundamental relationships between demographic changes and community structure (Goldscheider 1987).

Over recent decades, a large body of literature has emerged on the economic, social, and ecological impacts of urban-to-rural migration, retirement migration, and amenity migration on the rural destination communities. Only a small number of studies, however, have intentionally examined the effects of such migration flows on the community development in rural areas. The large-scale turnaround migration to small towns and rural areas in the United States since the 1970's was thought to result in structural disturbances to the stability of rural communities (Price and Clay 1980). Migration to rural communities overloads local community institutional infrastructure because the demands of migrants exceeded the carrying capacity of community services. Newcomers also usually differ from long-time residents in socioeconomic backgrounds, values, and needs (Graber 1974; Green et al. 1996; Nelson 1997; Smith and Krannich 2000; Stinner and Toney 1980). Since the relationships between migrants and long-term residents greatly influence community communication and interaction, these findings provide important implications for the possible impacts of migration on the community structure and dynamics of destination places. Price and Clay (1980) argued that the differences between migrants and non-migrants led to a community "cultural clash" and decreased community solidarity. However, social tensions and conflicts between the two groups in destination communities are not always found in empirical studies (Smith and Krannich 2000).

A subset of this literature has specifically investigated the impacts of metropolitan to nonmetropolitan migration on rural community participation and involvement. Ploch (1980)

found that the reverse migration to rural areas in Maine increased community activities and civic services. However, there were obstacles in the social interaction between non-migrants and migrants, particularly between younger community residents and middle-aged in-migrants due to the competition for community leadership. Several survey-based studies assessed the impacts of migration on community by comparing newcomers with longer-term residents regarding community satisfaction and participation. Recent migrants were found to be generally less satisfied with local communities (Stinner and Toney 1980; Brown et al. 1989). They were also less attached with communities, less involved with community organizations, and had lower level of social interaction than long-term residents (Matarrita-Cascante et al. 2006). Nevertheless, Rank and Voss (1982) contended that migrants over time tended to become as involved in their destination communities as longtime residents. Further study is needed to better understand how in-migrants are integrated into or segregated from local community, and what influences migration has on community social interaction and collective action in areas of destination.

Research on the impacts of migration on community in areas of origin concentrates on different aspects of community structure. Much of this research was conducted in the setting of rural areas, especially those in the developing world. A major facet of migration impacts to rural sending communities that has been intensively studied is social stratification. Brandes (1975) investigated a Spanish village and argued that well-developed rural migration networks increased local social and economic homogeneity and strengthened extended ties with urban society, thereby enhancing community cohesion and solidarity in the village. In contrast, in a case study of a rural Mexican town, Reichert (1981, 1982) found that migration and remittances transformed the town from a relative egalitarian community of poor landless families to a community where social and economic resources were controlled by migrant elite. The increased

economic stratification resulting from migration created serious divisions among community residents and intensified social conflicts. Social interaction among residents in the town had become increasingly concentrated within disparate groups based on wealth and migrant status. These contradictory findings suggest that the effects of migration and remittances on community stratification are time- and site-specific. As migration usually involves high costs and risks, early labor migrants are most likely from better-off households (Stark et al. 1986; Taylor et al. 1996). Thus remittances may have an unequalizing effect on the distribution of income in origin areas in the initial stage of migration. However, in the long term, remittances tend to promote income equality as access to the migration strategy become diffused across households in sending communities through the cumulative impact of migrant networks (Massey 1990).

Researchers have also examined the impacts of migration on social relationships in sending communities. In addition to the goods and money sent or brought back by migrants, migration also results in a flow of values, information, and ideas from the destination to the origin. These social and cultural remittances may even have a stronger influence on community structure than economic remittances. Goldscheider (1987) argued that the diffusion of modern culture from urban areas to rural areas through rural out-migration catalyzed changes in both the intrafamily and the interfamily power relationships, and the connections between families and the community kinship network. The intensive case studies of two rural communities in Poland also showed that rural migration reshapes relationships between migrants and remaining family members, between the gender groups, between the older and younger generations, and between migrants and other nonmigrant community residents (Elrick 2008). Elrick maintained that the long absence of key community members had a detrimental effect on social interaction and social cohesion in origin communities. Similarly, in a comparative study on the impacts of rural-

to-urban migration on rural development in three villages in Hunan Province of China, Li (2006) found that the massive exodus of rural laborers disrupted traditional family functions and community relations, and eventually caused the breakdown of village communities.

Beyond influencing social relationships, migration affects origin communities by altering local social organization. In the rural areas of Mexico, the increased landholding by migrant households undermined the traditional organization of agricultural production because migrant households tended to farm their land less intensively or let more lands lie idle than nonmigrant households (Massey et al. 1987; Reichert 1981, 1982). This practice reduced local food supply, increased the price of staple crops, and decreased the demand for local agricultural labor, all of which increased the pressure for further migration from rural communities. Research in other countries has also shown that rural out-migration causes a substitution of mutual labor help or exchanges with hired labor or professionals (Brandes 1975; Brown 1987; Elrick 2008). The transformation from traditional cooperative forms of labor to a commercialization of individualistic work thus leads to a loosening of close interpersonal relationships within rural communities.

Despite the largely negative out-migration impacts to rural communities delineated in the literature, migration may also generate positive outcomes for local community development in rural origin areas. Typically, rural out-migration in developing countries is temporary, seasonal, and circular (Brown 2002; McDowell and de Hann 1997). This bidirectional migration process can influence origin communities through building and transforming the social networks between sending and receiving communities. Each act of migration produces a new set of social ties between origin and destination areas, thus migration becomes a self-perpetuating process after the volume of migrant network connections in an origin area reaches a threshold level

(Massey 1990). Rather than breaking the existing local social bonds in areas of origin, migration may strengthen social ties across places with substantial geographic distances. Seasonal migrants are still considered as much a part of origin communities as those remaining residents. The regular social interaction between migrants and nonmigrants through social networks based on shared understanding of kinship and friendship and on the common locality of residence extends the spatial boundary of an origin community (Brandes 1975; Brown 2002). Several researchers argue that the strong social fields constructed and maintained across space in circular international migration create transnational communities containing multiple geographic sites in different states (Goldring 1996; Levitt 1997; Rouse 1991). By engaging beyond localized “spaces of dependence” into wider “spaces of engagement” (Cox 1998) via the migration process, rural communities can expand social interaction spaces to a broader scale.

A number of empirical studies found that migration brought beneficial effects on the community development in areas of origin. Conway and Cohen (1998) contended that migration actually promoted community support systems and reinforced reciprocal social and cultural ties among local residents of original communities. In rural highland Ecuador, circular labor migration was critical to the continuance of rural communities since it let local people to remain rooted to rural places (Flora 2006). Many case studies of migrant sending communities in Mexico and other Latin American countries also showed that international migration and remittances played a key role in the mobilization of collective resources for public community projects (e.g. Goldring 1996; Levitt 1997; Reichert 1981). The extended ties of rural communities to outer society through migration may actually enhance communities’ capacity for collective action. In addition, although rural out-migration is often viewed to diminish the social capital and capacity for collective action in origin communities (Adams 1969; Bebbington 1997;

Uphoff 1986), Rudel (2006) argues that the negative effects of out-migration on the local community have a selective nature. Community capacity for collective action after labor out-migration may decline in one segment of a community but increase for those residents (especially women) remaining in the community, which may provide the basis for successful strategies of sustainable community development. In sum, the impacts of migration, particularly circular labor migration, on community in sending areas are better described as complex and context-contingent, and no generalization can be easily made.

### ***Community and environmental conservation***

As the setting of tangible contact between individuals and society, communities (particularly resource based communities) occupy a unique interface between human and the natural environment (Flint and Luloff 2005; Wilkinson 1991). Community and the environment have been interdependent throughout human history. Local communities must play a key role in natural resource conservation if ecosystems are to be sustainable on a social, economic, and ecological basis. Nevertheless, despite the strong empirical evidence of meaningful community-environment interactions, the community-based approach has not been employed in formal frameworks for natural resource management and policy until the recent past.

People were generally excluded from traditional theories and practices of environmental conservation. Early theories such as Malthusianism suggest simplistic negative relationships between population growth and the natural environment (Malthus 1798). Such views put people and the environment in opposition. Population pressure was viewed as a root cause of environmental degradation and resource depletion. Residents in rural areas often directly rely on natural resources for subsistence. Hence the needs of local communities were considered to be

incompatible with the goals of environmental conservation. Meanwhile, communally owned resources were believed to be subject to “tragic” degradation due to overpopulation and the lack of clearly articulated property rights (Hardin 1968). All these ideas implied that natural resources could only be saved through the coercive management of the state, or through the adjustment of market and private property rights.

During the past decades, the increasing disenchantment with the poor outcomes of large-scale, capital-intensive, and centrally planned conservation and development projects has forced policy makers and researchers to rethink the role of community in natural resource use and management (Agrawal and Gibson 1999). Other contextual factors also help community gain attention in environmental conservation. With the spread of democratic political structures and increasing insistence on participation, unrepresentative development and conservation projects have been heavily criticized (Leach et al. 1999). The community-based approach became widely accepted because forms of local resource management were supported by emergent transnational goals of social justice, environmental health, and sustainability (Brosius et al. 1998). Moreover, various non-governmental organizations at multiple political levels also promoted the significance of local communities in natural resource conservation (Bratton 1989).

Community-based natural resource management programs are based on the suppositions that local populations have a greater interest in the sustainable use of resources than the state or outside organizations; that local communities have a better knowledge about the intricacies of local ecological systems; and that they are more able to manage resources through “traditional” forms of access (Brosius et al. 1998). In addition, the legitimate role of community in natural resource management is reinforced by findings from the literature on common property resources. Based on abundant empirical case studies, research on common property system has shown that

local communities can achieve successful resource management through institutional arrangement, collective action, and the use of traditional or local ecological knowledge (e.g. Berkes 1989; Berkes and Folke 1998; Feeny et al. 1990; Ostrom 1990).

Community-based natural resource management can also be further justified by the concept of sustainable community development. Given the political and cultural difficulties to achieve much less defined sustainable development at a global level, it is necessary to shift the focus on sustainability to sustainable community development at the local level (Bridger and Luloff 1999). Sustainable development is generally defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987). While the relevancy of macro-level sustainability is difficult to connect to people’s daily life, sustainable community development is the most effective means of achieving sustainability on a broader scale (Yanarella and Levine 1992). Obviously, community-based natural resource management is among the most important dimensions of sustainable community development.

Despite the increasing employment of community in natural resource management, there is no shared conceptual understanding of this core concept (Jakes and Anderson 2000; Kumar 2005; Luloff et al. 2004). This confusion mirrors the varied conception of community in migration studies and in social science research in general. However, nearly all types of community definitions involve social interactions, common ties, and shared place (Hillery 1955). Community is not a homogenous group of like-minded people; instead, it is composed of multiple and conflicting perspectives (Bridger and Luloff 1999). The interactive theory of community underscores the importance of the dialogue, interaction, and inclusion of diverse and

complex interests. The essence of a community-based approach to environmental conservation is community involvement and the capacity for collective action (Flint et al. 2008).

Review of the relevant literature to date reveals few systematic studies on how migration affects community-based natural resource management. Research on common resource management suggests migration disrupts social bonds and trust within rural destination communities which are fundamental to the regular function of common resource institutions (McCay and Jentoft 1998; Mearns 1996; Ostrom et al. 1999). Migrants often do not understand the rules and norms of indigenous resource management and do not invest in long-term community well-being enhancement. Common property resource systems are thus at risk of collapse, when initial community members feel threatened and either fail to continue to enforce their own self-restraint, or simply join in the race to use up resources (Ostrom et al. 1999). However, such a migration-induced “tragedy of the commons” may be avoided if communities successfully regulate access to resources and create incentives for collective and sustainable use (Cassels et al. 2005; Singleton and Taylor 1992).

Migration can also influence community resource management in areas of origin. In a Mexican rural community, Garcia-Barrios and Garcia-Barrios (1990) found that out-migration led to a labor scarcity and hence distorted traditional collective resource management institutions which were essential to local ecological sustainability. In the Gamba Complex of Protected Areas of Gabon, emigration of young laborers to urban areas disrupted community-based conservation projects (Bilsborrow 2002). In addition, a number of case studies on the Sahelian countries found that labor out-migration had mixed effects on natural resource management of rural communities (David 1995). Although migration disturbed communal agricultural activities

and undermined the capacity of villages to effectively manage resources, it also had the potential to support community development initiatives in rural areas.

In summary, the literature review above shows that migration and community are two interrelated domains of social structure and process. Migration produces profound and complex effects on various aspects of community development at both destination and origin places. Moreover, community holds a critical role in natural resource management. The concept of community emerges as a key theme in the studies on migration and environmental conservation. Notwithstanding its widespread use, community remains a complicated and elusive concept in both literatures. The holistic interactive perspective of community provides a solid base for the synthesis of research on migration, communities, and environmental conservation. This study contributes to the current literature on migration and the environment by empirically examining the impacts of migration on community interaction and implications for environmental conservation in rural origin areas in a large developing country. The research focuses on the community level of analysis to understand the environmental impacts of rural-to-urban labor migration mediated by local community development. Ideally, community should be employed as both the level and the unit of analysis to avoid aggregation bias (Luloff et al. 2004). Nevertheless, it is necessary to collect information at the household level to understand the migration influences to community interaction at the broader community level. Previous work on migration and community suggests that migrants differ from non-migrants in many respects and migration has complex impacts on community development. This study investigates whether rural households with different labor migration status can be distinguished regarding community participation and involvement, and whether the results vary across study communities.

## Methods

### *Study area and community descriptions*

Four rural communities in Chongqing Municipality of Southwest China were purposively selected for this study. Chongqing is a typical hill-mountain region where soil erosion and environmental degradation are severe problems. It currently has the highest proportion of rural work force participating in rural-to-urban labor migration in China. Much of this large-scale labor migration process is seasonal or circular in nature. Moving to cities for work for varying lengths of time has been adopted as a critical livelihood strategy by local households. Meanwhile, most of the rural labor migrants still consider themselves as active members of their origin communities. Similar patterns of rural migration have also been documented in many developing countries in Southeastern Asia, Latin America, and Africa in recent literature. For the most part, rural Chongqing can serve as a prime example of the massive phenomenon of circular rural-to-urban labor migration in China, while research on rural out-migration in Chongqing also has general implications for other developing countries. Therefore, the combination of the high magnitude of rural-to-urban labor migration and marginal biophysical conditions makes Chongqing an important study area for assessing the impacts of out-migration on local communities, and the subsequent trends for rural community-based environmental conservation.

The four rural communities studied were Bailin Village in Baipei District, Banliao Village in Wansheng District, Dacao Village in Kaixian County, and Tuanjie Village in Qianjiang District (Figure 5.1). They were selected for study using a two-stage criterion-based approach to ensure that the final set of communities had varying socioeconomic and ecological characteristics.<sup>24</sup> Such research design helps to improve the potential generalizability of the findings, and makes possible the comparison of similarities and differences among study

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<sup>24</sup> For other methodological details of this study, see the method section of Chapter 6.

communities with respect to the effects of rural labor out-migration on community social interaction.

Bailin Village is a hilly community of approximately 2,320 people situated near the Jinyun Mountain National Protected Area. It is located closer to the center of Chongqing Municipality and has a more diverse economy than the other three study communities. Bailin is the site of several small-scale manufacturing enterprises and thus a large number of local residents take up off-farm work inside or near the village. Nevertheless, long-distance labor migrants still account for a large majority of farmers who are engaged in non-agricultural jobs. Banliao Village has a population of 3,080 and abounds with farmland and forest resources. Its economy is mainly based on agriculture and surface mining. This village is well linked with the nearby Qingnian Township and the city zone of Wansheng District. More than half of the labor force of Banliao circulates to work in urban areas within Chongqing and on the east coast of China. A reservoir with a storage capacity of 9.5 million cubic meters is currently under construction in Banliao. This leads to a series of issues including house relocation and compensation for expropriated farmlands for villagers living in the reservoir area.

