The Impact of Rural to Urban Migration on Forest Commons in Oaxaca, Mexico

By

James P. Robson

A Thesis Submitted to the Faculty of Graduate Studies of
The University of Manitoba
In Partial Fulfilment of the Requirements for the Degree of

Doctor of Philosophy

Clayton H. Riddell Faculty of Environment Earth and Resources
Natural Resources Institute
University of Manitoba
Winnipeg, Manitoba
R3T 2N2

Copyright © 2010 James P. Robson

THE UNIVERSITY OF MANITOBA
FACULTY OF GRADUATE STUDIES

*****

COPYRIGHT PERMISSION

The Impact of Rural to Urban Migration on Forest Commons in Oaxaca, Mexico

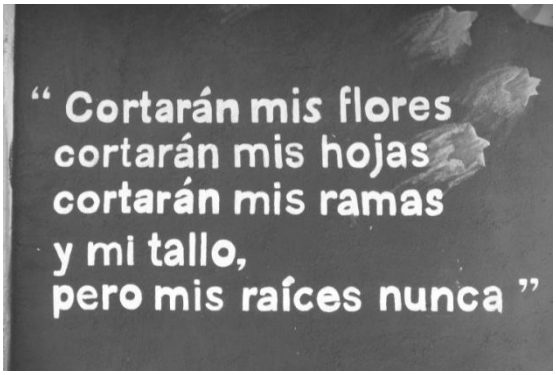
By

James P. Robson

A Thesis submitted to the Faculty of Graduate Studies
of the University of Manitoba in partial fulfillment of the
requirements of the degree of Doctor of Philosophy

© 2010

Permission has been granted to the Library of the University of Manitoba
to lend or sell copies of this thesis to the National Library of Canada
to microfilm this thesis and to lend or sell copies of the film, and to
University Microfilms Inc. to publish an abstract of this thesis.
This reproduction or copy of this thesis has been made available by authority
of the copyright owner solely for the purpose of private study and research, and
may only be reproduced and copied as permitted by copyright laws or
with express written authorization from the copyright owner.



“They can cut my flowers
they can cut my leaves
they can cut my branches
and my trunk,
but my roots never”

Message on mural
Community of San Juan Evangelista Analco, Oaxaca, Mexico

Abstract

This thesis investigates the multiple impacts that demographic and cultural changes through rural to urban migration are having on long-standing resource management regimes in Oaxaca, documented to be the most biologically and culturally diverse state in Mexico. The vast majority of Oaxaca's forests are *terrenos comunales* (communal lands), legally owned and managed by mainly indigenous communities. In most areas, the local subsistence economy has traditionally been dependent on a widely shared body of knowledge based on territorial, plant and animal resources. This knowledge is tied to a number of different environmental practices from *milpa* agriculture and the gathering of non-timber forest products through to domestic and commercial forestry, and, more recently, conservation and ecotourism activities.

Since the second half of the twentieth century, these communities have engaged with regional, national and international markets for wage labour, with many losing a significant percentage of their resident populations to out-migration. Using qualitative data from two indigenous communities in the Sierra Norte (northern highlands) of Oaxaca, the study highlights the struggle of local people to hold fast to their customs, livelihoods and knowledge while embracing the wider world. Findings show how demographic and cultural changes are impacting the two social institutions – *cargos* and *tequios* – that underpin the highly autonomous form of governance the region is famed for. The loss of able-bodied men and women has meant that these customary systems are struggling to remain operational, particularly in smaller localities. In response, a number of far-reaching changes have been introduced, including institutional adaptations and the forging of strong translocal ties that show potential for reducing the vulnerability of affected communities. However, while migration was temporary and circular for much of the 1970s, 1980s and 1990s, thus helping to maintain a balance between subsistence production and market engagement, more permanent forms of migration have come to dominate over the past decade and a half. This critical yet poorly recognised shift in migration dynamics has seen new and increased pressures emerge, and served to reduce the effectiveness of adaptive strategies at the community level.

Rural to urban migration has also been a catalyst for further reducing the dependency of local people on their communal lands and territorial resources. A significant percentage of households now source most of their basic food needs through the marketplace rather than local

farming practices. In both study communities, the area of land actually under cultivation has fallen to less than one hectare per household, with only a small minority of families producing enough crops to meet domestic needs throughout the year. Out-migration has robbed households of within-family labour to cover on-farm activities, while local wage labourers are conspicuous by their absence. A decline in market prices for key cash crops, such as coffee, and unpredictable weather patterns are additional drivers. As many families abandon their fields and become more sedentary, cultivating fields closer to home, there has been a reduction in the diversity of crops being grown, and a fall in resource use in general.

Given these findings, the implications for commons theory are discussed, with two alternate frameworks (rational choice *vs.* moral economy) utilised to explain why institutions may persist, transform or fail in the face of change. In addition, a new layer of complexity is added to the body of work examining the consequences of rural depopulation on Mexican forest landscapes and associated biological diversity. The study questions the assumption that rural to urban migration necessarily stimulates ecosystem recovery and enhances biodiversity conservation at a landscape scale. In fact, because of abandonment of a mosaic of use, the net effect may be an overall loss of biodiversity. From a policy perspective, the principal contributions of the study are especially pertinent at a time when funding agencies and government programs show belated interest in the consequences of out-migration for environmental management, resource use and rural livelihoods in tropical country settings.

Acknowledgements

Conducting the research, analysing the data and writing the dissertation have marked a most eventful period in my life and I have many people to thank for their support, hard work, patience and understanding.

In the Sierra Norte of Oaxaca, I sincerely thank the citizens of Santiago Comaltepec, San Juan Evangelista Analco and Capulalpam de Mendez for their warm welcome and for participating so fully in the research process. In Comal, special thanks to Doña Margarita and Don Palimon for their kindness, in La Esperanza, Don Felipe and Don German were fantastic and enthusiastic forest guides, while Don Eusebio taught me a great deal about farming in the region and also helped with introductions in San Martin Soyolapam. In Analco, I am eternally grateful to the hospitality and *cariño* of the Mendez Pacheco family. Doña Eva, Don Nupo and their four wonderful children (Daniel, Jasmine, Isai and Lluvia) made my numerous visits to their community so much more enriching. Thank you from the bottom of my heart. Many others in Analco deserve a special mention. Don Eusebio, Doña Kenya and their children were always very supportive and great fun. Rosita, Don Pancho, and the taco boys made good friends. Analco was very much a home away from home. In Capulalapm, Elia and family (Don Chevo, Neco, and Montserrat) always welcomed me with open arms and great meals. I have been visiting the family since 2004 and always look forward to the time I spend with them – *muchisimas gracias por acompañarme a todas las fiestas*! Fermin at UZACHI has always been a great source of information and an important ally. Victor and Pablo are two of the younger crowd who would share a mezcal with me and chat about their experiences as migrants in the U.S. Fieldwork was also conducted in Los Angeles. My time there would not have been as productive or enjoyable were it not for Eliseo Luna, his wife Maria and their two children, Irwin and Zoila. They made me feel immediately at home, while Eliseo was very kind in showing me round L.A. and putting me in contact with many people who contributed to this thesis. It is not easy for a *gringo* to interview undocumented migrants in their homes and workplaces, and Eliseo's role was crucial in making this happen. In Santa Ana, thanks to Constantino Sosa and family for having me over for dinner and sharing their stories with me.

Assorted Plates: Some of the wonderful individuals I had the good fortune to work, live and socialise with during my time in Oaxaca and California

Photos: Jim Robson

In Oaxaca City, I have a number of people to thank. First and foremost, my good friend Gabriela Acosta opened her doors and let me use her beautiful house in San Lorenzo Cacaotepec as a base of operations and a home away from home. Ariel Arias Toledo, a colleague from my days at UNAM and always good value, performed the great service of introducing me to Analco... *muchas gracias guey*! Francisco Chapela and Yolanda Lara were a fantastic sounding board, given their extensive experience working in the Sierra Norte. Likewise, Salvador Anta, David Bray and Marco Antonio Gonzalez kindly gave up their time for interviews and informal chats. Lastly, much appreciation to Gudran and all at the *Instituto Welte para Estudio Oaxaqueños*, a fabulous bibliographic resource in Oaxaca City that I used extensively for reviewing historical and ethnographic texts written about the study region.

In Mexico City, I have to say a very warm thank you to Leticia Merino. Leticia has played an instrumental role in my relationship with Oaxaca and Mexico in general. She hired me back in 2002 to work with her at the Instituto de Investigaciones Sociales (IIS) of the National Autonomos University of Mexico (UNAM), where she introduced me to the intricacies of community-based research. She has been a source of intellectual stimulation and emotional support ever since. Leticia funded the IFRI studies that I coordinated in Analco and Comaltepec, and which contributed data that features heavily in this thesis. *Lety, te agradezco mucho*! The success of those IFRI studies was dependent on the hard work of a group of students and researchers from different university faculties and departments in Mexico. A big shout out therefore to Alicia García, América Plata, Rosalba Lara, Nancy Mejia, Denise Lugo, Armando Rincón, Esperanza (Mestli Matías), Mauricio Cervantes, and all the community guides who stopped us from getting lost, provided pairs of extra hands and indispensable local knowledge. Away from the research, old friends in Mexico City – Eduardo Orozco, Mayra Clua, Alejandro Garibay, Claudia Janez, all at Squash Alfa, 'honey-boy' Judah Sussman (I'm counting you as a *Chilango* here!), Maria Osterroff, Mariana Bellot, the Bellot-Rojas family, Martha Rosas – have all been there when I've needed them and shared in some funny moments too.

In and around the University of Manitoba, there are many who deserve a mention. First and foremost, my advisor Dr. Fikret Berkes has been very supportive throughout the process. Through a Canada Research Chair (CRC) grant, he fully supported my first two years in the program, he pushed me when I needed pushing, and he showed great understanding during the difficult times. I have thoroughly enjoyed working with him and I hope the feeling is mutual! My

other two ‘local’ committee members, Dr. Iain Davidson-Hunt and Dr. Raymond Wiest, have been a great help in the advice they have provided and in shaping specific sections of the thesis. The external examiner, Dr. Dan Klooster, provided some very insightful comments on the previous version of this thesis, and a number have been incorporated into the current document. The friends I have made in Winnipeg have become my surrogate family in Canada. In no particular order: Andres, Grace (and Aurora), Carlos, Julia, Karin, Jason, Kate, Prateep, Andy, Shirley, Sam, Catie, Nathan, Hugo, Elly and the Special O kids, and others who I have forgotten to mention by name (you know who you are). Deserving a special mention for both their friendship and help with this document are Andrea Herbert and Joanne Moyer for proof-reading many chapters, and Sones for his patience when training me up on GIS. For some reason, Sones rarely gets a mention in these acknowledgement sections despite having helped many students in recent years... it’s not in his job description, people! Likewise Jackie, Shannon, Tammy and Dalia at the NRI have had to put up with my many silly questions, odd requests and technical mishaps, and always responded so positively! Cheers! Last but not least, I would like to thank Laura and Tim for their support and delicious cappuccinos. I put much of this document together when looking after their home and their dogs, and I have no doubt that walking Max and Shadow twice a day during the long Winnipeg winter helped keep me sane.

That just leaves England! My Mum and Dad have been brilliant. They always are. Thanks so much for the 36 years (and counting) of unconditional love and support. Likewise, Dan, Carol, Sam, Jacob, Matt and Claire make the ‘Robsons’ a great family to be part of.

Finally, this work would not have been possible without generous financial support. In addition to the funding I received from Dr Berkes and Dr Merino, I am very grateful to the University of Manitoba for awarding me a Graduate Fellowship, an Aboriginal Press Scholarship, and an International Student Entrance Scholarship.

Jim Robson
Winnipeg, Manitoba
November 2010

TABLE OF CONTENTS

Abstract ..... **i**
Acknowledgements ..... **iii**
List of Tables ..... **xiii**
List of Text Boxes ..... **xiv**
List of Figures ..... **xv**
List of Maps ..... **xv**
List of Plates (photos) ..... **xvi**
Glossary of Spanish Terms ..... **xvii**
Glossary of Acronyms ..... **xx**

CHAPTER 1 - INTRODUCTION **1**
1.1 Background and Theoretical Orientation **1**
1.2 Purpose of the Research **5**
1.3 Research Objectives **5**
1.4 The Field Context **5**
1.5 Research Approach and Methods **8**
1.6 Main Contributions to Knowledge **10**
1.7 Applied Perspective **11**
1.8 Organisation of the Thesis **12**

CHAPTER 2 – THEORY AND PRACTICE **13**
2.1 Introduction **13**
2.2 Migration, Development and Transnationalism **13**
2.2.1 Why people migrate? Evolving theoretical perspectives ***14***
2.2.2 Transnationalism: Towards a new collective voice ***18***
2.2.3 Migration versus development ***22***
2.3 Commons, Complexity, and Drivers of Change **27**
2.3.1 Conventional commons theory ***27***
2.3.2 Rethinking commons institutions ***31***
2.3.3 Commons as complex social-ecological systems ***33***
2.3.4 Commons institutions and drivers of change ***34***
2.4 The Vulnerability and Adaptive Capacity of Complex Commons Regimes **35**
2.4.1 Vulnerability and adaptive capacity: Commonalities and fit ***35***
2.4.2 Community vulnerability and institutional capacity ***37***
2.4.3 Community vulnerability in a multi-level world ***39***
2.5 Oaxacan Forest Landscapes **40**
2.5.1 Multifunctional landscapes and biodiversity conservation ***40***
2.5.2 Common property regimes and the rise of community-based forestry ***44***
2.5.3 Oaxacan commons governance and institutions ***46***
2.6 Summary **50**