Dacao and Tuanjie villages are mountain communities situated in relatively remote areas in Chongqing Municipality. Dacao had a population of 3,016 in 2008. It lies on the northeastern border of Kaixian County, which has been well-known for its high rural labor out-migration rate throughout the country. Tuanjie Village is the only study community with high ethnic minority presence. Nearly half of its population of 2,328 consists of *Miao* and *Tujia* minority people. In both Dacao and Tuanjie, agriculture makes up the base of local economy, whereas labor migration to cities forms the major income source for a majority of rural households. Destination

areas for rural labor migrants from these two villages are generally concentrated in east-southeast coastal provinces such as Zhejiang, Shanghai, and Guangdong.

### ***Data collection***

A mixed-methods approach was used to collect and analyze data for this study (Tashakkori and Teddlie 1998). Secondary socioeconomic and biophysical data from Chongqing year books, environment reports, and government agencies facilitated the research site selection and provided a structural backdrop for the study communities. A preliminary investigation using key informant interviews was conducted to explore the range of community interaction experiences and enhance contextual understanding of the impacts of rural labor out-migration across the four study communities. In summer of 2008, fifteen initial key informant interviews were completed using a multiple-group and modified snowball sampling methodology (Luloff 1999). The results of the interviews informed the development of a household survey, which was administered with a total of 345 randomly selected rural households using a face-to-face questionnaire interview technique in fall of 2008. The household surveys inquired about the community participation, labor migration experiences, and basic characteristics of sampled rural households. The survey data were used in the quantitative analysis of the effects of rural labor migration on community interactions. In order to provide further detailed information to facilitate the interpretation of survey findings, additional in-depth interviews with twenty-six key informants were also conducted across the study area at the time of the household survey. Informants were asked to comment on the experiences, perceptions, and actions of their communities as a whole. All interviews were taped, transcribed, and thematically analyzed

(Dunn 2000). Major findings from the in-depth interviews are incorporated into the discussion of the results of the survey data analysis.

### ***Measurement of variables***

*Dependent variable.* Community interactional capacity was operationalized as household participation in community activities, which was used as the dependent variable for the statistical analysis of the household survey data. It was measured using seven general community activities and three community actions particularly related to environmental management, all of which are commonly used in the literature on community participation and involvement (e.g. Flint and Luloff 2007; Matarrita-Cascante et al. 2006). The questions about these community activities were specially tailored to the context of the study area. Respondents were asked whether in the past twelve months they (or anyone in their households) had (1) attended a local community event; (2) contacted a public or village official about some issue of concern; (3) worked with others in the community to deal with some community issue or problem; (4) attended any public meeting in the community; (5) participated in a community organization; (6) voted in an local election or referendum; (7) served as member of the village administration committee, member of the local political party branch, village group head, or villager representative; (8) participated in community efforts to preserve natural resources or deal with some environmental problem; (9) attended a public hearing or meeting about the environment; and (10) contacted a village official or a governmental agency to get environmental information or complain about an environmental problem. Responses were coded into dichotomous values: 0 for “no participation” and “1” for participation. Results from exploratory factor analysis suggest one key underlying dimension

among the ten items. A composite community interaction variable was created by summing responses to these questions (Cronbach's alpha reliability coefficient = .65).<sup>25</sup>

*Independent variable.* Household labor migration status was the independent variable for the analysis of migration impacts to community interaction. The labor migration status of a surveyed household was determined based on basic information collected on all of its members. Rural households with at least one member working in an urban area for most of the time during the last two years of survey were classified as labor migrant households, and non-labor-migrant households otherwise.<sup>26</sup> According to this criterion, the aggregate survey dataset include 179 labor migrant households and 166 non-labor-migration households.<sup>27</sup>

*Control Variables.* A number of household sociodemographic variables were included in the analysis as controls to obtain a more accurate assessment of the effects of labor migration on households' involvement in community interactional activities. The household sociodemographic characteristics included in this study were years of residence, household size (total number of members), number of laborers in a household (including urban labor migrant members for labor-migrant households), mean age of labor members, and mean educational level of labor members. Educational attainment was measured by eight different levels in the survey: (1) illiterate or semi-illiterate; (2) less than an elementary school degree; (3) elementary school degree; (4) junior high school degree; (5) senior high school degree; (6) middle level

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<sup>25</sup> The normally accepted range for reliability coefficients is .065 to .70. The construction of the community interaction indicator included all the ten questions because reliability coefficient did not increase by removing any item from the analysis.

<sup>26</sup> Since the household survey collected information about community participation of rural households in the past twelve months, the period of the last two years at the time of survey was chosen for determining the labor migration status of households. Thus a time sequence was built in the relationship between labor migration of household member(s) and household participation in community activities.

<sup>27</sup> Ten households in the dataset did not have any labor migrant member at the time of survey but had someone with labor migration experience in the past. I classified them as non-labor-migrant households in this study, but acknowledge the heterogeneity within this household group. The effect of this factor on the analysis should be limited due to the relatively small size of this subgroup of households.

professional, technical or vocational school degree; (7) two year associate degree; and (8) four year college degree or above.

### ***Analytic methods***

The analyses of the household survey data were conducted in three phases. Initially, descriptive statistics were calculated for each of the key variables in the study. One-factor analysis of variance (ANOVA) was then used to examine community variations on these variables. Next, differences between labor-migrant and non-labor-migrant households with respect to participation in community activities and sociodemographic characteristics were assessed with the independent *t*-test.<sup>28</sup> Finally, analysis of covariance (ANCOVA) was used to compare the differences between the two households groups in community participation, while controlling for the effects of the five household sociodemographic variables. Post-hoc analysis was also run using the Multiple Classification Analysis (MCA) technique to show the adjusted differences between labor-migrant and non-labor-migrant households on the community interaction indicator. Both the bivariate (using *t*-test) and multivariate analyses (using ANCOVA and MCA) were carried out for the aggregate dataset and for each study community.

## **Results**

### ***Descriptive and univariate analyses***

Descriptive statistics of the household sociodemographic variables were used in the analysis to describe the sample of surveyed rural households. Household sociodemographic

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<sup>28</sup> Levene's test was used to assess the equality of variance in different household groups before running the independent *t*-test and one-way ANOVA. When the Levene statistic was significant, modified procedures in SPSS (*t* statistic with equal variances not assumed for the independent *t*-test and Welch statistic for ANOVA) were used for the comparison of means.

characteristics for the aggregate dataset and for each study community are shown in Table 6.1. On average, surveyed households lived in their villages for almost 29 years. The average rural household in the survey had about 5 members and 3 laborers. The mean age of household labor members was around 42, while the mean educational level of household laborers was slightly higher than elementary school completion.

The comparison of these variables across the four communities indicated significant differences for all characteristics but the number of household laborers. Tukey's post hoc test was used to disentangle the statistical differences among community means. The post hoc analyses revealed that on average surveyed households from Bailin Village had significantly longer length of residence than those from Dacao and Tuanjie villages. The average size of Dacao households was significantly higher than that for Bailin and Tuanjie households. Bailin Village also had significantly lower average household size than Banliao Village. In general, respondent households from Bailin Village reported the highest mean age of labor members and Tuanjie households the lowest. The average Bailin household had a significantly higher mean age of labor members than an average household from any of the other three villages. The mean educational level of labor members for Dacao households was the lowest and differed significantly from the highest labor education levels found among Bailin and Tuanjie households.

Table 6.2 presents descriptive statistics of community participation variables for the aggregate dataset and individual study communities. Overall, nearly all of surveyed households (99.1%) indicated participation in at least one of the ten community interactional activities listed in the survey. The average number of community activities participated was 4 for the aggregate dataset. Bailin and Banliao villages had relatively higher average number of community activities than Dacao and Tuanjie villages. However, no statistically significant difference among

communities was found when the level of community participation was compared across the four study communities.

Community variation was further explored for those community participation variables showing significant difference across the four study communities. Overall, voting in a local election or public decision-making was the most common form of community activities both for the aggregate dataset and for each study community. Banliao Village had the highest level of participation in local voting and Dacao Village had the lowest. The post-hoc test showed that only the difference between these two was significant.

For both the whole dataset and each community, attending a public meeting in community ranked the second highest on participation rate among the ten community activities. Bailin households had the lowest level of attending community meetings, which differed significantly from the higher levels of participation found among Banliao and Dacao villages. The overall participation rate for community meetings about the environment was 48%. Levels of participation differed significantly between Banliao and Tuanjie villages, which respectively had the highest and the lowest levels.

Contacting a village official or a governmental agency to get environmental information or complain about an environmental problem had an aggregate participation rate of 24%. Tuanjie Village again had the lowest level of participation in this activity, which was significantly lower than the highest level found in Bailin Village. Finally, participation in community organizations was 18% for the aggregate dataset. Bailin Village had the highest participation rate and differed significantly from the other three communities in its level of participation for this activity.

### ***Bivariate comparisons of household groups on major variables***

The independent *t*-test was used to analyze differences between labor-migrant and non-labor-migrant households with respect to community participation and sociodemographic characteristics. Results of comparisons of these two household groups on community participation variables for the aggregate dataset and for study communities are shown in Table 6.3. Overall, labor-migrant households did not differ significantly from non-labor-migrant households on the composite index of community interaction for the aggregate dataset. When the ten different types of community actions were compared separately between the two groups, no significant difference was found for all variables except attendance in local community events.<sup>29</sup> The participation rate for this activity of labor-migrant households was marginally significantly higher than that of non-labor-migrant households. In addition, significant differences between the two household groups were identified for all the five household sociodemographic characteristics (see Table 6.4). Labor-migrant households on average lived longer in the community, were larger in size, and had more labor members than non-labor-migrant households. In general, laborers from labor-migrant households tended to be younger and more educated than those from non-labor-migrant households.

There are many differences among bivariate comparison analyses of community participation variables for each study community (see Table 6.3). For Bailin Village, no significant difference existed between labor-migrant and non-labor-migrant households on the constructed community interaction indicator or any of the ten community activity variables. Non-labor-migrant households on average had participated in more community activities than labor-migrant households in Dacao Village, but this difference did not attain statistical

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<sup>29</sup> Due to the exploratory nature of this research, the analysis here used a .10 significance threshold instead of the more conventional .05 significance level.

significance. However, Dacao labor-migrant households were almost significantly less likely than non-labor-migrant households to contact public officials or village leaders about community issues and participate in community organizations. For Tuanjie Village, labor-migrant households had significantly higher level of community interaction than non-labor-migrant households. More specifically, the participation rates for contacting public officials or village leaders about general and environmental issues of Tuanjie non-labor-migrant households were significantly lower than those of Tuanjie labor-migrant households. In contrast, for Banliao Village, non-labor-migrant households had significantly higher level of community interaction than labor-migrant households. This is largely due to the differences between the two groups in participating in local community events and attending public meetings in the community. Banliao labor-migrant households had significantly lower rates of participation in these two activities when compared to Banliao non-labor-migrant households.

Table 6.4 also shows some variations across the four study communities in the comparison of the two household groups on household sociodemographic variables. Year of residence in community was significant in distinguishing between labor-migrant from non-labor-migrant households for the aggregate data and only for Dacao villages. Average household sizes of the two household groups differed significantly for all study communities but Banliao. Labor-migrant households had more labor resources than non-labor-migrant households across the study communities, while the difference between labor-migrant from non-labor-migrant households in the mean age of labor members did not gain statistical significance only for Dacao Village. Finally, significant difference was found between the two household groups in the mean educational level of labor members for the aggregate dataset and Bailin and Banliao villages, but not for Dacao and Tuanjie villages.

### *Multivariate analyses*

Results of bivariate analyses reveal significant correlation between household labor migration status and sociodemographic variables. Beyond simplistic bivariate analyses, a multivariate procedure is needed to examine the relative effect of labor migration on a rural household's participation in community activities while holding all the household sociodemographic characteristics constant. ANCOVA analysis was deemed particularly appropriate here to assess the differences between labor-migrant and non-labor-migrant households in community participation when variations in the household sociodemographic variables were controlled. This technique is very similar to multiple regression analysis but is statistically more effective and meaningful for the purpose of this study. A routine post-hoc analysis of the ANCOVA using the MCA can also provide more detailed information about the main effect of household labor migration status on community participation adjusting for the control variables.

Table 6.5 presents the summary of the ANCOVA on participation in community activities for the aggregate dataset and for individual communities. The focus of analysis here is on the relationship between household labor migration status and community participation rather than the total explained variance of the models. As shown in Table 6.5, the effect of household labor migration on community participation was not statistically significant for the study communities as a whole. This means that overall there was no significant difference between labor-migrant and non-labor-migrant households with respect to participation in community activities while controlling for basic sociodemographic characteristics. Results of the MCA depicted in Table 6.6 shows that the relationship of household labor migration status to

community participation is stronger after the adjustment by household sociodemographic variables, but still does not achieve statistical significance.

The same process of the ANCOVA and MCA conducted with the aggregate data was used for examining the differences in community participation between labor-migrant and non-labor-migrant households for each study community. Table 6.5 and Table 6.6 also give a comparison of the aggregate and community analytical models. Results for Bailin and Dacao villages are consistent with those from bivariate analyses. Although the strength of household labor migration status increased somewhat after adjustment in both community models, no significant difference was found between labor-migrant and non-labor-migrant households in participation in community activities. For Tuanjie households, the relationship between household labor migration and community participation was no longer significant when accounting for variations in household sociodemographic variables. It appears that the significant community interaction difference between labor-migrant and non-labor-migrant households found in the bivariate analysis for Tuanjie Village is explained away by the sociodemographic controls. Finally, for Banliao households, household labor migration still had a significant influence on participation in community activities (albeit slightly weaker than in the bivariate analysis) while controlling for the effects of household sociodemographic variables. The MCA procedure also confirmed that household labor migration status retained its statistical strength as an independent variable in Banliao even after adjusting for the sociodemographic characteristics. On average, non-labor-migrant households had a significantly higher level of participation in community activities than labor migrant households from Banliao Village.

## Discussion

This study examines the effects of migration on community development within the context of four rural villages that experience high level of rural-to-urban labor migration. Results of the analysis for each study community revealed substantial differences. This confirms that the impacts of rural-to-urban labor migration on rural community interaction are not simple but complex and diversified. More concretely, this study shows that rural labor out-migration have both detrimental and beneficial possibilities for community development in rural origin areas.

Most key informants indicated a dearth of community activities in their villages and felt only limited influences of labor migration concerning this aspect. While no significant difference was found between labor-migrant and non-labor-migrant households in community participation for the aggregate data, the community-level analysis suggested that labor migration reduced rural households' community involvement in Banliao Village. Banliao labor migrant households were less likely than Banliao non-labor-migrant households to participate in most of the community activities, particularly attending a local community event and attending a public meeting their community. The bivariate comparisons for the aggregate dataset and for Dacao Village also revealed that labor-migrant households were significantly less likely than non-labor-migrant households to attend local community events, join in community organizations, and contact public or village officials about community issues.

These findings are not surprising given the fact that migrants are usually away from their home villages for months. Their long absence generally constrains labor-migrant households' ability in participating in many community activities. As rural people migrate to cities for jobs and other needed resources, their attachments to local community may decline (Wilkinson 1986). Labor-migrant households may become less involved in the community since they gain an

alternative source of income and depend less on local resources for living. In addition, the increased connections with outside society brought by out-migration may deemphasize the role of rural villages in these households' sphere of social interaction. Thus, over time labor-migrant households may become detached from local community issues and activities. Community actions often emerge in response to external threats (Tilly 1973). The presence of a government-organized reservoir construction project in Banliao Village may increase the overall community activeness, but not to the same extent for labor-migrant and non-labor-migrant households. Additionally, being overwhelmed by tasks and work assigned by local government, the village administration committee of Banliao took little action to reach out to labor migrants away from home. Therefore, labor migration had an especially strong negative effect on community interaction in this village.

In all the other three study communities, labor migration was not found to significantly negatively influence the community participation of rural households. In fact, the analysis for Tuanjie Village suggested a positive relationship between labor migration and households' community involvement, though the effect was statistically weak when controlling for basic household sociodemographic characteristics. In Tuanjie Village, members of the community administration committee maintained regular contact with most of the labor migrants, and held discussion meetings with them when they returned from cities. Analysis of survey data found that Tuanjie labor-migrant households were significantly more likely than Tuanjie non-labor-migrant households to contact public or village leaders about community issues and environmental problems. In addition, key informant interviews across the study communities indicated that remaining family members of labor-migrant households still actively participated in community infrastructure works such as road construction and irrigation system maintenance.

These results provide empirical support for the potential beneficial influences of labor migration on community interaction in rural areas.

The circular nature of rural-to-urban labor migration adds an additional level of complexity to the relationship between rural out-migration and local community development, and challenges the simplistic notion of migration as a unidirectional process that disrupts rural community interactions and activities. Circular migration is a particularly suitable tool for rural household strategies to optimize the exploitation of both rural and urban resources (Paerregaard 1997). Since most rural households in developing countries can be viewed as “multi-spatial” (Tacoli 1998), temporary rural-to-urban labor migration does not necessarily disrupt social interaction of migrant households in rural origin areas. On the contrary, circulation can serve as an important mechanism for supporting rural household livelihoods and for maintaining village-based social networks. In a sense, the reciprocal connections between origin and destination areas generated in the labor migration circuit link together rural and urban sectors.

The analysis herein suggests that the rural origin village still constitutes an essential part of the living space of labor migrant households. The interactional theory of community provides a particularly useful explanatory framework for the positive possibilities of labor migration for rural community development. There is a strong locality dimension to the interactive conception of community (Wilkinson 1991). In the meantime, the shift from a social systems view to a social field perspective in the interactive community theory goes beyond the limitation of conceptualizing communities with strict boundaries (Wilkinson 1970, 1991). Community field is an unbound and dynamic process of social interactions. It represents the collective capacity of local residents to improve their own well-being (Wilkinson 1991). The original rural community field can be extended beyond local boundaries by the external ties and linkages developed

through circular labor migration. The set of social and economic relationships maintained by urban labor migrants with rural origin villages gives rise to a transboundary community field cutting across rural and urban areas. Although the conception of transboundary community leads to the fluidity of territorial boundaries, its field of interaction is anchored around the rural areas of origin. Since rural dependency on and distance from urban centers are considered as serious barriers to community interaction in rural areas (Wilkinson 1986), the community field expanding across “spaces of engagement” (Cox 1998) should contribute to the potential of rural community development.

The diverse impacts of rural-to-urban labor migration on rural community development have important implications for rural environmental conservation in China. Rural China has seen radical changes in natural resource management institutions in the past three decades. Before the economic reform that started in the early 1980’s, rural natural resources such as land and forests were managed through the People’s Communes system. Under the commune regime, farmers were organized to collectively use and manage farmland and other resources. It is noteworthy that the concept of “collective resources” in China’s commune era does not mean a real joint resource management by local community members (Miao and West 2004; Sun 2007). Since communes had to comply with the production orders from the central government, these “collectively owned” resources in rural areas were tightly controlled by the state. During the economic reform, the commune system was replaced by the Household Responsibility System (HRS). Under this system, though farmlands remain collectively owned under the title of the village community, long-term use rights to farmlands were assigned to individual rural households. Farmers are free to make decisions about agricultural production and land

management for their contracted plots of farmland. Over time, the HRS was used to govern other natural resources such as grasslands and forestlands.

Although this incentive system has substantially increased in China's agricultural production, it has also caused serious obstacles for community development and natural resource management in rural areas. The two-tier HRS emphasizes the combination of individual household operations and aggregate community actions on paper. However, in the field, the collective social and economic organization is largely neglected in most rural areas. In-depth interviews also suggested that there was a deeply biased attitude against terms such as "collective management" and "collective action" among rural farmers due to the strongly held negative mental image of the old communal system. The rapid transition from the commune regime to the HRS has given rise to a large disruption of local community development. Meanwhile, this speedy shift from highly organized communal management to relatively independent household economies has resulted in fragmented resource management by individual households. In the study communities and many other rural areas in China, there is not any locally formulated mechanism to manage village collective resources.<sup>30</sup>

Qualitative data from the key informant interviews revealed that local residents did not attest to any substantial impacts of labor migration on natural resource management in the communities. As one Bailin resident said, "The leaving of laborers has not brought any changes on local resource management. According to the current management system, there are not any changes. It does not matter for resource management whether these people are in the village or not." Where there is no community-based natural resource management system, rural labor out-

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<sup>30</sup> Varied forms of community-based resource management still exist in some parts of rural China. For example, collective and small group grassland management has persisted in the Tibetan Plateau and Xinjiang Uygur Autonomous Region (Banks et al. 2003), while collective farm system is a popular pattern in more-developed coastal provinces such as Shanghai, Jiangsu, and Zhejiang (Croll and Huang 1997; Zhu and Jiang 1993).

migration does not appear to have any direct influences on the collective resource management in rural origin areas. However, as community interactive capacity holds an essential role in community-based environmental conservation, the labor migration effects on rural community development essentially relate to grass-roots community initiatives in local natural resource management. When labor migration leads to lower level of community interaction in rural areas, the prospect of local community-based natural resource management is further limited. To the extent that rural labor out-migration extends the local community field, it contributes to the dual objectives of rural community development and sustainable natural resource management.

## Tables

Table 6.1: Household Sociodemographic Characteristics for the Aggregate Dataset and Study Communities, Given as Means of Variables

Variables	Overall (N=345)	Bailin (N=87)	Dacao (N=86)	Tuanjie (N=85)	Banliao (N=87)	F-score
	<b>mean</b>					
Years of residence	28.8	33.2 <sup>DT</sup>	27.1 <sup>B1</sup>	26.0 <sup>B1</sup>	29.0	6.72***
Household size	4.5	4.0 <sup>DB2</sup>	5.1 <sup>B1T</sup>	4.3 <sup>D</sup>	4.6 <sup>B1</sup>	9.04***
Number of labor members	3.1	3.3	3.2	3.0	3.0	1.74
Mean age of labor members	42.4	46.2 <sup>DTB2</sup>	41.0 <sup>B1</sup>	40.3 <sup>B1</sup>	42.1 <sup>B1</sup>	7.78***
Mean educational level of labor members	3.1	3.2 <sup>D</sup>	2.8 <sup>B1T</sup>	3.2 <sup>D</sup>	3.0	4.82***

Notes: Codes for communities: B1=Bailin, D=Dacao, T=Tuanjie, B2=Banliao. Any code identified indicates a significant difference between the two communities at the .05 level using Tukey Test.

\*\*\*sig. at the .001 level; \*\* sig. at the .01 level; \* sig. at the .05 level.

Table 6.2: Community Participation for the Aggregate Dataset and Study Communities

Variables	Overall (N=345)	Bailin (N=87)	Dacao (N=86)	Tuanjie (N=85)	Banliao (N=87)	F-score
	<b>mean</b>					
Participation in community activities	4.08	4.40	3.86	3.84	4.21	1.50
	<b>percent</b>					
Attended a local community event	28.1	33.3	26.7	25.9	26.4	.52
Contacted a public official or village cadre about some issue of concern	37.1	41.4	34.9	38.8	33.3	.50
Worked with others in your community to deal with some community issue or problem	21.4	23.0	26.7	22.4	13.8	1.54
Attended a public meeting in your community	82.0	69.0 <sup>DB2</sup>	84.9 <sup>B1</sup>	83.5	90.8 <sup>B1</sup>	5.25**
Participated in a community organization	18.0	39.1 <sup>DTB2</sup>	10.5 <sup>B1</sup>	7.1 <sup>B1</sup>	14.9 <sup>B1</sup>	13.65***
Voted in a local election or referendum	95.1	97.7	89.5 <sup>B2</sup>	94.1	98.9 <sup>D</sup>	3.30*
Served on the village administration or local party branch	12.2	11.5	11.6	11.8	13.8	.10
Participated in community efforts to preserve natural resources or to deal with some environmental problem	42.3	44.8	31.4	44.7	48.3	1.97
Attended a community meeting about natural resources and the environment	47.8	46.0	46.5	37.6 <sup>B2</sup>	60.9 <sup>T</sup>	3.28*
Contacted a public official or village cadre to get environmental information or complain about an environmental problem	23.8	34.5 <sup>T</sup>	23.3	17.6 <sup>B1</sup>	19.5	2.75*

Notes: Community variation was tested with a one-factor ANOVA. Codes represent communities: B1=Bailin, D=Dacao, T=Tuanjie, B2=Banliao. Any code identified indicates a significant difference between the two communities at the .05 level using Tukey Test.

\*\*\*sig. at the .001 level; \*\* sig. at the .01 level; \* sig. at the .05 level.

Table 6.3: Bivariate Comparisons of Household Groups on Community Participation Using the Independent *t*-Test for the Aggregate Dataset and Study Communities, Given as Means of Variables

Variables	Overall (N=345)		Bailin (N=87)		Dacao (N=86)		Tuanjie (N=85)		Banliao (N=87)	
	NLM (N=166)	LM (N=179)	NLM (N=41)	LM (N=46)	NLM (N=38)	LM (N=48)	NLM (N=45)	LM (N=40)	NLM (N=42)	LM (N=45)
Participation in community activities	4.16	4.00	4.39	4.41	4.17	3.58	3.46*	4.32*	4.68*	3.72*
Attended a local community event	32 <sup>(*)</sup>	24 <sup>(*)</sup>	41	26	32	22	21	32	36*	16*
Contacted a public official or village cadre about some issue of concern	37	37	39	43	44 <sup>(*)</sup>	27 <sup>(*)</sup>	29*	51*	36	30
Worked with others in your community to deal with some community issue or problem	22	20	20	26	32	22	25	19	14	14
Attended a public meeting in your community	84	80	68	70	88	82	81	86	100**	81**
Participated in a community organization	21	15	44	35	17 <sup>(*)</sup>	4 <sup>(*)</sup>	8	5	18	12
Voted in a local election or referendum	94	96	95	100	90	89	92	97	100	98
Served on the village administration or local party branch	13	12	12	11	12	11	10	14	16	12
Participated in community efforts to preserve natural resources or to deal with some environmental problem	43	42	44	46	32	31	40	51	57	40
Attended a community meeting about natural resources and the environment	47	49	46	46	41	51	31	46	68	53
Contacted a public official or village cadre to get environmental information or complain about an environmental problem	22	26	29	39	29	18	8*	30*	23	16

Note: (1) \*\* significant at the .01 level, \* significant at the .05 level, <sup>(\*)</sup> marginally significant at the .10 level; (2) NLM="non-labor-migrant households", LM="labor-migrant households".

Table 6.4: Bivariate Comparisons of Household Groups on Sociodemographic Variables Using the Independent *t*-Test for the Aggregate Dataset and Study Communities, Given as Means of Variables

Variables (means)	Overall (N=345)		Bailin (N=87)		Dacao (N=86)		Tuanjie (N=85)		Banliao (N=87)	
	NLM (N=166)	LM (N=179)	NLM (N=41)	LM (N=46)	NLM (N=38)	LM (N=48)	NLM (N=45)	LM (N=40)	NLM (N=42)	LM (N=45)
Years of residence	27.0**	30.5**	33.3	33.1	23.7**	30.1**	24.3	28.1	28.0	29.9
Household size	3.9***	5.1***	3.0***	4.8***	4.3***	5.9***	4.0**	4.8**	4.4	4.8
Number of labor members	2.5***	3.7***	2.6***	3.9***	2.5***	3.9**	2.4***	3.7***	2.5***	3.4***
Mean age of labor members	44.5***	40.2***	49.8**	43.0**	42.3	39.8	42.2*	37.8*	44.3**	39.9**
Mean educational level of labor members	2.9***	3.2***	2.9**	3.5**	2.7	3.0	3.1	3.3	2.7**	3.2**

Notes: (1) NLM="non-labor-migrant households", LM="labor-migrant households"; (2) \*\*\*significant at the .001 level, \*\* significant at the .01 level, \* significant at the .05 level.

Table 6.5: Summary of the ANCOVA on Community Participation for the Aggregate Dataset and Study Communities

Variables	Overall (N=345)		Bailin (N=87)		Dacao (N=86)		Tuanjie (N=85)		Banliao (N=87)	
	F-score	p-value	F-score	p-value	F-score	p-value	F-score	p-value	F-score	p-value
Labor migration status	1.906	.168	.552	.459	2.572	.113	2.426	.123	3.806 <sup>(*)</sup>	.055
Years of residence	.048	.826	.493	.485	.032	.858	.075	.785	.160	.690
Household size	1.653	.199	1.945	.167	.317	.575	.814	.370	.000	.986
Number of labor members	.036	.850	.467	.496	.003	.954	.284	.596	.062	.803
Mean age of labor members	3.044	.082	1.397	.241	1.133	.290	.059	.809	.838	.363
Mean educational level of labor members	18.249***	.000	2.196	.142	13.731***	.000	7.932**	.006	1.115	.294
Multiple R	.24		.30		.41		.39		.28	
Multiple R square	.06		.09		.17		.15		.08	

Note: \*\*\*sig. at the .001 level; \*\* sig. at the .01 level; \* sig. at the .05 level; <sup>(\*)</sup> marginally sig. at the .1 level.

Table 6.6: Summary of the MCA of Community Participation for the Aggregate Dataset and Study Communities, Given as Means of Variables

Variables	Overall (N=345)		Bailin (N=87)		Dacao (N=86)		Tuanjie (N=85)		Banliao (N=87)	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Labor migration status:										
Non-labor-migrant households	4.16	4.26	4.39	4.63	4.17	4.33	3.46	3.49	4.68	4.70
Labor-migrant households	4.00	3.89	4.41	4.20	3.58	3.43	4.32	4.28	3.72	3.70
Eta/Beta	.04	.09	.01	.10	.13	.20	.23	.21	.24	.25

## CHAPTER 7

### CONCLUSION

There is a need for better understanding of the mediating mechanisms through which migration influences the environment in recent population and environment literature. Responding to this call, this dissertation research develops a comprehensive conceptual framework bridging migration and environment research, rural livelihoods, interactional theory of community, migration and community studies, and community-based environmental conservation. This conceptual model depicts rural household livelihoods and community development as key mediating factors between rural migration and the rural environment. The efficacy of the conceptual model is empirically assessed in the context of rural-to-urban labor migration in Chongqing Municipality, Southwest China. The conceptual framework for rural migration and environment itself and the general support found for it in the empirical analysis have implications for the advancement of theories, for research methods, and for natural resource management and rural development policy.

#### **Conceptual Framework: Findings and Implications**

The structure of this dissertation is framed by the overarching goal of developing and evaluating a conceptual model for rural migration impacts to the rural environment. A review of recent literature reveals major mediating factors employed to explain the environmental impacts of migration revolve around rural livelihoods and community development. However, the extant migration and environment literature has not yet systematically linked with these research areas. The conceptual model constructed in this study establishes theoretical and empirical linkages

among common concepts across multiple fields of study. The key assumption is that rural household livelihoods and community interactional capacity are critical intervening variables between rural migration and the rural environment. Although I focus on the environmental effects of rural migration in areas of origin in the discussion, this framework can be readily adapted for studying such effects in rural areas of destination.

This conceptual framework of environmental impacts of rural migration is an effort toward a middle-range theory of migration and the environment. Merton (1967) defined theories of middle-range as involving abstractions but close to observed and empirical data. Middle-range theories link empirical investigation to more inclusive grand theories, and consolidate empirical findings from diversified fields. 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). A middle-range theory would help to ground the complex relationship between migration and the environment in various community contexts, and accommodate variability and diversity across observations.

This work on better understanding the environmental effects of rural migration is also orientated to improving rural development policies and natural resource management. Given the contextually specific effects of rural migration on the environment, a constructive approach to advance the current research is to analyze why in some cases environmental consequences are positive while in other cases they are negative. The middle-range conceptual framework developed in this article can provide a common platform for synergizing diverse research findings from varied social, economic, and ecological circumstances. Drawing upon such synthetic analysis, future policies on population mobility can be devised to increase the possibilities of positive environmental effects of rural migration.

Further, this conceptual framework highlights important factors that need to be better understood by practitioners and researchers alike in the broad field of migration, development and the environment. Although the environmental effects of migration are complicated, the household level and the community level mediating variables between rural migration and environmental outcomes underscore important areas for policy intervention. Concerning rural labor migrant sending areas, policies should concentrate on improving local social and economic environments to enhance people's livelihoods and promote more sustainable use of natural resources. Additionally, policies which facilitate community interactions may help rural communities better respond to the profound socioeconomic and environmental consequences of labor out-migration. These policy prescriptions are critical for many developing countries' endeavors to achieve the sustainable development of rural areas that are increasingly involved in labor migration and urbanization development.