CHAPTER 3 – METHODOLOGY AND METHODS **53**
3.1 Introduction **53**
3.2 Research Philosophy **53**
3.3 Strategy of Inquiry and Site Selection **55**
3.3.1 Study sites ***56***
3.4 Interactive, Adaptive Research **58**
3.5 Research Methods **58**
3.5.1 Setting the scene: The use of IFRI methodology ***59***
3.5.2 Participant observation ***62***
3.5.3 Structured interviews ***62***
3.5.3.1 Structured interviews and surveys *62*
3.5.3.2 Sample size and method of application *64*
3.5.4 Semi-structured interviews ***66***
3.5.5 Focus group discussions ***68***
3.5.6 Forest sampling and forest transects ***68***
3.5.7 Territorial walking tours ***71***
3.5.8 Community workshops ***72***
3.5.9 Document review ***72***
3.6 Methods and Questions for Specific Research Objectives **73**
3.6.1 Objective 1 ..... ***73***
3.6.2 Objective 2 ..... ***73***
3.6.3 Objective 3 ..... ***74***
3.6.4 Objective 4 ..... ***75***
3.7 Consent and Anonymity **76**
3.8 Validation and Reliability of Data **77**
3.9 Analysis of Data **79**
3.10 Changes **79**
3.11 Research Timeline **80**
3.12 Dissemination **82**

CHAPTER 4 – THE STUDY REGION AND COMMUNITIES **83**
4.1 Introduction **83**
4.2 The State of Oaxaca **83**
4.3 The Sierra Norte: A Biological and Cultural Crossroads **86**
4.4 The Study Communities - Historical and Contemporary Setting **87**
4.4.1 The Chinantec community of Santiago Comaltepec ***87***
4.4.2 The Zapotec community of San Juan Evangelista Analco ***92***
4.4.3 Comparative village demographics and household structure ***96***
4.5 The Study Communities - Natural Capital **100**
4.5.1 Forest ecosystems ***100***

4.5.1.1 Dry tropical forest *101*
4.5.1.2 Dry oak-pine forest *102*
4.5.1.3 Temperate pine-oak forest *103*
4.5.1.4 Montane cloud forest *104*
4.5.1.5 Tropical evergreen forest *106*
4.5.2 Notable fauna and floristic diversity ***107***
4.5.3 Hydrological resources ***108***
4.6 The Study Communities - Territorial Land Use and Practices **108**
4.6.1 Cropping zones ***108***
4.6.2 Interconnected knowledge domains ***112***
4.6.3 Resource conservation ***113***
4.6.4 Local conservation values and ethics ***116***
4.7 Tenure, Governance and Rules of Resource Use **119**
4.7.1 The common property regime ***119***
4.7.2 The communal authorities ***119***
4.7.3 Individual and collective property rights ***121***
4.7.4 Local rules of resource use ***121***
4.8 Summary **122**

CHAPTER 5 – OUT-MIGRATION AND COMMONS INSTITUTIONS **125**

PART I – Historical Migration Flows, Contemporary Dynamics and Local Perceptions **125**
5.1 Introduction to Chapter 5 / Part I **125**
5.2 Historical and Contemporary Migration Flows **126**
5.2.1 From 1910 -1960 ..... ***126***
5.2.2 From 1960-2008 ..... ***127***
5.2.3 Migrant numbers and destinations ***129***
5.3 Push and pull factors **134**
5.3.1 An economic explanation of migration ***134***
5.3.2 Towards a cultural explanation of migration ***137***
5.3.3 Migrant networks ***138***
5.4 Changing Dynamics of U.S.-bound Migration **139**
5.5 Migrant Remittances **142**
5.6 Local Perceptions of Migration **146**
5.7 Summary **150**

PART II – The Impact of Demographic Change on Commons Institutions **151**
5.8 Introduction to Chapter 5 / Part II **151**
5.9 Demographic Changes **152**

5.9.1 Population growth and decline (1930-2008) ***152***
5.9.2 Changing age-sex structure ***153***
5.10 Number (and age) of resident and non-resident *comuneros* **156**
5.10.1 Community of Santiago Comaltepec ***156***
5.10.1.1 Santiago Comaltepec (Head village) *156*
5.10.1.2 La Esperanza *157*
5.10.1.3 San Martin Soyolapam *158*
5.10.2 Community of San Juan Evangelista Analco ***159***
5.10.3 Commonalties and differences between the two study communities ***160***
5.11 Impact on *Cargos* and *Tequios* **162**
5.11.1 Community cargos ***162***
5.11.2 Cargos vs comuneros ***163***
5.11.3 'Forced' changes to the cargo system ***168***
5.11.3.1 Disappearance of municipal cargos *168*
5.11.3.2 Discontinuation of the 'escalafon' *169*
5.11.3.3 Weakening of rule enforcement on age limits and years of 'service' *170*
5.11.4 Impacts on the tequio system ***170***
5.12 Quality of municipal and communal *cargo*-holders **172**
5.13 Impact of demographic change on other areas of village life **173**
5.14 Summary **174**

CHAPTER 6 – IMPACT OF MIGRATION ON TERRITORIAL LAND USE AND BIODIVERSITY **175**
6.1 Introduction **175**
6.2 Impact on Farming Practices **177**
6.2.1 Number of families farming and area under cultivation ***177***
6.2.2 Subsistence versus commercial production ***178***
6.2.3 Deficits in farm labour ***179***
6.2.4 Source of food staples ***180***
6.2.5 Reduced territorial mobility ***182***
6.2.6 Change in crop diversity ***186***
6.2.7 Changing weather patterns ***188***
6.2.8 Changing attitudes to farming ***190***
6.3 Impact on Forest Use **191**
6.4 Declining Resource Use amid Shifting Communities of Practice **194**
6.5 Implications for Biological Diversity **199**
6.5.1 Mapping and photographing land use change and forest encroachment ***199***
6.5.2 Effect on ecological processes and habitat characteristics ***204***

6.5.2.1 Ecological succession and disturbance *206*
6.5.2.2 Patches, gaps and edge effects *208*
6.5.3 Agricultural biodiversity ***210***
6.6 Summary **212**

CHAPTER 7 – COMMUNITY RESPONSES TO OUT-MIGRATION: PERCEPTIONS, ADAPTATIONS AND OBSTACLES **215**
7.1 Introduction **215**
7.2 Individual and Community-level Perceptions of Out-migration **216**
7.2.1 Individual-level perceptions ***216***
7.2.2 Community-level perception ***217***
7.3 Institutional Adaptations to Demographic and Cultural Change **218**
7.3.1 Reduction in duration of cargo term ***219***
7.3.1.1 Logic *219*
7.3.1.2 Drawback *220*
7.3.2 Expanded role of women ***223***
7.3.3 Establishing obligations of migrant comuneros ***224***
7.3.3.1 Obligations of migrant comuneros from Comaltepec *225*
7.3.3.2 Obligations of migrant comuneros from Analco *226*
7.3.4 Adolescent male migrants ***228***
7.4 Hometown Associations as Trans-local Institutions **228**
7.4.1 Migrant Diasporas ***228***
7.4.2 Hometown Associations (HTAs) ***230***
7.4.2.1 Analco *231*
7.4.2.2 Comaltepec *233*
7.5 HTAs and Migrant Investments **235**
7.6 Compliance with Migrant Obligations and HTAs **238**
7.7 Obstacles to Participation in HTAs and Compliance with Migrant Obligations **241**
7.6.2.1 Changing migrant profiles *243*
7.6.2.2 Shift in migration patterns *244*
7.6.2.3 Attitudes among second and third generation of migrants *246*
7.8 Summary **247**

CHAPTER 8 – CONTINUITY AND CHANGE IN COMMONS GOVERNANCE: CHALLENGES, OPPORTUNITIES AND SCENARIOS **251**
8.1 Introduction **251**
8.2 Continuity and Change: Lessons for the Commons **252**
8.2.1 De-territorialisation of community ***253***
8.2.2 Appropriate adaptation of institutional arrangements ***256***

8.2.3 Reduced resource practice and declining territorial mobility *263*
8.3 Towards a Transformation of Local Ways of Life? **264**
8.3.1 Striking a balance between the modern and the traditional *266*
8.4 What Does the Future Hold? **269**
8.4.1 External Drivers: Neo-liberalism, NAFTA, rural development policies *270*
8.4.1.1 Economic liberalisation and NAFTA *272*
8.4.1.2 Mexican rural development *275*
8.4.1.3 Summary *277*
8.4.2 Contemporary opportunities for developing community economy *278*
8.4.3 Commons governance in a trans-local context *281*
8.4.4 Governance and natural resource scenarios *284*
8.5 Summary **289**

CHAPTER 9 – CONCLUSIONS AND RECOMMENDATIONS **291**
9.1 Summary of Findings **291**
9.2 Contributions of the Thesis **294**
9.2.1 Commons *294*
9.2.2 Population-environment nexus *297*
9.3 Research and Policy Recommendations **298**
9.4 Closing Remark **300**

LITERATURE CITED **303**

APPENDICES ..... **i**
Appendix I: Example of Research Contract with Study Community ..... **i**
Appendix II: Household Survey (General) ..... **iii**
Appendix III: Household Survey (Migration) ..... **xvii**
Appendix IV: Migration Questionairre for Communal Authorities ..... **xxvii**
Appendix V: IFRI Forest Plot Form ..... **xxxi**
Appendix VI: Letter of introduction to HTA of Analqueños in Los Angeles, CA ..... **xxxix**
Appendix VII: Sample Interview Guide (External Government Actor) ..... **xli**
Appendix VIII: Floristic List from Pine-oak Forest of Analco ..... **xliii**
Appendix IX: Floristic List from Cloud Forest of Comaltepec ..... **xlix**
Appendix X: Milpa Agriculture ..... **lvii**
Appendix XI: Resource Practices in Study Communities ..... **lix**

List of Tables

Table 3.1: Four philosophical worldviews 53
Table 3.2: Study community selection criteria 57
Table 3.3: Summary explanation of IFRI forms used in the study 60
Table 3.4: Number of households included in each survey (by locality) 64
Table 3.5: Number of semi-structured interviews (and interviewees) by locality 67
Table 3.6: Research timeline according to field site 81
Table 4.1: Villages with a permanent resident population, Analco 96
Table 4.2: Villages and settlements with a permanent resident population, Comaltepec 97
Table 4.3: Average age and level of schooling for parents and children 98
Table 4.4: Principal occupations among adult residents of Comaltepec and Analco 99
Table 4.5: Household income in Comaltepec and Analco 99
Table 4.6: Correlation of Comaltepec settlements and ranches to climate/cropping zones 111
Table 4.7: Chinantec climate/cropping zones and correlation to rainfall, temperature, elevation and vegetation type 111
Table 4.8: Community land planning in Comaltepec and Analco 114
Table 4.9: Local conservation values 117
Table 4.10: Importance of forests rated for uses and services provided to local families 118
Table 5.1: Households with migrant members 127
Table 5.2: Numbers and destination of migrants 128
Table 5.3: Country destination for recent migrants 128
Table 5.4: Numbers and destinations of migrant siblings 129
Table 5.5: Rationale behind decision to migrate 137
Table 5.6: Significance of migrant networks 138
Table 5.7: Percentage of current migrants expected to return to live in the home village 140
Table 5.8: Level of current household income through migrant remittances 144
Table 5.9: Categories of spending of migrant remittances 146
Table 5.10: Household-level perception of impact of migration on village life 146
Table 5.11: Household perception of value of migration 148
Table 5.12: Numbers of active and retired resident *comuneros*, Santiago Comaltepec 157
Table 5.13: Age range of resident *comuneros*, Santiago Comaltepec 157
Table 5.14: Numbers of active and retired resident *comuneros*, La Esperanza 157
Table 5.15: Age range of 'active' *comuneros* resident in La Esperanza 158
Table 5.16: Number of active and retired resident *comuneros*, San Martin Soyolapam 158
Table 5.17: Age range of *comuneros* resident in San Martin Soyolapam 159
Table 5.18: Number of retired and active resident *comuneros* in Analco 160
Table 5.19: Age range of *comuneros* resident in Analco 160
Table 5.20: Numbers of resident and non-resident *comuneros* in Comaltepec and Analco 161
Table 5.21: Age structure of resident *comuneros* in Comaletpec and Analco 162
Table 5.22: Categories and numbers of *cargos* in operation during 2008 165
Table 5.23: Estimated *comunero: cargo* ratios for 2008 165
Table 5.24: Categories and numbers of *cargos* (estimated) in operation (late 1970s) 166
Table 5.25: Estimated *comunero: cargo* ratios for the late 1970s 166
Table 6.1: Percentage of farming households and area under cultivation (permanent settlements of Analco and Comaltepec) 177