### **Household Livelihoods Mediating-factor: Findings and Implications**

Rural household livelihoods were conceptualized as an integrative mediating factor in the conceptual framework of rural migration and the rural environment. Findings based on the rural household survey data and key informant interviews confirm the research hypothesis that labor-migrant and non-labor-migrant households are significantly different in livelihood activities including agricultural practices, income and consumption, and resource use and management. Results showed that labor-migrant households farmed land less intensively, had higher rural cash income, owned more consumer assets, and depended less on forest resources for fuel use than non-labor-migrant households. Moreover, the analysis found that rural non-labor-migrant households were an internally diverse instead of a homogenous group. Labor-migrant households

particularly differed from farming households with respect to the rural livelihood constructs, while sharing many similar livelihood characteristics with local off-farm work households. A further comparison of labor-migrant and farming households on livelihood activities provided more support for the conceptual model and research hypothesis.

These findings have implications for rural environmental management and development policy making and for research methods. The general support found in the analysis for the conceptual linkages among rural migration, household livelihoods, and the rural environment demonstrates the adequacy of the conceptual model in improving our understanding of the environmental impacts of rural migration. The ultimate environmental consequences of labor out-migration in rural origin areas are contingent on the resulting changes in rural household livelihoods. The mediating livelihood variables between rural migration and the rural environment highlight potential areas for policy intervention. Rural migration can bring either dramatic gains or losses to the long-term conservation of local natural resources. Thus, future rural environmental management policies should aim at providing favorable institutional conditions to facilitate the potentially positive environmental outcomes of labor migration while avoiding or minimizing the possible negative ones.

Rural labor migration undoubtedly leads to less intensive land use and a gradual withdraw from agricultural production of migrant households, but this does not necessarily contribute to land recuperation and vegetation regeneration. The relationship between agricultural land use and the rural environment is especially complicated in hilly-mountainous areas of developing countries. Rural-to-urban labor migration and the abandonment of farmland may facilitate forest transition and ecological recovery. However, the abandoned land may fail to rehabilitate naturally because the village landscapes may be irreversibly transformed. Integrated

resource management planning should be implemented early on to optimize the ecological effects of rural labor migration and concomitant household agricultural adjustment. Policies encouraging ecosystem recovery in the abandoned land (e.g. planting of trees or other perennials) can promote sustainable land use and reduce water and soil erosion. Meanwhile, it is of great importance to develop holistic policies and programs to enhance both rural people's socioeconomic welfare and rural environmental sustainability. A better incorporation of policies on rural labor migration with development and environmental conservation programs in China (e.g. poverty reduction policies and the Grain for Green Program) can further improve ecological restoration in rural areas.

In addition, the analysis showed that local off-farm work households were quite similar to labor-migrant households in terms of livelihood activities, and were even better off in some aspects such as living expenditure and consumer assets. Since local non-agricultural employment does not result in the prolonged absence of key household laborers from home, this strategy should achieve a better combination of resource-based and non-resource-based activities in rural household livelihood portfolios. Therefore, creating more non-agricultural employment opportunities within commuting distance from rural communities without causing environmental degradation will likely enhance the sustainability of agricultural production and natural resource use.

The environmental impacts of rural migration in rural origin areas are seldom systematically assessed. The findings of this research suggests that rural out-migration leads to lower dependency on agriculture and local natural resources for subsistence, and that a trend toward vegetation regeneration is emerging in the study area. However, these relationships are too tenuous to predict an extensive ecological recovery across rural Chongqing. This study

underscores the need to systematically monitor and investigate changes in land quality, soil erosion, and forest cover over time in rural areas experiencing high magnitude of labor out-migration. Better longitudinal biophysical data at both the macro and the micro levels are needed to improve research and management of rural natural resources following rural out-migration.

Finally, this study has methodological implications for further research on rural migration, livelihoods, and the environment. The findings show that a simplistic dichotomous typology of migrant and non-migrant households neglects the complexity within the two populations. In fact, non-migrant households are a diverse rather than a homogenous group. Likewise, migrant households can be further classified based on characteristics of labor migrants, such as gender, household member status (e.g. household head or offspring), length of participation in labor migration, and migration destination (e.g. within or outside province, domestic or international). Accounting for the variations within both migrant and non-migrant household groups in future studies is important to advance our understanding of the impacts of rural migration on household livelihoods and consequent environmental changes.

### **Community Interaction Mediating-factor: Findings and Implications**

Another line of inquiry based on the conceptual framework focuses on the role of local community interaction capacity in mediating the impacts of rural migration on the rural environment. Findings from this study showed that the effects of rural labor out-migration on households' community participation varied across study communities. Analysis at the community level found that rural labor migration was negative and significantly related to household participation in community activities for Banliao, but not for the other three study communities. For Tuanjie, the analysis actually suggested a positive influence of labor out-

migration on the community involvement of rural households. These results support the hypothesis that the migration influences to rural community development and their consequences for local environmental conservation are complex and context-contingent. Rural labor out-migration may constrain the participation level of migrants and migrant households for community activities, at the same time that there exist good possibilities for constructing and maintaining a rural community field extending beyond local boundaries in a broader regional context (Flint et al. 2009).

Community development is essentially a purposive process to improve social interactions and the community field structure (Wilkinson 1991). A direct practical implication of these results for rural community development is to develop policies which enhance the positive effects of rural-to-urban labor migration on community interactions while limiting the negative ones. Both the key informant interviews and the survey data found that interactional capacity was generally low across the study communities. This may increase local vulnerability to socioeconomic and environmental changes caused by the labor out-migration process. There is little effort to tie the people who share common interests in local place and community together in contemporary rural China. Rural community development is inherently interrelated with the System of Village Self-Governance in China. Village administration committees can play an essential role in promoting active dialogue and collective problem solving among local residents. Fostering the improvement of community interactions and capacity for collective actions in rural areas needs to be incorporated as a key component in the ongoing New Rural Construction Program in China. Moreover, labor migration should be viewed as an opportunity instead of a problem for rural community development. It is of great importance to encourage the productive linkages between labor migrants to cities and residents remaining in rural areas, and facilitate

labor migrants' contribution to rural community development (for example through strengthen the labor migrant network and mobilizing remittance funds for community projects). Bringing labor migrants and non-migrant villagers together to address common community problems is a critical step in improving rural community well-being. Nevertheless, although the potential contribution of rural labor out-migration to rural community development can be significant, it cannot substitute for the state's responsibility in investing in infrastructure construction and social welfare in rural areas. Any long-term benefits brought by labor migration will depend on adequate institutional support from different levels of government.

The findings of this study have implications for natural resource management in rural China. The analysis suggests that rural-to-urban labor migration may exacerbate the fragmentation or rural natural resource management by reducing community interactional capacity in rural origin areas. However, the circular rural labor migration process may also contribute to the improvement of the overall community interaction level in rural areas through extending local community field. Sustainable environmental management and economic development in rural China demands a shift from the overemphasis on fractional household operations to a real household-community co-management in rural natural resource policies. Policies focusing on promoting community development in rural areas through labor migration are integral to building local collective capacities for rural environmental conservation. Moreover, since community interaction is at the core of community-based natural resource management, the advancement of the community-based approach to environmental conservation will in turn foster community development in rural China.

The results also have implications for the ultimate environmental outcomes of rural-to-urban labor migration in rural China. Rural communities with higher level of community

interaction are expected to be in a better position to ameliorate the environmental consequences of rural labor out-migration. Rural communities are principle agents in the use and management of collectively owned resources in rural areas. For instance, under the HRS in China, farm households have exclusive use rights to farmland in the name of their local village community, but do not hold individual land property rights. Labor scarcity caused by the out-migration of key family laborers often leads to the under-cultivation or even abandonment of productive farmland. Local communities with higher capacity for collective action in resource management can better organize land transfer among rural households and make the utilization of land resources more effective. The resulting improvement of agricultural production scale should produce beneficial effects on land, water, and forest resources in the long run. Besides being directly involved in the allocation of local resources, rural communities can also contribute to the natural resource management strategies of government agencies in response to the environmental impacts of rural-to-urban labor migration. The development of rural community interaction facilitates the incorporation of community perspectives and participation in assessing these environmental effects and identifying high priority areas for policy intervention.

This research provides empirical evidence for the context-specific impacts of migration on community interaction in rural origin areas, but it is still not clear what community characteristics and circumstances account for the potential positive or negative consequences. In the present study, the analysis on labor migration and community interaction was conducted at the household level and in the setting of migrant sending communities. Further research at the individual and the community levels in broader contexts is needed for a more complete understanding of the effects of labor migration on rural community interaction. At the community level, a key factor associated with both migration and community development is

community equality. Community equality is a necessary condition for the emergence of community. Inequality seriously disrupts open social contacts among local residents that are required for the development of community interaction (Wilkinson 1986). Uneven distribution of income and assets within communities also undermines local capacity for collective action in natural resource management (Adger et al. 2002). Since migration and remittances initially tend to widen income equalities and show more of an equalizing effect over time in areas of origin (Taylor et al. 1996), it is important to conduct longitudinal studies of the effects of labor out-migration on rural community equality and community interaction. At the individual level, despite their physical absence from home for varying length, labor migrants to cities do not necessarily have lower level of community participation than those remaining in rural villages. By directly examining labor migrants' social and economic ties with their relatives in rural home, their interaction with other migratory workers from the same villages in destination cities, and their participation in community activities in rural origin areas, we can improve our understanding of the relationships among rural-to-urban labor migration, rural community development, and the potential for community-based environmental conservation in rural China.

### **Closing Thoughts**

This dissertation research focuses on the household and the community level mediating factors in examining the impacts of rural labor out-migration on the rural environment in Chongqing Municipality, Southwest China. Studies of migration-environment relationships vary across different scale of analysis. There is a nested hierarchical structure of population and environment relationships, with many variations at the local level but some general trends at the global level (Zaba and Clarke 1994). Much of the earlier research on population and the

environment was centered around expensive and large scale macro-level modeling and simulation (Marquette and Bilsborrow 1999). Recent literature in this field shows a shift from macro-level to meso- and micro-level studies. Empirical investigations at lower levels can produce rich information on various sociocultural and economic mediating factors between population (migration) and the environment. Such research also fosters the development of middle-range theories. Nevertheless, more comprehensive projects at higher levels are still necessary for identifying overall patterns across diverse findings from different contexts. A substantial integration of research on different scales is needed for a full picture of the complex and dynamic relationships between migration and the environment.

Migration is not the only factor that contributes to environmental impacts in rural areas. Sociocultural, economic, and institutional intervening variables often serve as more proximate causes of rural environmental changes. Future migration and environment research can benefit from a better combination of investigation on the mediating factors and direct examination of relationships between migration and environmental outcomes. A primary restriction to the current migration and environmental research lies in research data. Linking migration and environmental data has been difficult as units of population data are rarely matched with units of environmental data. Population data are normally collected based on political or administrative divisions, while environmental data are mostly gathered in accordance with ecological or geographical regions (Marquette and Bilsborrow 1999). This problem of data incompatibility is especially evident for less developed regions of the world. Further advancement of research on migration-environment relationships depends on better connections of demographic and environmental data at the appropriate scales and units of analysis. Migration data should be collected in a more innovative way so that they can be easily related to environment data such as

those obtained by remote sensing. Geographic information systems (GIS) provide a particularly useful technique to link and analyze spatially coded migration and environmental data. GIS is a powerful tool for combining, analyzing, and displaying population and environmental information, but it can only work with existing and comparable data. Greater integration of demographic and environmental data will facilitate the utilization of GIS to investigate the complex migration-environment relationships.

In addition to the comparability of migration and environmental data, another important data-related issue in studying migration-environment relationships is data availability. There are increasing quantities of socio-economic and demographic data collected through national censuses or large-scale surveys, as well as biophysical data obtained by environmental monitoring or satellite remote sensing. However, such data are often collected at the aggregate level. Disaggregated migration and environmental data at the local level are seldom available. As we shift research focus from macro-level to micro-level in future migration and environment studies, much more efforts need to be made to collect socio-economic, demographic, and environmental data at the household and the community levels. These local-level data can also be combined with information at higher levels to offer a better interpretation of migration and environment relationships.

Although this study mainly examines the individual mediating roles of rural household livelihoods and community interaction capacity in the conceptual model, findings suggest theoretical and empirical linkages between rural household livelihoods and community dimensions of natural resource management. Bivariate analysis of the survey data revealed that household participation in community activities concerning general and natural resource issues was significantly positively related with five household livelihood indicators: per capita annual

cash living income, per capita annual cash living expenditure, household consumer asset index, total number of types of forest products regularly used, and total number of resource improvement activities taken in the past year (results not included in previous chapters). Local natural resource stocks constitute an important component of capital assets for sustainable rural livelihoods. A considerable part of the livelihood strategies adopted by rural households are natural resource based. Moreover, the overall level of social interaction and collective action in community-based natural resource management depends upon individual households' involvement in community activities in general and in environmental issues in particular. Further synthesis of rural livelihoods and community-based natural resource management research can promote a more integrated environmental and resource sociology scholarship.

Both the key informant interviews and my personal observations revealed a phenomenon referred to as “culture of migration” (Horváth 2008) in the study area. Labor migration was embedded in the life course of the people, particularly younger ones, in the study communities. A Tuanjie resident voiced a common sentiment: “Labor migration has become an inherent part of rural life.” The dual urban-rural structure and the rigid household registration system are commonly recognized as major underlying determinants of the large-scale circular rural-to-urban labor migration flows. In June 2007, Chongqing was designated as the largest experimental area for the coordinated and balanced urban-rural development reform in China. Although the social and economic ramifications of this reform are still unfolding, a better integration of urban and rural areas and progressive adjustments in the household registration system may bode a gradual shift from temporary or circular labor migration to permanent settlement in cities for rural migrants. Any resulting changes in the rural migration patterns will also result in new trends for the migration impacts to the rural environment in the long term.

Chongqing is a typical hilly-mountainous region experiencing large-scale rural labor out-migration. Findings from this research have general implications for environmental effects of labor out-migration in rural areas with similar socioeconomic and biophysical characteristics of both China and other developing countries. As noted earlier in Chapter 4, there exist large regional variations in rural-to-urban labor migration trends across China. Rural areas in different regions of China can be classified into various categories based on the balance between agriculture, local non-farm industries, and long-distance labor migration in their local economy (Croll and Huang 1997). In addition, it is expected that rural labor out-migration brings varied effects on the rural environment across regions with distinct ecological characteristics. Further comparison studies incorporating different regions are needed for a more complete understanding of the environmental impacts of rural-to-urban migration in rural China.

This dissertation only analyzes one aspect of the mutual relationship between rural-to-urban labor migration and the rural environment: the environmental impacts of rural labor out-migration. Further studies of the environmental causes of rural labor out-migration are needed for a complete understanding of the migration-environment interactions in rural China. Research in this area can also help the investigation of environmental consequences of labor migration in rural areas. Findings from this research show that rural-to-urban migration has potential positive and negative impacts on the rural environment. It is still too early to determine the ultimate environmental outcomes of labor migration in rural origin areas. However, the analysis suggested an association between rural labor out-migration and rural ecological recovery. A logical extension of this study is to examine the influences of rural labor migration on the urban environment in China. Do the vast inflows of rural labor migrants threaten the natural environment of urban destination areas? Is there any association between the magnitude of rural

labor in-migration and the environmental quality in cities throughout the country? What are the aggregate environmental impacts of rural-to-urban labor migration flows in the country as a whole? These questions are also meaningful topics for future research.