Table 6.2: Percentage of households producing for domestic consumption only, or for sale in local / regional markets 176
Table 6.3: Use of intra-family labour resources vs hired help 180
Table 6.4: Source of food for households in Comaltepec and Analco 181
Table 6.5: Principal crops grown in each village (during 2008 agricultural year) 186
Table 6.6: Agricultural land use categories, Santiago Comaltepec and Analco 188
Table 6.7: Summary of farmer perceptions about changing weather patterns 189
Table 6.8: The impact of out-migration on forest practices 192
Table 6.9: Household dependence on forest resources 192
Table 6.10: Time spent collecting forage, firewood, timber and other forest products 193
Table 6.11: Increase or decline in natural resource practices across the study communities 195
Table 7.1: Categorising institutional responses to out-migration 219
Table 7.2: Principal destinations of migrants from Comaltepec 229
Table 7.3: Principal destinations of migrants from Analco 229
Table 7.4: *Analqueño* Hometown Associations 232
Table 7.5: *Comaltepecano* Hometown Associations 233
Table 7.6: Migrant investments in village-level infrastructure, customs and initiatives 237
Table 7.7: Numbers of active and non-active *comuneros* 239
Table 7.8: Percentage of *Analqueño* migrant families participating in HTAs 241
Table 7.9: Percentage of *Comaltepecano* migrant families participating in HTAs 241
Table 7.10: Estimated numbers of U.S-based migrants with dependents in home village 243
Table 7.11: Estimated numbers of permanent migrant *comuneros* 244
Table 8.1: External drivers impacting rural communities in northern Oaxaca 271
Table 9.1: Sumnmary of findings by research objective 292

List of Text Boxes

Text Box 2.1: Attributes associated with successful commons management systems 29
Text Box 2.2: Design principles characteristic of long-enduring commons institutions 30
Text Box 6.1: 'A tale of two tortillas' 184
Text Box 7.1: 2004 Revisions to Communal Statute, Comaltepec 226
Text Box 7.2: 'Migrants stick together' 230
Text Box 7.3: *"It's tough for us and tough for those left behind"* 249

List of Figures

Figure 1.1: Conceptual framework for the study 3
Figure 2.1: Development of migrant flows over time and relationship to sending and receiving countries 17
Figure 2.2: The process of transnationalism 22
Figure 3.1: IFRI Conceptual Model 61
Figure 4.1: Distribution of forest types in Comaltepec 100
Figure 4.2: Distribution of forest types in Analco 101
Figure 4.3: Main subsistence and commercial activities in Analco as they correlate to climatic and cropping zones 109
Figure 4.4: Main subsistence and commercial activities in Comaltepec as they correlate to climatic and cropping zones 110
Figure 5.1: Growth of urban centres in the State of Oaxaca (1930-2000) 127
Figure 5.2: Population change in Comaltepec and Analco (1930-2008) 152
Figure 5.3: Age-sex pyramids of resident population in Analco 154
Figure 5.4: Age-sex pyramids of resident population in Comaltepec 155
Figure 6.1: The potential impacts of human activities on biodiversity in forest landscapes 205
Figure 9.1: Framework conceptualising the main findings of the study 293

List of Maps

Map 1.1: State of Oaxaca, southern Mexico 6
Map 1.2: Location of the Sierra Norte of Oaxaca 7
Map 1.3: Location of the two study communities 9
Map 2.1: The municipalities of Mexico, showing a particularly high concentration in the south of the country (Oaxaca, Veracruz, State of Mexico) 47
Map 3.1: Concentric sampling for household survey, Analco 65
Map 3.2: Location of IFRI sites and transects in the forests of Comaltepec 69
Map 3.3: Location of IFRI sites and transects in the forests of Analco 70
Map 4.1: Territorial layout of Comaltepec 88
Map 4.2: Territorial layout of Analco 93
Map 4.3: State of Oaxaca showing high biodiversity areas and location of state and federal Protected Areas (PAs) and autonomous Community Conservation Areas (CCAs) 113
Map 5.1: Principal migration flows from Analco to Mexican destinations 132
Map 5.2: Principal migration flows from Analco to US destinations 132
Map 5.3: Principal migration flows from Comaltepec to Mexican destinations 133
Map 5.4: Principal migration flows from Comaltepec to Mexican destinations 133

Map 6.1: Extensiveness and pattern of agricultural abandonment around head village of Santiago Comaltepec (1961-2008) 200
Map 6.2: Extensiveness and pattern of agricultural abandonment across the communal territory of Analco (1961-2008) 200
Map 6.3: Forest resurgence west of Federal Highway 175, Analco 202

List of Plates (photos)

Plates 3.1 and 3.2: Guides accompanied me on territorial walking tours 71
Plate 4.1: Mixe settlement of Coatlan, Sierra Norte in the nineteeth century 84
Plate 4.2: Chinantecs of San Pedro, Sierra Norte 84
Plate 4.3: Head village of Santiago Comaltepec 89
Plates 4.4 and 4.5: La Esperanza and San Martin Soyolapam 90
Plates 4.6: Village of Analco 92
Plate 4.7: Municipal Palace and Offices of the CBC, Analco 95
Plate 4.8: Deciduous dry tropical forest in September (after summer rains) 102
Plate 4.9: View of cloud forest from El Relampago, south-west of La Esperanza 106
Plate 4.10: Giant ferns, cloud forest of Comaltepec 106
Plate 4.11: Tree nursery, Santiago Comaltepec 115
Plates 5.1 and 5.2: U.S. vehicle licenses bearing the names of Comaltepec and Analco 125
Plate 5.3: *Comaltepecano* migrants working on store remodel in Glendale, CA 135
Plate 5.4: New house builds in Analco 143
Plate 6.1: Heading back with the corn harvest from *tierra caliente*, Analco 175
Plate 6.2: Deserted homestead, Rancho San Pedro, west of Santiago Comaltepec 185
Plate 6.3: Corn cobs (*mazorka*) 'burnt' by heavy rains 190
Plate 6.4: Pine as pioneer species in area of dry oak-pine forest, Analco 201
Plate 6.5: Pine as pioneer species in plot abandoned 6 yrs ago, Santiago Comaltepec 201
Plate 6.6: New growth on corn field abandoned 5 years previously 201
Plate 6.7: Forest growth on plot abandoned 12 years previously 201
Plate 6.8: Maturing secondary forest, 18 years after abandonment 201
Plate 6.9: Secondary forest (pine) on corn terraces abandoned in the early 1980s 201
Plate 6.10: Hillside west of village of Analco (formerly under cultivation), now covered in young pine forest(*P. oaxacana* and *P. michoacana*) 203
Plate 6.11: Clearance of tropical evergreen forest to open up larger *potreros*, San Martin Soyolapam 204
Plate 6.12: Multi-crop agroforestry system, Puerto Eligio, Comaltepec. 210
Plate 6.13: Shade Coffee, Vista Hermosa, Comaltepec 210
Plate 7.1: Men chatting, Analco 215
Plates 7.2: Onlookers enjoy the '*Banda Juvenil* Santiago Comaltepec' 234
and 7.3 play at Plaza Mexico, City of Downey, California
Plate 7.4: New church in San Martin Soyolapam, with construction part-financed by migrant contributions 238
Plate 8.1: "*The land belongs to those who work with their hands*", Mural on wall of Analco's Municipal Palace. 288

Glossary of Spanish Terms[1]

adobe	sun-dried mud brick
agencia de policía	police agency
agencia municipal	municipal agency
aguardiente	distilled alcohol (from corn or sugarcane)
albañil	building labourer
alcalde	judge
ama de casa	home worker
analqueño	native of San Juan Evangelista Analco
anciano	elder, in indigenous communities
artesanía	handicraft
atole	maize-based non-alcoholic drink
ayuntamiento	local community council
barrio	district or neighbourhood of a village
bienes comunales	communal land or property
cabecera municipal	municipal centre
cabecera	head settlement or village
cabildo	council
cacique	hereditary ruler or chief; now often translates as local boss
caciquismo	leadership regime
campo	open countryside
cargo	post or obligation
cerro	hill or peak
ciudad	city or large town
colonia	informal settlement or neighbourhood
comal	hot plate for cooking tortilla over firewood stove
comaltepecano	native of Santiago Comaltepec
comerciante	businessman or trader
comida	meal or food
comisariado de bienes comunales	commissioner for communal resources
compadrazgo	ritual kinship
comunal	communal
comunero	communal (village) rights holder
comunidad agraria	agrarian (indigenous) community
consejo de vigilancia	oversight or surveillance committee
coyote	people smuggler
criollo	native
curandero	traditional healer
derecho de monte	royalty on cut timber
limpiando	cleaning/weeding
desmontado	leveling or clearing (of forest)

[1] Whilst many of these entries are my own, others are modified from the glossary used by Clarke (2000) in '*Class, Ethnicity, and Community in Southern Mexico: Oaxaca's Peasantries*'.

dialecto	dialect
distrito	administrative district
ejidatario	property–rights holder of land reform unit
ejido	land reform unit
el norte	United States of America
fiesta	religious festival (usually a saint's day)
guelaguetza	reciprocal work or exchange
huaraches	sandals
huipil	woman's traditional tunic
idioma	language
indigenismo	policy of the post-revolutionary period, emphasizing non-coercive integration of the Indians into Mexican society
ixtle	fibre made from maguey or tropical palm
yunta de bueyes	pair of oxen
leña	firewood
limpiado	fields cleared or prepared prior to onset of summer rains
localidad	locality
maguey	cactus from which mezcal is distilled
mayorazgo	legal device to prevent splitting of property through inheritance
mayordomo	officer responsible for supporting a particular saint's fiesta
mazorca	maize ear
mercado	market
mestizo	person of mixed caucasian and Indian origin
metate	grindstone
mezcal	southern Mexican alcoholic beverage made from the maguey (agave) plant
milpa	traditional Mesoamerican cropping system; commonly used to refer to corn plant
molino	grindstone / mill
monte	upland area (ie. above village); normally refers to natural forest but can also contain pasture
mozo	local wage labourer for agricultural tasks
municipio	municipality
ocote	pine with high resin content used as natural firelight
palacio municipal	municipal office or town hall
palenque	small distillery
panela	cake of sugar produced by boiling down sugarcane juice
paisano	name used in reference to somebody from the same community or region
parcela	plot or parcel of land
patrón	boss or employer

piscando	harvesting maize
plaza	market-place that normally marks village centre
policía	village policeman
político	politician
presidente municipal	municipal president
pueblo	village or people
puesto	job or market stall
ranchería	rural settlement consisting of small number of homesteads
rancho	ranch, small landed property
regidor	councilman
riego	irrigation or irrigated
sembrando	planting
sierra	large upland area or mountain range
sindico	trustee
solar	yard or compound adjacent or close to family home
suplente	alternate (for whatever office)
temporada	season of year
temporal	seasonal rain-fed land
tequio	an obligatory labour day levied on adult able-bodied men
terreno	piece of land
tianguis	market
tierra caliente	warm (dry or humid) lowland
tierra o terreno communal	communal land
tierra templada	temperate zone that falls between *tierra caliente* and *tierra fría*
tierra fría	cold upland
topil	messenger boy
tortilla	flat maize bread
tumba-roza-quema	slash and burn (or long fallow) cultivation
usos y costumbres	term referring to the traditional system of governance used by indigenous communities in Oaxaca

Glossary of Acronyms

CBC	*Comisariado de bienes comunales*: Commissioner for Communal Property
CBE	Community-based Enterprise
CCMSS	*Consejo Civil para la Silvicultura Sostenible*: Mexican Council for Sustainable Forestry
CDI	*Comision Nacional para el Desarrollo de los Pueblos Indigenas*: National Commission for Indigenous Development
CECYTE	*Colegio de Estudios Científicos y Tecnológicos del Estado de Oaxaca*: Science and Technology College of the State of Oaxaca
CEPCO	*Coordinadora Estatal de Productores de Café de Oaxaca, A.C.*: The Coffee Growers Association of Oaxaca.
CFE	Community Forest Enterprise
CFM	Community Forest Management
COINBIO	*Proyecto de conservación de la biodiversidad por comunidades e indígenas de los estados de Oaxaca, Michoacán y Guerrero*: Indigenous Biodiversity Conservation in the States of Oaxaca, Michoacán and Guerrero
CONAFOR	Comisión Nacional Forestal: National Forest Commission
CONASUPO	*Compañía Nacional de Subsistencia Populares*: National Popular Subsistence Company
CPR	Common-pool Resource
CURP	*Clave Unica de Registro de Poblacion*: Unique Population Register Code
CV	*Consejo de vigilancia*: Oversight or surveillance committee
ERA	Estudios Rurales y Asesoria: Rural Studies and Advice
FAPATUX	*Fabricas Papeleras de Tuxtepec*: Tuxtepec Pulp and Paper Company
GAIA	*Grupo Autónomo para la Investigación Ambiental*: Autonomous Environmental Research Group
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
HTA	Hometown Association
IASC	International Association for the Study of the Commons
IFRI	International Forest Resources and Institutions Program
IIS	*Instituto de Investigaciones Sociales*: Institute of Social Research
INAFED	*Instituto Nacional para el Federalismo y el Desarrollo Municipal*: National Institute for Federal and Municipal Development
INE	*Instituto Nacional de Ecología*: National Institute of Ecology
INEGI	*Instituto Nacional de Estadística y Geografía*: National Institute of Geography and Statistics
INI	*Instituto Nacional Indigenista*: National Indigenous Institute
IPCC	Intergovernmental Panel on Climate Change
IUCN	World Conservation Union
LA	Los Angeles (Metropolitan Area)