## REFERENCES

- Adams, D. W. (1969). Rural migration and agricultural development in Colombia. *Economic Development and Cultural Change* 17(4): 527-539.
- Adams, R. (1998). Remittances, investment, and rural asset accumulation in Pakistan. *Economic Development and Cultural Change* 47(1): 155-173.
- Adams, R. (2006). Remittances, poverty and investment in Guatemala. In Özden, Ç., and Schiff, M. (eds.), *International Migration, Remittances, and the Brain Drain*, The World Bank, Washington, D.C., pp. 53-80.
- Adger, W. N. (2000). Social and ecological resilience: are they related? *Progress in Human Geography* 24(3): 347-364.
- Adger, W. N., Kelly, P., M., Winkels, A., Huy, L. Q., and Locke, C. (2002). Migration, remittances, livelihood trajectories, and social resilience. *Ambio* 31(4): 358-366.
- Agrawal, A. and Gibson, C. C. (1999). Enchantment and disenchantment: the role of community in natural resource conservation. *World Development* 27(4): 629-649.
- Aide, T. M., and Grau, H.R. (2004). Globalization, migration, and Latin American ecosystems. *Science* 305: 1915–1916.
- Airola, J. (2007). The use of remittance income in Mexico. *International Migration Review* 41(4): 850–859.
- Banks, T., Richard, C., Li, P., and Yan, Z. (2003). Community-based grassland management in Western China. *Mountain Research and Development* 23(2): 132-140.
- Bates, D. C. (2002). Environmental refugees? Classifying human migrations caused by environmental change. *Population and Environment* 23(5): 465-477.
- Bebbington, A. (1997). Social capital and rural intensification: local organization and islands of sustainability in the rural Andes. *The Geographical Journal* 163(2): 189-197.
- Berkes, F., (eds). (1989). *Common Property Resources. Ecology and Community-Based Sustainable Development*, Belhaven Press, London.
- Berkes, F. and Folke, C. (1998). Linking social and ecological systems for resilience and sustainability. In Berkes, F. and Folke, C. (eds.) *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, Cambridge University Press, Cambridge, UK, pp.1-25.

- Bilsborrow, R. E. (1987). Population pressures and agricultural development in developing countries: a conceptual framework and recent Evidence. *World Development* 15(2): 183-203.
- Bilsborrow, R. E. (1992). Rural poverty, migration and the environment in developing countries: three case studies. *World Bank Policy Research Working Paper (WPS1017)*, The World Bank, Washington, DC.
- Bilsborrow, R. E. (2002). Migration, population change, and the rural environment. *Environmental Change and Security Project Report 8*: 69-94.
- Bilsborrow, R. E. and DeLargy, P. (1991). Land use, migration and natural resource deterioration: the experience of Guatemala and Sudan. *Population Development Review* 16(Suppl.): 125-147.
- Bilsborrow, R. E., McDevitt, T. M., Kossoudji, S., and Fuller, R. (1987). The impact of origin community characteristics on rural-urban out-migration in a developing country. *Demography* 24(2): 191-210.
- Bilsborrow, R. E., Oberai, A. S., and Standing, G. (1984). *Migration Surveys in Low-income Countries: Guidelines for Survey and Questionnaire Design*. Croom Helm, London.
- Bilsborrow, R. E. and Ogendo, H. W. (1992). Population-driven changes in land use in developing countries. *Ambio* 21(1): 37-45.
- Black, R. (1993). Migration, return, and agricultural development in the Serra Do Alvao, Northern Portugal. *Economic Development and Cultural Change* 41(3): 563-585.
- Boserup, E. (1965). *The Conditions of Agricultural Growth*, Aldine, New York.
- Boserup, E. (1981). *Population and Technological Change*, University of Chicago Press, Chicago.
- Brandes, S. H. (1975). *Migration, Kinship, and Community: Tradition and Transition in a Spanish Village*, Academic Press, New York.
- Bratton, M. (1989). The politics of government-NGO relations in Africa. *World Development* 17(4): 569-587.
- Bridger, J. C. and Alter, T. R. (2006). Place, community development, and social capital. *Community Development: Journal of the Community Development Society* 37(1): 5-18.
- Bridger, J. C. and Luloff, A. E. (1999). Toward an interactional approach to sustainable community development. *Journal of Rural Studies* 15(4): 377-387.
- Bridger, J. C. and Luloff, A. E. (2001). Building the sustainable community: is social capital the answer? *Social Inquiry* 71(4): 458-472.

- Brosius, J. P., Tsing, A. L., and Zinner, C. (1998). Representing communities: histories and politics of community-based natural resource management. *Society & Natural Resources* 11(2): 157-168.
- Browder, J. (1995). Redemptive communities: indigenous knowledge, colonist farming systems, and conservation of tropical forest. *Agriculture and Human Values* 12(1): 17-30.
- Brown, D. L. (2002). Migration and community: social networks in a multilevel world. *Rural Sociology* 67(1): 1-23.
- Brown, P. E. (1987). Population growth and the disappearance of reciprocal labor in a highland Peruvian community. *Research in Economic Anthropology* 8: 225-245.
- Brown, R. B., Geersten, H. R., and Krannich, R. S. (1989). Community satisfaction and social integration in a boomtown: A longitudinal analysis. *Rural Sociology* 54(4): 568-586.
- Cai, F., eds. (2002). Report on China's Population and Labor: Employment Issues and Strategies in Urban and Rural Areas, Social Sciences Documentation Publishing House, Beijing (in Chinese).
- Carney, D., eds. (1998). Sustainable Rural Livelihoods: What Contribution Can We Make? Department for International Development (DFID), London, UK.
- Carr, D. (2009). Population and deforestation: why rural migration matters? *Progress in Human Geography* 33(3): 355-378.
- Cassels, S., Curran, S. R., and Kramer, R. (2005). Do migrants degrade coastal environments? Migration, natural resource extraction and poverty in North Sulawesi, Indonesia. *Human Ecology* 33(3): 329-363.
- Central People's Government Website (2006). Key findings of 2005 national land survey. Available online at: [http://www.gov.cn/ztlz/jqtdtk/content\\_380008.htm](http://www.gov.cn/ztlz/jqtdtk/content_380008.htm) (in Chinese).
- Chambers, R. and Conway, G. R. (1992). Sustainable rural livelihoods: practical concepts for the 21st century. Institute of Development Studies Discussion Paper 296, Brighton, UK.
- Chen, J. (2007). Rapid urbanization in China: a real challenge to soil protection and food security. *Catena* 69 (1): 1-15.
- Chen, N., Valente, P., and Zlotnik, H. (1998). What do we know about recent trends in urbanization? In Bilsborrow, R. E. (eds.) *Migration, Urbanization, and Development: New Directions and Issues*. UN Population Fund and Kluwer Academic Publishers, Norwell, MA, pp. 59-88.

- Cheng, C. and Bao, S. (1994). Urbanization in China and its development trend. *Acta Ecologica Sinica* 14(1): 84-89 (in Chinese).
- China Census Office (2000). China 2000 Census, China Statistical Press, Beijing (in Chinese).
- China Ministry of Human Resources and Social Security (CMHRSS) and China Bureau of Statistics (CBS) (2008). China Human Resources and Social Security Development Report 2008. Available online at:  
[http://www.stats.gov.cn/tjgb/qttjgb/qgqttjgb/t20090519\\_402559984.htm](http://www.stats.gov.cn/tjgb/qttjgb/qgqttjgb/t20090519_402559984.htm) (in Chinese).
- Chongqing Bureau of Statistics (2009a). Chongqing Year Book 2008. Available online at:  
<http://www.cqjt.gov.cn/tjnj/2008/yearbook2008.pdf> (in both Chinese and English).
- Chongqing Bureau of Statistics (2009b). Analysis of the environmental conditions of Chongqing in the 60 years since the establishment of New China. Available online at:  
<http://www.cqjt.gov.cn/UploadFile/20090922111903281.pdf> (in Chinese).
- Chongqing Environmental Protection Bureau (2006). Report on the Current Natural Environmental Conditions in Chongqing Municipality. Available online at:  
<http://www.cepb.gov.cn/zrsd/zhxx/441.htm> (in Chinese).
- Chongqing Rural Survey Team (2004). Characteristics and new problems of Chongqing's rural-to-urban labor migration. Available online at:  
<http://www.sannong.gov.cn/fxyc/ldlzy/200412031252.htm> (in Chinese).
- Chongqing Rural Survey Team (2005). Characteristics of Chongqing's rural-to-urban labor migration. Available online at:  
<http://www.sannong.gov.cn/fxyc/ldlzy/200507110169.htm> (in Chinese).
- Chongqing University of Arts and Sciences (2009). A Survey Report on the Role of Universities in Rural Labor Migrant Training. Available online at:  
[http://cq.cqnews.net/cqztlm/sz/kxfzg/dcyj\\_kxfzg/200906/t20090615\\_3341877.htm](http://cq.cqnews.net/cqztlm/sz/kxfzg/dcyj_kxfzg/200906/t20090615_3341877.htm) (in Chinese).
- Collins, J. (1988). *Unseasonal Migrations: The Effects of Rural Labor Scarcity in Peru*. Princeton University Press, Princeton, NJ.
- Conway, D. and Cohen, J. H. (1998). Consequences of migration and remittances for Mexican transnational communities. *Economic Geography* 74(1): 26-44.
- Cox, K. (1998). Spaces of dependence, spaces of engagement and the politics of scale, or: looking for local politics. *Political Geography* 17(1): 1-23.
- Croll, E. J., and Huang, P. (1997). Migration for and against agriculture in eight Chinese villages. *The China Quarterly* 149: 128-146.

- 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.
- David, R. (1995). *Changing Places? Women, Resource Management and Migration in the Sahel: Case Studies from Senegal, Burkina Faso, Mali and Sudan*, SOS Sahel, London, United Kingdom.
- Davin, D. (1999). *Internal Migration in Contemporary China*, Antony Rowe Ltd., Great Britain.
- Dunn, K. (2000). Interviewing. In Hay, I. (eds.) *Qualitative Research Methods in Human Geography*, Oxford University Press, New York, pp. 50-82.
- de Haan, A. (1999). Livelihoods and poverty: the role of migration. *Journal of Development Studies* 36(2): 1-47.
- de Haas, H. (2006). Migration, remittances and regional development in Southern Morocco. *Geoforum* 37(4): 565-580.
- De Jong, G. F. (1999). Choice processes in migration behavior. In Pandit, K. and Withers, S. D. (eds.) *Migration and Restructuring in the United States: A Geographic Perspective*, Romen and Littlefield Publishers, New York, pp. 273-293.
- de Sherbinin, A., VanWey, L. K., McSweeney, K., Aggarwal, R., Barbieri, A., Henry, S., Hunter, L. M., Twine, W., and Walker, R. (2008). Rural household demographics, livelihoods and the environment. *Global Environmental Change* 18(1): 38-53.
- Durand, J., Parrado, E., and Massey, D. (1996). Migradollars and development: a reconsideration of the Mexican case. *International Migration Review* 30(2): 423-444.
- Ehrlich, P. R. (1968). *The Population Bomb*, Ballantine Books, Inc., New York.
- Ehrlich, P. R. and Holdren, J. P. (1971). Impact of population growth. *Science* 171: 1212-1217.
- Ellis, F. (2000). *Rural Livelihoods and Diversity in Developing Countries*, Oxford University Press, Oxford.
- Elrick, T. (2008). The influence of migration on origin communities: insights from Polish migrations to the West. *Europe-Asia Studies* 60(9): 1503-1517.
- Entwisle, B., Walsh, S., Rindfuss, R., and Chamrathirong, A. (1998). Land-use/land-cover and population dynamics, Nang Rong, Thailand. In Liverman, D., Moran, E., Rindfuss, R. and Stern, P. (eds.) *People and Pixels*, National Academy Press, Washington, D.C., pp. 121-144.

- Entwisle, B. and Tong, Y. (2005). The impact of migration and remittances on households in rural Thailand. Paper presented at the annual meeting of the Population Association of America, Philadelphia, March 31-April 2.
- Fan, C. C. (2002). The elite, the natives, and the outsiders: migration and labor market segmentation in urban China. *Annals of the Association of American Geographers* 92(1): 103-124.
- Fan, C. C. (2005). Interprovincial migration, population redistribution, and regional development in China: 1990 and 2000 census. *The Professional Geographer* 57(2): 295-311.
- Fan, C. C. (2008). Migration, hukou, and the Chinese city. in Yusuf, S. and Saich, T. (eds.) *China Urbanizes: Consequences, Strategies and Policies*, World Bank Publications, Washington, D. C., pp. 65-89.
- Feeny, D., Berkes, F., McCay, B. J., and Acheson, J. M. (1990). The tragedy of the commons: twenty-two years later. *Human Ecology* 18(1): 1-19.
- Feng, Y. and Ma, Y. (2001). The status quo, causes, and countermeasures of idle farmlands: the case from Jiangjin County, China. *Rural Economy* 2001(06): 23-24 (in Chinese).
- Filmer, D. and Pritchett, H. (2001). Estimating wealth effects without expenditure data – or tears: an application to educational enrollments in states of India. *Demography* 38(1):115-32.
- Findley, S. E. (1987). An interactive contextual model of migration in Ilocos Norte, the Philippines. *Demography* 24(2): 163-190.
- Flint, C. G. and Luloff, A. E. (2005). Natural resource-based communities, risk, and disaster. *Society & Natural Resources* 18(5): 399-412.
- Flint, C.G. and Luloff, A. E. (2007). Community activeness in response to forest disturbance in Alaska. *Society & Natural Resources* 20(5): 431-450.
- Flint, C.G., Luloff, A. E., and Finley, J. (2008). Where is community in community-based forestry? *Society & Natural Resources* 21(6): 526-537.
- Flint, C.G., Luloff, A.E., and Theodori, G. (2009). Extending the concept of community interaction to explore regional community fields. *Journal of Rural Social Science*, in press.
- Flora, G. (2006). Circular migration and community identity: their relationship to the land. In Rhoades, R. E. (eds.) *Development with Identity: Community, Culture and Sustainability in the Andes*, CABI Publishing, Wallingford, United Kingdom, pp. 271-286.
- Flora, J. L. (1998). Social capital and communities of place. *Rural Sociology* 63(4): 481-506.

- Ford, K., Jampaklay, A., and Chamratrithirong, A. (2007). The impact of migration on household wealth in Kanchanaburi Province, Thailand. Paper presented at the annual meeting of the Population Association of America, New York, March 29-31.
- Garcia-Barrios, R. and Garcia-Barrios, L. (1990). Environmental and technological degradation in peasant agriculture: a consequence of development in Mexico. *World Development* 18(11): 1569-1585.
- Garcia-Ruiz, J. M., Lasanta, T., Ortigosa, L., Ruiz-Flafio, P., Marti, C., and Gonzalez, C. (1995). Sediment yield under different land uses in the Spanish Pyrenees. *Mountain Research and Development* 15(3): 229-240.
- Garip, F. (2007). Internal migration, remittances and community development. Paper presented at the annual meeting of the Population Association of America, New York, March 29-31.
- Garland, E. B. (1995). The social and economic causes of deforestation in the Peruvian Amazon Basin: Natives and Colonists. In Painter, M. and Durham, W. H. (eds.) *The Social Causes of Environmental Destruction in Latin America*, The University of Michigan Press, Ann Arbor, pp. 217-246.
- Gellrich, M., Baur, P., Koch, B., and Zimmermann, N. (2007). Agricultural land abandonment and natural forest re-growth in the Swiss mountains: a spatially explicit economic analysis. *Agriculture, Ecosystems and Environment* 118 (1-4): 93-108.
- Goldring, L. (1996). Blurring borders: constructing transnational community in the process of Mexico-US migration. *Research in Community Sociology* 6: 69-104.
- Goldscheider, C. (1987). Migration and social structure: analytic issues and comparative perspectives in developing nations. *Sociological Forum* 2(4): 674-696.
- Goldstein, A. and Goldstein, S. (1996). Migration motivations and outcomes: permanent and temporary migrants compared. In Goldstein, A. and Wang, F. (eds.) *China: The Many Facets of Demographic Change*, Westview Press, Boulder, Colorado, pp. 187-212.
- Graber, E. E. (1974). Newcomers and oldtimers: growth and change in a mountain town. *Rural Sociology* 39(4): 504-513.
- Granoveter, M. (1973). The strength of weak ties. *American Journal of Sociology* 78(6): 1360-1380.
- Gray, C. L. (2008). Out-Migration, Environmental Change and Rural Livelihoods in the Southern Ecuadorian Andes, Doctoral Dissertation, University of North Carolina, Chapel Hill, NC.