LEGEEPA	*Ley General de Equilibrio Ecológico y Protección del Ambiente*: General Law of Environmental Protection and Ecological Equilibrium
MEA	Millennium Ecosystem Assessment
NAFTA	North American Free Trade Agreement
NGO	Non-governmental Organisation
NTFP	Non-timber Forest Product
ODRENASIJ	*Organización para Defensa de los Recursos Naturales y Desarrollo Social de la Sierra de Juárez*: Organization for Defense of Natural Resources and Social Development of the Sierra Juárez
PA	Protected Area
PES	Payment for Environmental Services
PROCAMPO	*Programa de Apoyos Directos al Campo*: Countryside Direct Support Program
PROCEDE	*Programa de Certificacion de Derechos Ejidales y Titulacion de Solares*: Ejidal and Agrarian Land Titling Certification Program
PROCYMAF	*Proyecto de Conservación y manejo Sustentable de Recursos Forestales en México*: Project for Conservation and Sustainable Management of Forest Resources in Mexico
RAN	*Registro Agrario Nacional*: National Agrarian Registry
RFC	*Registro Federal de Contribuyente*: Federal Register of Contributors
SANREM CRSP	Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program
SEMARNAT	*Secretaria de Medio Ambiente y Recursos Naturales*: Ministry of Environment and Natural Resources
SERBO	*Sociedad para el Estudio de los Recursos Bioticos de Oaxaca*: Society for the Study of the Biotic Resources of Oaxaca
SES	Social-ecological System
SICOBI	*Sistema Comunitario para la Biodiversidad*: Community Biodiversity Conservation System
TEK	Traditional Environmental (or ecological) Knowledge
UNAM	*Universidad Nacional Autónoma de México*: National Autonomous University of Mexico
U.S.	United States of America
UZACHI	*Union de Comunidades Zapoteco-Chinanteca*: Union of Zapotec and Chinantec Communities

CHAPTER 1 - INTRODUCTION

1.1 Background and Theoretical Orientation

In October 2009, Elinor Ostrom was awarded the Nobel Prize in Economic Sciences for her "analysis of economic governance, especially the commons". A 'commons' can be considered any resource (environmental or otherwise) that is subject to forms of collective use, with the relationship between the resource and the human institutions that mediate its appropriation considered an essential component of the management regime. In awarding the prize, the Nobel committee stated that Ostrom's work had "challenged the conventional wisdom that common property is poorly managed and should either be regulated by central authorities or privatized". Upon hearing news of the award, I was delighted yet surprised – surprised because her seminal work, *Governing the Commons*, had been published two decades earlier. I then realised how timely the award was. In addition to her obvious achievements, the underlying values and ideals that the commons evoke – those of reciprocity, trust, cooperation and the common good – would be particularly resonant following a global economic recession, with the newspapers still reporting on stories of capitalist greed and corruption. In some ways, the commons had "come of age"; ready to be embraced by a wider public looking for more inclusive ways of structuring human behaviour and activity.

It would be quite wrong, however, to assume that the kind of traditional resource commons (forests, fisheries, rangelands etc.) that Ostrom based much of her work on function outside of the dominant economic-social-political setting. Rather, as examples of complex social-ecological systems (SES)[2], commons are situated very much within larger entities or structures. Consequently, long-standing regimes have had inherent within them, or have evolved, certain characteristics to persist over time. This is known as a system's 'resilience', which has been defined as the "capacity… to absorb disturbance and re-organise while undergoing change

[2] Using examples from fisheries, wildlife and forestry management, Berkes et al. (1998; 2003) highlight the limitations of the single-sector, single-species focus of conventional resource management regimes, and show how social-ecological systems are seldom linear and predictable. Rather, they are characterised by nonlinearity, uncertainty, emergence, multiple scales, and self-organisation. As many environmental problems appear resistant to conventional science solutions, it has been suggested that complex systems thinking can help bridge the gap between the social and natural sciences, and provide a toolkit to manage for sustainability (Berkes et al. 2003). Commons are examples of complex SES, given the importance of social, political and economic organisations, with institutions (rules-in-use, cultural norms and values) as the mediating factors that govern the relationship between social systems and the ecosystems on which they depend (Adger 2006).

so as to still retain essentially the same function, structure, identity and feedbacks" (Walker et al. 2004:1). In addition to developing robustness, resilience also concerns the opportunities that disturbance provides in terms of reconfiguring structures and processes, bringing about system renewal, and the emergence of new trajectories (Folke 2006:263). This is referred to as a system's 'adaptive capacity'. It has been noted that an important factor in the long-term success of some commons regimes has been their capacity to respond to change by modifying existing or developing new institutions (Agrawal 2002; Ostrom 1990, 2005; Wilson 2002).

However, even if a commons regime is dynamic in its response to change and can build social-ecological resilience, it may still be vulnerable to social, environmental or economic drivers (Folke et al. 2003). Vulnerability in this sense is defined as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt" (Adger 2006:268). It is an emergent property in commons terminology, with little understood about how a regime's vulnerability may best be determined or assessed. Likewise, the study of 'drivers of change' remains a neglected and poorly understood aspect of resource management science (Gunderson and Holling 2002). The work of the Millennium Ecosystem Assessment (MEA) is a rare exception – having conceptualised how a driver may have consequences not only for local systems of governance but also for environmental resources through modifications to territorial practices.

The preceding paragraphs provide context to the research presented in this thesis, which investigates the impact of demographic and cultural change through human migration on long-standing commons regimes in Oaxaca, Mexico. The flow of people leaving the state has increased so dramatically in recent decades that Bezaury (2007) reports that close to half of Oaxaca's population has become semi-permanent or permanent residents of the Mexico City metropolitan area, the northern states of Mexico, or the United States of America. Despite this, little is known empirically about the social-ecological consequences of out-migration for sending (or source) communities. In adapting the MEA's conceptual framework (Figure 1.1), it is possible to identify the linkages and processes that connect out-migration, land use practices, ecological integrity and community wellbeing[3] as they form part of a complex SES operating at

[3] I follow White and Ellison's (2007:158) understanding of human wellbeing, which having built "on established critiques of narrowly economic approaches to poverty or development and restrictively medical understandings of health" offers a "rounded, positive focus which includes not only material resources and social relationships, but also the psychological states and subjective perceptions of people themselves". In the context of community

multiple levels. From an institutional perspective, out-migration can both impact and elicit responses from the social arrangements (rules-in-use, norms, values) that define resource use and thus act as the link between migration and environmental outcomes.