- Green, G. P., Marcouiller, D., Deller, S., Erkkila, D., and Sumathi, N. R. (1996). Local dependency, land use attitudes, and economic development: comparisons between seasonal and permanent residents. *Rural Sociology* 61(3): 427-445.
- Green, J. W. and Mayo, S. C. (1953). A framework for research in the actions of community groups. *Social Forces* 31(4): 320-327.
- Guangming Daily (2009). Chinese rural labor migrants itinerating between urban and rural areas. Available online at: [http://www.gmw.cn/content/2009-05/07/content\\_911776.htm](http://www.gmw.cn/content/2009-05/07/content_911776.htm) (in Chinese).
- Gutmann, M., Deane, G., Lauster, N., and Peri, A. (2005). Two population-environment regimes in the Great Plains of the United States, 1930-1990. *Population and Environment* 27(2): 191-225.
- Hardin, G. (1968). The tragedy of the commons. *Science* 162: 1243-1248.
- Harden, C. P. (1993). Land use, soil erosion, and reservoir sedimentation in an Andean drainage basin in Ecuador. *Mountain Research and Development* 13(2): 177-184.
- Harden, C. P. (1996). Interrelationships between land abandonment and land degradation: a case from the Ecuadorian Andes. *Mountain Research and Development* 16(3): 274-280.
- Hare, D. (1999). 'Push' versus 'pull' factors in migration outflows and returns: determinants of migration status and spell duration among China's rural population. *Journal of Development Studies* 35(3): 45-72.
- Henry, S. (2005). The choice of migration destination in Burkina Faso. Paper presented at the XXV International Population Conference of the IUSSP, 18-23 July, Tours, France.
- Henry, S., Schoumaker, B., and Beauchemin, C. (2004). The impact of rainfall on the first out-migration: a multi-level event-history analysis in Burkina Faso. *Population and Environment* 25(5): 423-460.
- Hillery, G. A. (1955). Definitions of community: areas of agreement. *Rural Sociology* 20(2): 111-123.
- Holling, C. S. (1986). The resilience of terrestrial ecosystems: local surprise and global change. In Clark, W. C. and Munn, R. E. (eds.), *Sustainable Development of the Biosphere*, Cambridge University Press, Cambridge, pp. 292-317.
- Holling, C. S., Schindler, D. W., Walker, B. W., and Roughgarden, J. (1995). Biodiversity in the functioning of ecosystems: an ecological synthesis. In Perrings C., Maler, K. G., Folke, C., Holling, C. S., and Jansson, B. O. (eds.) *Biodiversity Loss: Economic and Ecological Issue*, Cambridge University Press, Cambridge, pp. 44-83.

- Horváth, I. (2008). The culture of migration of rural Romanian youth. *Journal of Ethnic and Migration Studies* 34(5): 771-786.
- Huang, P. and Zhan, S. (2005). Internal migration in China: linking it to development. Paper presented at the Regional Conference on Migration and Development in Asia, Lanzhou, China, March 14-16, 2005.
- Hugo, G. (1996). Environmental concerns and international migration. *International Migration Review* 30(1): 105-31.
- Hull, J. (2007). Migration, remittances, and monetization of farm labor in subsistence sending areas. *Asian and Pacific Migration Journal* 16(4): 451-484.
- Hunter, L. M. (2005). Migration and environmental hazards. *Population and Environment* 26(4): 273-302.
- Hyden, G., Turner, B. L., II, and Kates, R. (1993). Beyond intensification. In Turner, B. L., II, Hyden, G., and Kates, R. (eds.) *Population Growth and Agricultural Change in Africa*, University of Florida Press, Gainesville, pp. 320–360.
- Jakes, P. J. and Anderson, D. (2000). Introduction: diverse perspectives on community. *Society & Natural Resources* 13(5): 395-397.
- Jiao, J. (2002). A Study on floating population from the rights point of view. *Population and Economics* 2002(3): 73-75 (in Chinese).
- Jokisch, B. D. (2002). Migration and agricultural change: the case of smallholder agriculture in highland Ecuador. *Human Ecology* 30(4): 523-550.
- Jolly, C. L. (1994). Four theories of population change and the environment. *Population and Environment* 16(1): 61-90.
- Katz, E. G. (2000). Social capital and natural capital: a comparative analysis of land tenure and natural resource management in Guatemala. *Land Economics* 76(1): 114-132.
- Kaufman, H. F. (1959). Toward an interactional conception of community. *Social Forces* 38(1): 8-17.
- Kaye, L. (1994). The reckoning. *Far Eastern Economic Review*, 157(43): 24-30.
- Kumar, C. (2005). Revisiting ‘community’ in community-based natural resource management. *Community Development Journal* 40(3): 275-285.
- Lall, S. V., Selod, H., and Shalizi, Z. (2006). Rural-urban migration in developing countries: a survey of theoretical predictions and empirical findings. *World Bank Policy Research Working Paper (WPS 3915)*, The World Bank, Washington, DC.

- Le, X. (2004). The impacts of rural living styles on the rural environment in China. *Agricultural Environment and Development* 21(4): 42-45 (in Chinese).
- Leach, M., Mearns, R., and Scoones, I. (1999). Environmental entitlements: dynamics and institutions in community-based natural resource management. *World Development* 27(2):225-247.
- Lee, E. S. (1966). A theory of migration. *Demography* 3(1): 47-57.
- Levitt, P. (1997). Transnationalizing community development: the case of migration between Boston and the Dominican Republic. *Nonprofit and Voluntary Sector Quarterly*, 26(4): 509-526.
- Lewis, W. A. (1954). Economic development with unlimited supplies of labor. *The Manchester School of Economic and Social Studies* 22(1): 139-191.
- Li, C. (1996). Surplus rural laborers and internal migration in China: current status and future prospects. *Asian Survey* 36(11): 1122-1145.
- Li, Q. (2001). Rural labor migrants and remittances in China. *Sociological Research* 2001(04): 64-76 (in Chinese).
- Li, Q. (2003). Analysis of push and pull factors in rural-to-urban migration of China. *Chinese Social Sciences* 2003(01): 125-136 (in Chinese).
- Li, Y. (2006). *The Impact of Rural Migration on Village Development: A Comparative Study in Three Chinese Villages*, Doctoral Dissertation, Johns Hopkins University, Baltimore, Maryland.
- Lipton, M. (1980). Migration from rural areas of poor countries: the impact of rural productivity and income distribution. *World Development* 8(1): 10-20.
- Liu, J., Daily, G. C., Ehrlich, P. R., and Luck, G. W. (2003). Effects of household dynamics on resource consumption and biodiversity. *Nature*. 421: 530-533.
- Liu, Y., Li, R., and Song, X. (2005). A review of the relationship between urbanization and urban ecological environment. *Chinese Population, Resources and Environment* 15(3): 55-60 (in Chinese).
- Locke, C., Adger, W. N., and Kelly, P. M. (2000). Changing places: migration's social and environmental consequences. *Environment* 42(7): 24-35.
- López, E., Boccoa, G., Mendoza, M., Velázquez, A., and Aguirre-Rivera, J. (2006). Peasant emigration and land-use change at the watershed level: a GIS-based approach in central Mexico. *Agricultural Systems* 90(1-3): 62-78.

- Lucas, R. E., Jr. (2004). Life earnings and rural-urban migration. *Journal of Political Economy* 112(1): S29-S59.
- Luloff, A. E. (1999). The doing of rural community development research. *Rural Society* 9(1): 313-327.
- Luloff, A. E., Krannich, R.S., Theodori, G. L., Trentelman, C. K., and Williams, T. (2004). The use of community in natural resource management. In Manfredi, M. J., Vaske, J. J., Bruyere, B. L., Field, D. R., and Brown, P. J. (eds.) *Society and Natural Resources: A Summary of Knowledge*, Modern Litho, Jefferson, MO, pp. 249-259.
- Luloff, A.E. and Swanson, L.E. (1995). Community agency and disaffection: enhancing collective resources. In Beaulieu, L. J. and Mulkey, D. (eds.) *Investing in People: The Human Capital Needs of Rural America*, Westview Press, Boulder, CO, pp. 351-372.
- Luloff, A. E. and Wilkinson, K. P. (1979). Participation in the national flood insurance program: a study of community activeness. *Rural Sociology* 44(1): 137-152.
- Luo, H., Zhu, B., Liu, D., and He, X. (2006). Regionalization of ecological function in Chongqing Municipality, China. *Acta Ecologica Sinica* 26(9): 3144-3151 (in Chinese).
- Mackellar, F. L., Lutz, W., McMichael, A. J., and Suhrke, A. (1998). Population and climate change. In Rayner, S. and Malone, E. L. (eds.), *Human Choice and Climate Change Vol. 1*, Battelle Press, Columbus, pp. 89-193.
- Malthus, T. R. (1798). *Population: The First Essay*, The University of Michigan Press, Ann Arbor, 1960.
- Marquette, C. M. and Bilsborrow, R. (1999). Population and environment relationships in developing countries: recent approaches and methods. In Sundberg, B. and Moomaw, W. R. (eds.) *People and Their Planet*. St. Martin's Press, New York, pp. 29-44.
- Massey, D. (1990). Social structure, household strategies, and the cumulative causation of migration. *Population Index*, 56(1): 3-26.
- Massey, D. S., Alarcón, R., Durand J., and Gonzalez, H. (1987). *Return to Aztlan: The Social Process of International Migration from Western Mexico*. University of California Press, Berkeley, CA.
- Massey, D., Axinn, W., and Ghimire, D. (2007). Environmental change and outmigration: evidence from Nepal. *Population Studies Center Research Report No. 07-615*, Institute for Social Research, University of Michigan.

- Matarrita-Cascante, D., Luloff, A. E., Krannich, R. S., and Field, D. R. (2006). Community participation in rapidly growing communities. *Community Development: Journal of the Community Development Society* 37(4): 71-87.
- Mather, A. (1992). The forest transition. *Area* 24(4): 367–379.
- Mazambani, D. (1990). Labor Migration Impacts on Communal Land Agriculture: Case Studies from Manicaland Province, Zimbabwe, Doctoral Dissertation, Clark University, Worcester, MA.
- McCarthy, N., Carletto, G., Davis, B., and Maltoglou, I. (2006). Assessing the impact of massive out-migration on agriculture. Agricultural and Development Economics Division of the Food and Agriculture Organization of the United Nations, Working Paper No. 06-14.
- McCay, B. (2001). Community and the commons: romantic and other views. In Agrawal, A. and Gibson, C. C. (eds.) *Communities and the Environment: Ethnicity, Gender, and the State in Community-Based Conservation*, Rutgers University Press, New Brunswick, NJ, pp. 180-191.
- McCay, B. and Jentoft, S. (1998). Market or community failure? Critical perspectives on common property research. *Human Organization* 57(1): 21-29.
- McGranahan, G. and Tacoli, C. (2006). Rural-urban migration in China: policy options for economic growth, environmental sustainability and equity. Working Paper Series on Rural-Urban Interactions and Livelihood Strategies (No. 12), International Institute for Environment and Development.
- McDowell, C. and de Hann, A. (1997). Migration and sustainable livelihoods: a critical review of the literature. Institute of Development Studies Working Paper 65, Brighton, UK.
- Meadows, D. H., Meadows, D. L., Randers, J., and Behrens, W. W. (1972). *The Limits to Growth*, University Books, New York.
- Mearns, R. (1996). Community, collective action and common grazing: the case of post-socialist Mongolia. *Journal of Development Studies* 32(3): 297-339.
- Mendola, M. (2008). Migration and technological change in rural households: complements or substitutes? *Journal of Development Economics* 85(1): 150-175.
- Merton, R. K. (1967). *On Theoretical Sociology: Five Essays, Old and New*, Free Press, New York.
- Miao, G. and West, R. A. (2004). Chinese collective forestlands: contributions and constraints. *International Forestry Review* 6(3-4): 282-298.

- Montgomery, M. R. (2008). The urban transformation of the developing world. *Science* 319: 761-764.
- Murphy, R. (2002). *How Migrant Labor is Changing Rural China*, Cambridge University Press, Cambridge.
- Nai, C. (2000). Rural labor migration and the impacts on land use: the case from Zhejiang Province, China. *Zhejiang Academic Journal* 2000(5): 81-85 (in Chinese).
- Nelson, P. B. (1997). Migration, sources of income, and community change in the nonmetropolitan Northwest. *The Professional Geographer* 49(4): 418-430.
- North, D. (1990). *Institutions, Institutional Change, and Economic Performance*, Cambridge University Press, Cambridge.
- Oberai, A. S. and Bilsborrow, E. (1984). Theoretical perspectives on migration. In Bilsborrow, R. E., Oberai, A. S., and Standing, G. *Migration Surveys in Low-income Countries: Guidelines for Survey and Questionnaire Design*, Croom Helm, London and Sydney, pp. 14-30.
- O'Lear, S. (1997). Migration and the environment: a review of recent literature. *Social Science Quarterly* 78(2): 606-618.
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, Cambridge.
- Ostrom, E. (1992). Community and the endogenous solution of commons problems. *Journal of Theoretical Politics* 4(3): 343-351.
- Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., and Policansky, D. (1999). Revisiting the commons: local lessons, global challenges. *Science* 284: 278-282.
- Ouyang, L. and Zhou, S. (2002). An overview of rural-urban labor migration in Chongqing Municipality. *Chongqing Economy* 2002(8): 21-24 (in Chinese).
- Paerregaard, K. (1997). *Linking Separate Worlds: Urban Migrants and Rural Lives in Peru*, Berg Publishers, New York.
- Peek, P. and Antolinez, P. (1980). Labour migration in the Sierra of Ecuador: Causes and incidence. *World Employment Programme Research Working Paper WEP 10-6/WP36*. International Labour Office, Geneva.
- People's Daily (2001). China's urbanization rate to reach 60% in 20 years. Available online at: [http://english.people.com.cn/english/200105/17/eng20010517\\_70205.html](http://english.people.com.cn/english/200105/17/eng20010517_70205.html).

- Perz, S. G. (2003). Social determinants and land use correlates of agricultural technology adoption in a forest frontier: a case study in the Brazilian Amazon. *Human Ecology* 31(1): 133-165.
- Pichon, F. J. (1997). Settler households and land-use patterns in the Amazon frontier: farm-level evidence from Ecuador. *World Development* 25(1): 67-91.
- Ploch, L. A. (1980). Effects of turnaround migration on community structure in Maine. In David, L. B. and Wardwell, J. M. (eds.) *New Directions in Urban-Rural Migration: The Population Turnaround in Rural America*, Academic Press, New York, pp. 291-311.
- Population-Environment Balance, Inc. (1992). Why excess immigration damages the environment. *Population and Environment* 13(4): 303-312.
- Preston, D. (1998). Post-peasant capitalist graziers: The 21st century in southern Bolivia. *Mountain Research and Development* 18(2): 151-158.
- Preston, D., Macklin, M., and Warburton, J. (1997). Fewer people, less erosion: the twentieth century in southern Bolivia. *The Geographical Journal* 163(2): 198-205.
- Pretty, J. and Ward, H. (2001). Social capital and the environment. *World Development* 29(2): 209-227.
- Price, M. L. and Clay, D. C. (1980). Structural disturbances in rural communities: some repercussions of the migration turnaround in Michigan. *Rural Sociology* 45(4): 591-607.
- Prothero, R. M. and Chapman, M., eds. (1985). *Circulation in Third World Countries*, Routledge and Kegan Paul, London.
- Qu, G. and Li, J. (1994). *Population and the environment in China*, Lynne Rienner Publishers, Boulder, Colorado.
- Ranis, G. and Fei, J. (1961). A theory of economic development. *The American Economic Review* 51(4): 533-565.
- Rank, M. R. and Voss, P. R. (1982). Patterns of rural community involvement: a comparison of residents and recent immigrants. *Rural Sociology* 47(2): 197-219.
- Ravenstein, E. G. (1885). The laws of migration. *Journal of the Royal Statistical Society* 48(2): 167-235.
- Reichert, J. (1981). The migrant syndrome: seasonal US wage labor and rural development in central Mexico. *Human Organization* 40(1): 56-66.
- Reichert, J. (1982). A town divided: economic stratification and social relations in a Mexican migrant community. *Social Problems* 29(4): 411-423.

- Reardon, T. and Vosti, S. A. (1995). Links between rural poverty and the environment in developing countries: asset categories and investment poverty. *World Development* 23(9): 1495-1506.
- Richmond, A. (1994). *Global Apartheid: Refugees, Racism and the New World Order*, Oxford University Press, Toronto.
- Rindfuss, R., Kaneda, T., Chattopadhyay, A., and Sethaput, C. (2007). Panel studies and migration. *Social Science Research* 36(1): 374-403.
- Roberts, K. D. (2001). The determinants of job choice by rural labor migrants in Shanghai. *China Economic Review* 12(1): 15-39.
- Rouse, R. (1991). Mexican migration and the social space, *Diaspora* 1(1): 8-23.
- Rozelle, S., Taylor, J. E., and de Brauw, A. (1999). Migration, remittances, and agricultural productivity in China. *The American Economic Review* 89(2): 287-291.
- 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(5): 838-851.
- Rudel, T. K., Coomes, O. T., Moran, E., Achard, F., Angelsen, A., Xu, J., and Lambin, E. (2005). Forest transitions: towards a global understanding of land use change. *Global Environmental Change Part A* 15(1): 23-31.
- Saracoglu, D. Ş., and Roe, T. L. (2004). Rural-urban migration and economic growth in developing countries. *Society for Economic Dynamics 2004 Meeting Paper 241*, New York University, New York.
- Schmook, B. and Radel, C. (2008). International labor migration from a tropical development frontier: globalizing households and an incipient forest transition. *Human Ecology* 36(6):891–908.
- Schwarzweiler, H. K. (1979). Migration and the changing rural scene. *Rural Sociology* 44(1): 7-23.
- Scoones, I. (1998). *Sustainable rural livelihoods: a framework for analysis*. Institute of Development Studies Working Paper 72, Brighton, UK.
- Shao, J., Wei, C., Xie, D., and Liu, J. (2007). Farmers' responses to land transfer under the household responsibility system in Chongqing (China): a case study. *Journal of Land Use Science* 2(2): 79-102.
- Shrestha, S. S., and Bhandari, P. (2007). Environmental security and labor migration in Nepal. *Population and Environment* 29(1): 25-38.

- Sierra, R. (1999). Traditional resource-use systems and tropical deforestation in a multiethnic region in Northwest Ecuador. *Environmental Conservation* 26(2): 136-145.
- Sigurdson, J. and Palonka, K. (2008). Innovative city in west China Chongqing, European Institute of Japanese Studies Working Paper 239, Stockholm School of Economics, Stockholm, Sweden.
- Simelane, H. S. (1995). Labour migration and rural transformation in post-colonial Swaziland. *Journal of Contemporary African Studies* 13(2): 207-226.
- Simon, J. (1981). *The Ultimate Resource*, Princeton University Press, Princeton.
- Singleton, R. A., Jr. and Straits, B. C. (2005). *Approaches to Social Research* (4th edition), Oxford University Press, New York.
- Singleton, S. and Taylor, M. (1992). Common property, collective action and community. *Journal of Theoretical Politics* 4(3): 309-324.
- Sjaastad, L. (1962). The costs and returns of human migration. *Journal of Political Economy* 70(5): 80-93.
- Smith, M. D. and Krannich, R. S. (2000) Culture clash revisited: newcomer and longer-term residents' attitudes toward land use, development, and environmental issues in rural communities of the Rocky Mountain West. *Rural Sociology* 65(3):396-421.
- Solinger, D. J. (1999). *Contesting Citizenship in Urban China: Peasant Migrants, the State, and the Logic of the Market*, University of California Press, Berkeley, CA.
- Song, C., Lord, J. W., Zhou, L., and Xiao, J. (2008). Empirical evidence for impacts of internal migration on vegetation dynamics in China from 1982 to 2000. *Sensors* 8(8): 5069-5080.
- Stark, O. (1980). On the role of urban-rural remittances in rural development. *Journal of Development Studies* 16(3): 369-374.
- Stark, O. (1984). Rural-to-urban migration in LDCs: a relative deprivation approach. *Economic Development and Cultural Change* 32(3): 475-486.
- Stark, O. (1991). *The Migration of the Labor*, Harvard University Press, Cambridge, Massachusetts.
- Stark, O., and Bloom, D. (1985). The new economics of labor migration. *American Economic Review* 75(2): 173-178.
- Stark, O, Taylor, J. E., and Yitzhaki, S. (1986). Remittances and inequality. *Economic Journal* 96(383): 722-740.

- Stinner, W. F. and Toney, M. B. (1980). Migrant-native differences in social background and community satisfaction in non-metropolitan Utah communities. In David, L. B. and Wardwell, J. M. (eds.) *New Directions in Urban-Rural Migration: The Population Turnaround in Rural America*, Academic Press, New York, pp. 313-331.
- Suhrke, A. (1994). Environmental degradation and population flows. *Journal of International Affairs* 47(2): 473-496.
- Sun, Q. (2007). *Rebuilding Common Property Management: A Case Study of Community-Based Natural Resource Management in rural Guizhou, China*, Doctoral Dissertation, Wageningen University, Wageningen, The Netherlands.
- Sutton, W. A. and Kolaja, J. (1960). The concept of community. *Rural Sociology* 25(2): 197-203.
- Tacoli, C. (1998). Rural-urban linkages and sustainable rural livelihoods. In Carney, D. (eds.), *Sustainable Rural Livelihoods: What Contribution Can We Make?* Department for International Development (DFID), London, UK, pp. 67-80.
- Tan, Y. and Wang, Y. (2004). Environmental migration and sustainable development in the upper reaches of the Yangtze River. *Population and Environment* 25(06): 614-636.
- Tashakkori, A. and Teddlie, C. (1998). *Mixed Methodology: Combining Qualitative and Quantitative Approaches*, Sage Publications, Thousand Oaks, California.
- Taylor, J. (1999). The new economics of labour migration and the role of remittances in the migration process. *International Migration* 37(1): 63–88.
- Taylor, J., Arango, J., Hugo, G., Kouaouci, A., Massey, D., and Pellegrino, A. (1996). International migration and community development. *Population Index* 62(3): 397-418.
- Taylor, J. and Mora, J. (2006). Does migration shape expenditures in rural households? *World Bank Policy Research Working Paper* 3842.
- Taylor, J., Rozelle, S., and de Brauw, A. (2003). Migration and incomes in source communities: a new economics of migration perspective from China. *Economic Development and Cultural Change* 52(1): 75-101.
- Templeton, S. R. and Scherr, S. J. (1999). Effects of demographic and related microeconomic change on land quality in hills and mountains of developing countries. *World Development* 27(6): 903-918.
- Tilly, C. (1973). Do communities act? *Sociological Inquiry* 43(3-4): 209–240.
- Todaro, M. P. (1969). A model of labor migration and urban unemployment in less-developed countries. *American Economic Review* 59(1): 138-148.

- Turner, M. D. (1999). Labor process and the environment: the effects of labor availability and compensation on the quality of herding in the Sahel. *Human Ecology* 27(2): 267-296.
- United Nations (2008). *World Urbanization Prospects: The 2007 Revision*, Department of Economic and Social Affairs, Population Division, United Nations, New York.
- United Nations Economic and Social Commission for Asia and the Pacific (UN/ESCAP) (2005). *Urban Environmental Governance – For Sustainable Development in Asia and the Pacific: A Regional Overview*, United Nations Publication (ST/ESCAP/2387), United Nations Publication.
- United Nations Population Division (UN/PD) (2004). *World Fertility Report: 2003*, United Nations Publication (ESA/P/WP.189), United Nations Publication.
- Uphoff, N. T. (1986). *Local Institutional Development: An Analytical Sourcebook with Cases*, Kumarian Press, West Hartford, CT.
- Vanwey, L. K. (2003). Land ownership as a determinant of temporary migration in Nang Rong, Thailand. *European Journal of Population* 19(2): 121-145.
- Vanwey, L. K. (2005). Land ownership as a determinant of international and internal migration in Mexico and internal migration in Thailand. *International Migration Review* 39(1): 141-172.
- Wang, C. and Yao, Y. (2001). Farmland endowment and rural labor out-migration. *Rural Village, Society, and Economy* 2001(1): 23-31 (in Chinese).
- Wang, S. and Dai, F. (1998). Urbanization and environment. *Impact of Science on Society* 1998(1): 25-31 (in Chinese).
- Wang, W. W., and Fan, C. C. (2006). Success or failure: selectivity and reasons of return migration in Sichuan and Anhui, China. *Environment and Planning A* 38(5): 939-958.
- Wang, Z. (2003). Effects of farmland, income, and education on rural labor migration. *Agricultural Technological Economy* 2003(5): 10-13 (in Chinese).
- Westing, A. (1992). Environmental refugees: A growing category of displaced persons. *Environmental Conservation* 19(3): 201-207.
- Wilkinson, K. P. (1970). The community as a social field. *Social Forces* 48(3): 311-322.
- Wilkinson, K. P. (1986). In search of the community in the changing countryside. *Rural Sociology* 51(1): 1-17.
- Wilkinson, K. P. (1991). *The Community in Rural America*, Social Ecology Press, Middleton.

- World Commission on Environment and Development (1987). *Our Common Future: The Report of the World Commission on Environment and Development*, Oxford University Press, Oxford.
- Wouterse, F. and Taylor, J. (2008). Migration and income diversification: evidence from Burkina Faso. *World Development* 36(4): 625-640.
- Yanarella, E. J. and Levine, R. S. (1992). Does sustainable development lead to sustainability? *Future* 24(8): 759-774.
- Yao, Y. (2001). Egalitarian land distribution and labor migration in rural China. Working Paper Series of the China Center for Economic Research (No. E2001007), Peking University, Beijing.
- Zaba, B. and Clarke, J., eds. (1994). *Environment and Population Change*, International Union for the Scientific Study of Population, Belgium.
- Zarate-Hoyos, G. A. (2004). Consumption and remittances in migrant households: toward a productive use of remittances. *Contemporary Economic Policy* 22(4): 555-565.
- Zhang, Y., Guan, Y., Ding, H., and Zhou, L. (2007). The magnitude and distribution of rural labor out-migration in Chongqing Municipality. *Journal of Southwest Agricultural University (Social Science Edition)* 5(1): 84-88 (in Chinese).
- Zhang, W., Wu, S., Ji, H., and Kolbe, H. (2004). Estimation of agricultural non-point source pollution in China in early 21 century. *Scientia Agricultura Sinica* 37(7): 1008-1017 (in Chinese).
- Zhao, Y. (1997). Rural labor migration and the role of education: case from Sichuan Province. *Economic Studies* 1997(2): 37-42 (in Chinese).
- Zhao, Y. (1999). Leaving the countryside: rural-to-urban migration decision in China. *The American Economic Review* 89(2): 281-286.
- Zhu, D. and Xu, D. (2000). A survey of idle farmlands in rural areas. *Agricultural Economic Problems* 2000(12): 10-13 (in Chinese).
- Zhu, L. and Jiang, Z. (1993). From brigade to village community: the land tenure system and rural development in China. *Cambridge Journal of Economics* 17(4): 441-461.
- Zimmerer, K. S. (1991). Labor shortages and crop diversity in the southern Peruvian Sierra. *Geographical Review* 81(4): 414-432.

Zimmerer, K. S. (1993). Soil erosion and labor shortages in the Andes with special reference to Bolivia, 1953-91: implications for “conservation-with-development”. *World Development* 21(10): 1659-1675.

**APPENDIX A**  
**KEY INFORMANT INTERVIEW QUESTIONS**

1. How would you describe the local economy and quality of life in this village?
2. How would you describe the condition of natural resources and the environment in this village? Are there any major environmental problems?
3. Are you aware of any local knowledge and beliefs about the relationship between humans and the natural environment in this village?
4. Do local residents directly or indirectly rely on any natural resources (e.g. wild plants, wild animals, and non-timber forest products) for subsistence?
5. How would you describe the overall labor migration condition in this village?
6. Why do you think people move to cities for work? Do you think that the natural environment has an influence on the rural-to-urban labor migration in this village? If yes, please describe.
7. Do labor migrants regularly come back home? If yes, when? Do they regularly send or bring money back? If yes, for what is the money mainly used?
8. Would you say labor migrant and non-migrant households are different in ways of living?
9. How has rural labor out-migration affected this village? What is your opinion about these effects? (good or bad, please explain)
10. Do you think rural labor out-migration has any impacts on the local environment? (please explain your answer) If yes, what is your opinion about these effects? (good or bad, please explain)
11. Are local residents involved in the management of state-owned natural resources around this village? Are there any individual or community activities in protecting the local environment and natural resources? (check with questions in the draft questionnaire)
12. Are there any conflict between peoples' daily living and the conservation of state-owned natural resources around this village? If yes, please explain.
13. Could you describe the contracted farmland management system in this village?
14. Is subleasing of contracted farmland popular in this village? If yes, does the village have any formal or informal rules to regulate the circulation of contracted farmlands?
15. Do people in this village actively participate in community activities? What are the major local community activities?

16. How has the rural labor out-migration affected people's communication over issues of common concerns in this village? (good or bad effects, please explain) How are the involvement of labor migrants and the remained members of their households in local community issues?

17. Did any labor migrants return to the village permanently to open their own business?

18. What do you think this village will be like in 5-10 years?

19. Is there anything else about rural labor migration or environment issues that you'd like to tell me about?

20. Can you think of anyone else I should talk to who would have an opinion about these issues?

**APPENDIX B**  
**HOUSEHOLD SURVEY QUESTIONNAIRE**

The Impacts of Rural-to-Urban Labor Migration on the Rural Environment  
in Chongqing, China

Rural Household Survey

**ID NO.:**

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Place of Residence:

County (or district) \_\_\_\_\_ Village \_\_\_\_\_ Group \_\_\_\_\_

**Basic Information about the Household**

1. How long has your household lived in this village? \_\_\_\_\_ years  
→ If less than 5 years, where and how long did you live prior? \_\_\_\_\_

2. Total number of household members: \_\_\_\_\_; total number of members living permanently at home: \_\_\_\_\_; total number of household labor (including labor migrant members): \_\_\_\_\_.

**Answer Questions 3 to 11 for all household members.**

3. Relationship to the survey respondent:

1	Self	2	Spouse	3	Child/Child in Law
4	Grandchild	5	Parent/Parent in law	6	Grandparent
7	Brother / Sister	8	Other relative	9	Non-relative

4. Sex:

1	Male	2	Female
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5. Age \_\_\_\_ (years)

6. Marital status:

1	Married	2	Never Married
3	Divorced	4	Widowed

7. Educational level:

1	Illiterate or semi-illiterate
2	Less than an elementary school degree
3	Elementary school degree
4	Junior high school degree
5	Senior high school degree
6	Middle level professional, technical or vocational school degree
7	Two year associate degree
8	Four year college degree or above

8. Current labor status:

1	Adult labor	2	Elder labor
3	Elder non-labor	4	Full-time student
5	Pre-school child	6	Other (disabled, injured, etc.)

9. Occupational category of primary job:

- 1 Farmers
- 2 Workers in local enterprises or other local non-farm industries
- 3 Migrant workers in cities
- 4 Owners/managers of local small business or enterprises
- 5 Professionals (including teacher, doctor, technician, etc.)
- 6 Village leaders or public officials
- 7 Other\_\_\_\_\_

10. Economic sector of primary job:

- 1 Agriculture
- 2 Manufacture
- 3 Construction
- 4 Transportation
- 5 Commerce and trade
- 6 Restaurant and catering
- 7 Other\_\_\_\_\_

11. Has he or she had labor migration experience before (for household labor only)?

- 1 Yes
- 2 No

**Questions 3 – 11**

Question \ Person ID	3	4	5	6	7	8	9	10	11
01									
02									
03									
04									
05									
06									
07									
08									

Note: Person 01 is the survey respondent. If other household members assist in answering questions, please record their IDs here \_\_\_\_\_.

**Farmland Use and Agricultural Production**

12. Contracted farmland in 2008:

- Irrigated land (*shui tian*): number of plots\_\_\_\_\_, amount \_\_\_\_\_ *mu*;
- Dry land (*han di*): number of plots\_\_\_\_\_, amount \_\_\_\_\_ *mu*;
- Total number of farmland plots\_\_\_\_\_, total amount \_\_\_\_\_ *mu*.

13. Total amount of controlled forested land (*ziliu lin*) in 2008: number of plots\_\_\_\_\_, amount \_\_\_\_\_ *mu*;

14. Household farmland use in 2008:

- Cultivated farmland: \_\_\_\_\_ *mu*, of which \_\_\_\_\_ *mu* irrigated land, \_\_\_\_\_ *mu* dry land;
- Farmland left idle: \_\_\_\_\_ *mu*, of which \_\_\_\_\_ *mu* irrigated land, \_\_\_\_\_ *mu* dry land;
- Farmland converted to forested land: \_\_\_\_\_ *mu*, of which \_\_\_\_\_ *mu* irrigated land, \_\_\_\_\_ *mu* dry land;
- Farmland transferred out: \_\_\_\_\_ *mu*, of which \_\_\_\_\_ *mu* irrigated land, \_\_\_\_\_ *mu* dry land;
- Farmland transferred in: \_\_\_\_\_ *mu*, of which \_\_\_\_\_ *mu* irrigated land, \_\_\_\_\_ *mu* dry land.

15. Is your household involved in land transfer? \_\_\_\_\_ If yes, which mode did you use: \_\_\_\_\_

- 1 Subcontract
- 2 Alienation
- 3 Renting
- 4 Exchange
- 5 Temporary custody
- 6 Other\_\_\_\_\_

16. If your household is involved in land transfer, what was the land used for before the transfer \_\_\_\_\_?  
What is the land used for after the transfer \_\_\_\_\_?

- |   |                            |   |  |
|---|----------------------------|---|--|
| 1 | Grain crops                | 2 | Economic crops (vegetables, oil crops, etc.) |
| 3 | Fruit trees                | 4 | Breeding (poultry, aquatics, etc.)           |
| 5 | Non-agricultural use _____ | 6 | Other _____                                  |

17. Farmland used for different production types in 2008 (including land transferred in):

- Land used for grain crop production (rice, corn, potato, etc.): \_\_\_\_\_ *mu*  
Land used for commercial crop production (vegetable, oil crops, etc.): \_\_\_\_\_ *mu*  
Land used for fruit production: \_\_\_\_\_ *mu*  
Land used for livestock breeding: \_\_\_\_\_ *mu*  
Land used for other purpose ( \_\_\_\_\_ ): \_\_\_\_\_ *mu*

18. Please choose all types of agricultural production your household is engaged in in 2008:

- |    |  |   |             |   |  |
|----|--|---|-------------|---|--|
| 1  | Grains   | 2 | Potato      | 3 | Legume                                 |
| 4  | Vegetables   | 5 | Fruits      | 6 | Oil crops                              |
| 7  | Poultry  | 8 | Aquaculture | 9 | Livestock breeding (pig, cattle, goat) |
| 10 | Other _____ (e.g. greenhouse, sugar plants, tobacco, silkworm) |   |             |   |  |

19. Grain crop production in 2007:

- Land used for rice production: \_\_\_\_\_ *mu*; amount of production: \_\_\_\_\_ kg.  
Land used for corn production: \_\_\_\_\_ *mu*; amount of production: \_\_\_\_\_ kg.  
Land used for wheat production: \_\_\_\_\_ *mu*; amount of production: \_\_\_\_\_ kg.  
Land used for sweet potato production: \_\_\_\_\_ *mu*; amount of production: \_\_\_\_\_ kg.  
Land used for other ( \_\_\_\_\_ ) production: \_\_\_\_\_ *mu*; amount of production: \_\_\_\_\_ kg.

20. Use of agricultural production materials (seeds, chemical fertilizer, chemicals, etc.): \_\_\_\_\_

- |   |                                       |   |  |
|---|---------------------------------------|---|--|
| 1 | Purchase those of the highest quality | 2 | Purchase those of the moderate quality |
| 3 | Purchase those of the lowest quality  | 4 | Rarely purchase these materials        |

21. On average your household applies \_\_\_\_\_ kg organic fertilizer and \_\_\_\_\_ kg chemical fertilizer to each *mu* of farmland.

22. Has your household used any of the following agricultural techniques during the past 12 months?  
Please circle all that apply.

- 1 Tilling farmland for the cultivation of crops
- 2 Applying organic fertilizer as base manure before planting
- 3 Intercropping
- 4 Multiple cropping
- 5 Fixed crop rotation
- 6 Using a large amount of chemical fertilizer
- 7 Applying chemical fertilizer according to suggestions of agricultural extension
- 8 Applying pesticide in contracted farmland
- 9 Applying weed killer in contracted farmland
- 10 Using plastic farming film
- 11 Irrigate farmland with water pump
- 12 Using sowing machine
- 13 Using harvesting machine
- 14 Using protective cultivation techniques such as no-tilling farming
- 15 Other? \_\_\_\_\_

### Household Income, Expenditure, and Assets

23. Estimated annual household cash income in 2007 (RMB):

Income from farming: \_\_\_\_\_  
Income from local off-farm work: \_\_\_\_\_  
Income brought or remitted back by urban migrant workers: \_\_\_\_\_  
Income from village collective: \_\_\_\_\_  
Income from central government: \_\_\_\_\_  
Income from other sources (\_\_\_\_\_): \_\_\_\_\_  
Total annual household income: \_\_\_\_\_

24. Estimated annual household expenditure in 2007 (RMB; only applied to members remaining at home for labor migrant households):

Expenditure on food: \_\_\_\_\_  
Expenditure on clothing: \_\_\_\_\_  
Expenditure on daily use consumption goods: \_\_\_\_\_  
Expenditure on durable goods: \_\_\_\_\_  
Expenditure on education: \_\_\_\_\_  
Expenditure on house construction or maintenance: \_\_\_\_\_  
Expenditure on fuels: \_\_\_\_\_  
Expenditure on water and electricity services: \_\_\_\_\_  
Expenditure on transportation and communication (e.g. telephone): \_\_\_\_\_  
Expenditure on seeds, seedlings, fertilizer, and other farm chemicals: \_\_\_\_\_  
Expenditure on livestock and equipments for agricultural production: \_\_\_\_\_  
Expenditure on medical care: \_\_\_\_\_  
Other expenditure (\_\_\_\_\_): \_\_\_\_\_  
Total annual household expenditure: \_\_\_\_\_

25. Type of house construction:

1	Storied and concrete ceiling building	2	Storied brick-tile building
3	Single floor brick-tile house	4	Single floor soil-tile house
5	Other _____		

26. Current ownership of major durable consumer goods at home (numbers):

Black and white television sets: _____	Color television sets: _____
Tape recorders: _____	Bicycles: _____
Cameras: _____	Refrigerators: _____
Washing machines: _____	VCRs or DVD: _____
Stereo sets: _____	Land-line phones: _____
Mobile phones: _____	Motorcycles: _____
Sewing machines: _____	Water heaters: _____
Electric cookers: _____	Electric fans: _____
Air conditioners: _____	Other (_____): _____

### Household Natural Resource Use and Management

27. Sources of drinking water:

1	Tap water (source: _____)	2	Well
3	River, stream, or lake	4	Pond
5	Other _____		

28. Please mark the types of fuels your household uses and indicate respective proportions (add up to 100%).

- 1 Firewood (\_\_\_\_ %)
- 2 Crop stalks (\_\_\_\_ %)
- 3 Coal (\_\_\_\_ %)
- 4 Coal gas or liquefied gas (\_\_\_\_ %)
- 5 Marsh gas (\_\_\_\_ %)
- 6 Electricity (\_\_\_\_ %)

29. If your household uses firewood as fuels →

(1) What are the main firewood sources of your household? Select all that apply.

- 1 Trees in contracted farmland
- 2 Family-owned or contracted forests
- 3 Collective forests
- 4 National forests

(2) Who is responsible for collecting firewood in your household? \_\_\_\_\_

(3) How often does your household collect firewood every week? \_\_\_\_\_

And how long do you spend on collecting each time? \_\_\_\_\_ hours

(4) Compared with the past, the distance travelled to collect firewood \_\_\_\_\_

- 1 Has increased
- 2 Has decreased
- 3 Has stayed the same

(5) Compared with the past, the time needed to collect the same amount of firewood \_\_\_\_\_

- 1 Has increased
- 2 Has decreased
- 3 Has stayed the same

30. Did your household obtain any of the following non-timber forest products from local forests in the past? Does your household use them now? Please circle a number (1 = No and 2 = Yes).

	In the Past		Now	
	No	Yes	No	Yes
1 Trees	1	2	1	2
2 Mushroom and fungi	1	2	1	2
3 Medicinal materials and herbs	1	2	1	2
4 Wild edible vegetables	1	2	1	2
5 Wild fruits and nuts	1	2	1	2
6 Non-protected wild animals	1	2	1	2
7 Grazing of livestock	1	2	1	2
8 Other _____	1	2	1	2

31. Has your household engaged in any of the following natural resource improvement activities during the past 12 months? Please circle all that apply. \_\_\_\_\_

- 1 Planted trees or hedges in contracted farmland and/or forested land
- 2 Protected trees in contracted farmland and forested land
- 3 Built stone or soil ridge on sloping farmland to prevent soil erosion
- 4 Mended terrace ridges to prevent soil erosion
- 5 Improved irrigation condition of farmland
- 6 Converted sloping farmland into terraces
- 7 Increased use of organic farm fertilizer
- 8 Reduced use of chemical fertilizer and farm chemicals
- 9 Planted legume and other kinds of green manure crops
- 10 Practiced fallowing
- 11 Manually weeded household farmland and/or forested land
- 12 Got information on natural resource and the environment through television, newspaper, magazine, etc.
- 13 Other \_\_\_\_\_

32. What do you do with the crop stalks? Choose all that apply. \_\_\_\_\_
- |   |                   |   |                              |
|---|-------------------|---|------------------------------|
| 1 | Fuel for home use | 2 | Fodder for livestock         |
| 3 | Compost           | 4 | Smash and return to farmland |
| 5 | Mulch farmland    | 6 | Discard in farmland          |
| 7 | Burn in farmland  | 8 | Other _____                  |

**Community Involvement of Household**

33. Using a scale that ranges from 1 (Completely Dissatisfied) to 10 (Completely Satisfied), please circle the number that indicates how satisfied you are with your community as a place to live?

Completely Dissatisfied											Completely Satisfied
	1	2	3	4	5	6	7	8	9	10	

34. How would you describe your household’s level of involvement in community or local area activities or events using the following scale?

Not Active					Very Active
1	2	3	4	5	

35. Have you or has anyone in your household participated in any of the following activities during the past 12 months? Please circle a number (1 = No and 2 = Yes).

	No	Yes
1) Attended a local community event (e.g. school performance, film show, or village festival)	1	2
2) Contacted a public official or village cadre about some issue of concern	1	2
3) Worked with others in your community to deal with some community issue or problem	1	2
4) Attended a public meeting in your community (e.g. villager meeting)	1	2
5) Participated in a community organization (e.g. specialty economic association, family planning association, or senior club)	1	2
6) Voted in a local election (e.g. election of village administration committee)	1	2
7) Served on the village administration committee or local party branch	1	2

36. Have you or has anyone in your household participated in any of the following activities during the past 12 months? Please circle a number (1 = No and 2 = Yes).

	No	Yes
1) Participated in community efforts to preserve natural resources or to deal with some environmental problem (e.g. planting trees in collective forests, building irrigation facilities)	1	2
2) Attended a community meeting about natural resources and the environment	1	2
3) Contacted a public official or village cadre to get environmental information or complain about an environmental problem	1	2

**Answer Questions 37 to 41 only if the household has one or more members as urban labor migrant.**

37. Does the labor migrant member(s) regularly come back home? If yes, when? And What for?

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38. Does the labor migrant member(s) regularly send or bring money back? If yes, for what is the money mainly used? (Please circle all that apply.)

- 1 Purchase of seeds/seedlings, fertilizers, and pesticides
- 2 Purchase of livestock or equipments for agricultural production (e.g. farm cattle, reaper, and water pump)
- 3 Hiring local farm labor
- 4 Purchase of foods and clothes
- 5 Purchase of durable consumer goods
- 6 House construction, remodeling, and maintenance
- 7 Children's education costs
- 8 Investment in commercial crop, fruit, aquiculture, or other specialty agriculture productions
- 9 Investment in local business (e.g. grocery store, restaurant, small-scale enterprises)
- 10 Other \_\_\_\_\_

39. How would you describe your household's changes in the following aspects after engaging in labor migration to cities? Please circle a number (1=Has decreased/declined, 2=Has stayed the same, 3=Has increased/improved).

	—	=	+
1) Household income level	1	2	3
2) Household consumption level	1	2	3
3) Overall quality of life of household	1	2	3
4) Amount of cultivated farmland (excluding effects of converting farmland to forest)	1	2	3
5) Yields of crops	1	2	3
6) Quality of farmland	1	2	3
7) Labor input in agricultural production	1	2	3
8) Capital input in agricultural production	1	2	3
9) Dependence on firewood for fuel	1	2	3
10) Dependence on local forest resources (timber and non-timber)	1	2	3
11) Capacity in coping with stresses and shocks	1	2	3
12) Relationship with other farmers	1	2	3
13) Involvement in community issues	1	2	3
14) Efforts in conserving household-controlled natural resources	1	2	3
15) Participation in conserving collective natural resources	1	2	3

40. Dose labor migration has any impacts on your household's agricultural production? (probe for impacts on labor availability, cultivation pattern, cultivated area, farmland transfer, farm management, and management of farmland converted to forested land)

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41. Are there any other important changes brought by urban labor migration in the living of your household? (probe for changes related to consumption pattern, natural resource use and management, gender role)

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*Answer Questions 42 if the household does not have any labor migrant member at present but have someone with labor migration experience in the past.*

42. Does the labor migration experience of you or someone of your household in the past have any impacts on the living of your household?

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*Answer Questions 43 if none of the household members has labor migration experience.*

43. Does labor out-migration of others in your village (may include your relatives and friends) have any impacts on the living of your household?

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*Answer Questions 44 to 46 for all households.*

44. Do you think local natural resources should be managed by government or by villagers themselves? How do you feel about village collective's performance in natural resource management (probe for the participation of local residents)? Do you think rural labor migration has any impacts on local community natural resource management?

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45. What do you think are the three biggest risks or threats to local community development?

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46. Have you or anybody of your household been forced to move by natural disasters or hazards (e.g. earthquake, landslide, mud-rock flow)? Do you think local natural environment has any influence on rural labor out-migration in your village?

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**THANK YOU VERY MUCH FOR YOUR PARTICIPATION!**

## CURRICULUM VITAE

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### EDUCATION

- Ph.D. in Natural Resources and Environmental Sciences. University of Illinois at Urbana-Champaign, 2009
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- Ph.D. Student. Rural Sociology and Demography. Pennsylvania State University at University Park, 2005 – 2006
- M.S. Sociology. China Agricultural University, 2003
- B.S. International Business. China Agricultural University, 2000

### PROFESSIONAL EXPERIENCE

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- *Human Resource Manager*, Sanjiu Food and Brewery Investment Corporation, Sanjiu Enterprise Group (Beijing, China), June 2003 – July 2005.
- *Teaching Assistant*, Department of Development Sociology, China Agricultural University, September 2001 – May 2003.
- *Teaching Coordinator*, China Program, American Carden Educational Foundation, June 2001 – July 2002.
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### SELECTED PUBLICATIONS

- Qin, H.** and C. G. Flint. In press. "Toward a Transdisciplinary Environmental and Resource Sociology in China." *Society & Natural Resources* (in English).
- Qin, H.** and D. Ren. 2009. "Developing Scales for Measuring Public Legal Consciousness: An Analysis Based on Survey Data." *Jurists Review* 2009 (5): 111-119 (in Chinese).
- Qin, H.** and C. G. Flint. 2009. "A Review of Environmental Sociology and the Sociology of Natural Resources." *Social Sciences Abroad*, 2009 (2): 4-11 (in Chinese).

### SELECTED GRANTS AND AWARDS

- *Doctoral Dissertation Improvement Grant*. 2008. National Science Foundation, Geography and Spatial Sciences Program.
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- *Seymour Sudman Dissertation Award for Excellence in Survey Research*. 2008. University of Illinois at Chicago, Survey Research Laboratory.
- *University Graduate Fellowship*. 2005. Pennsylvania State University at University Park.