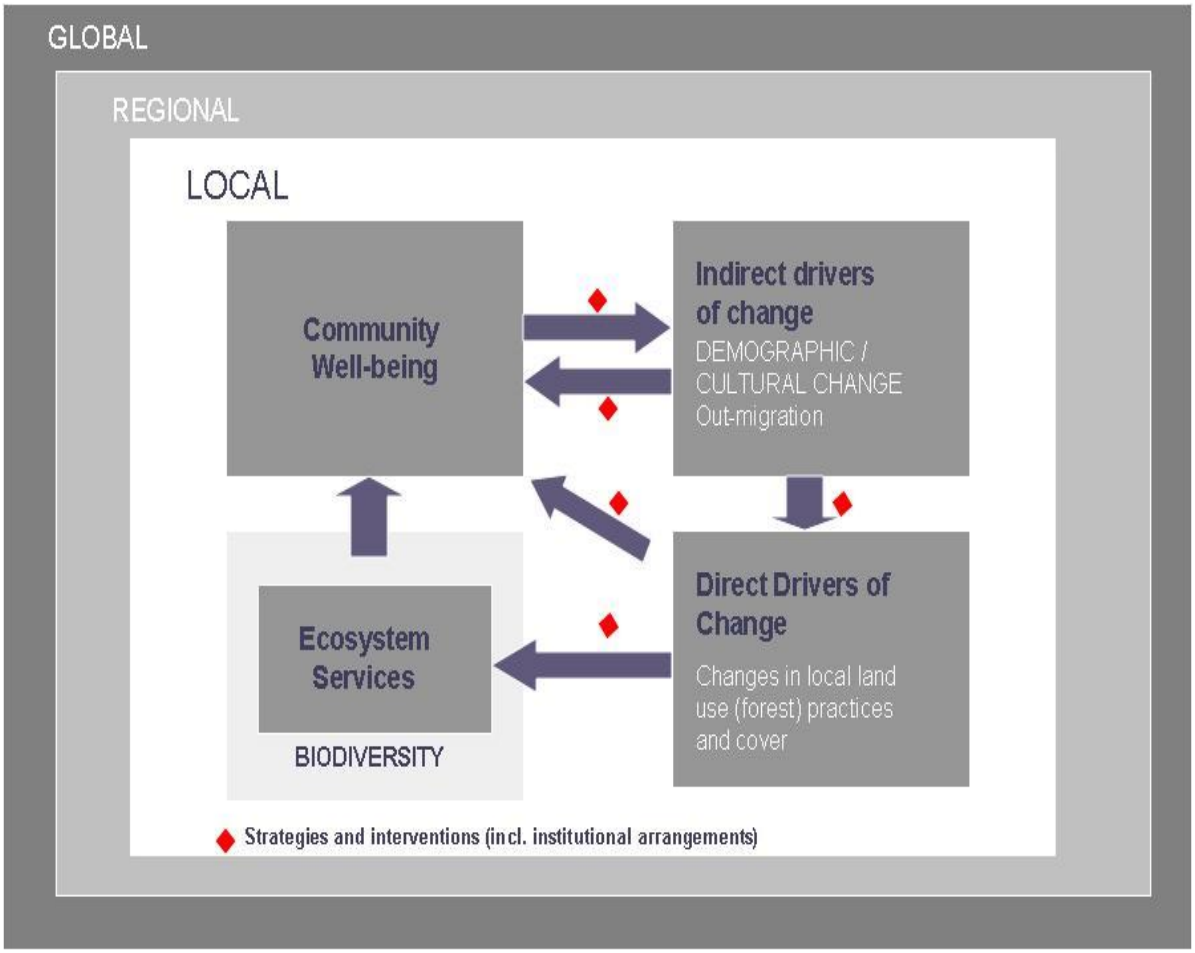


Figure 1.1: Conceptual framework for the study (adapted from the MEA 2005)

On the one hand, population loss and changing attitudes among resident community members can weaken the relevancy of customary rules and conventions, questioning their persistence over the long-term. As change erodes and weakens the societal feedback loops that are essential for sustaining and building resilience and adaptive capacity, institutional structures may fail (Acheson 2006). On the other hand, it may be that local institutions can adapt to target

wellbeing, I am more interested in social relations and collective perceptions, and less concerned with access to goods and resources that has come to dominate many livelihood discourses.

new or changing markets and realities. A number of studies point to the reinforcement rather than the weakening of local institutions in the face of such processes, and recognise that the erosion of community is not universal (Basch et al. 1994; Kearney 1995; Waterbury 1999).

What makes migration not just part of modernisation, but also characteristic of globalisation, are the deeper links that form between sending and destination countries – such as remittance flows, cyclical migration, and frequent communications. The recent literature on transnationalism has shown that migrants are forming sister communities that establish social and economic ties with their home communities – such that new senses of communal belonging and identity can be forged (Basch et al. 1994; Kearney 1995; Smith 2006; Bacon 2006). This may allow demographic and cultural change to strengthen community through positive changes to systems of governance and the social institutions that regulate community life and territorial management, where local traditions are reinvented in order to respond creatively to change (Orlove 1999; Waterbury 1999). For example, migration could contribute finances (remittances) to be invested in conservation and sustainable resource activities (Adger et al. 2002; Curran 2002). While the role of remittances in rural development continues to generate a great deal of debate (Martin 1998; Binford 2003; Cohen et al. 2005), their potential for assisting resource and environmental sustainability has not been properly explored. Adger et al. (2002) suggested that remittances can increase social resilience by promoting diversification and risk-spreading, enhancing social capital through investment in community projects, and extending opportunities to improve wellbeing.

While this study is primarily concerned with the relationship between out-migration and commons institutions, the impact that demographic and cultural change can have on the use and conservation of territorial resources forms an important additional component. Given Mexico's impressive bio-cultural diversity (Boege 2008), it is surprising how little is known about the effects of such change on land use, resource knowledge and practice. The literature that does exist is divided as to whether migration undermines agricultural systems in sending regions (triggering labour shortages, reducing production levels, and field abandonment) or whether return flows of new ideas and remittances are targeted to agricultural and conservation-related investments. This is important to understand since farming and the harvesting of timber and non-timber products remain central to community life and identity in many rural areas, and the limitations imposed by ongoing labour deficits can encourage more people to leave. This

subsequently increases the burden for those left behind, further weakening the customary governance regime and associated institutional arrangements.

1.2 Purpose of the Research

To investigate how commons regimes in the Sierra Norte of Oaxaca, southern Mexico, are impacted by, and responding to, demographic and cultural change through out-migration, and the implications for territorial resources and governance.

1.3 Research Objectives

1. To carry out a socio-demographic and socio-economic analysis of the study communities to determine the nature of exposure to out-migration at multiple levels.

2. To document, at multiple levels, the impact that out-migration is having on the study communities' social organisation and institutional arrangements, and to examine their response to such change.

3. To investigate the implications of demographic and cultural change on the continuity of local resource and conservation practices.

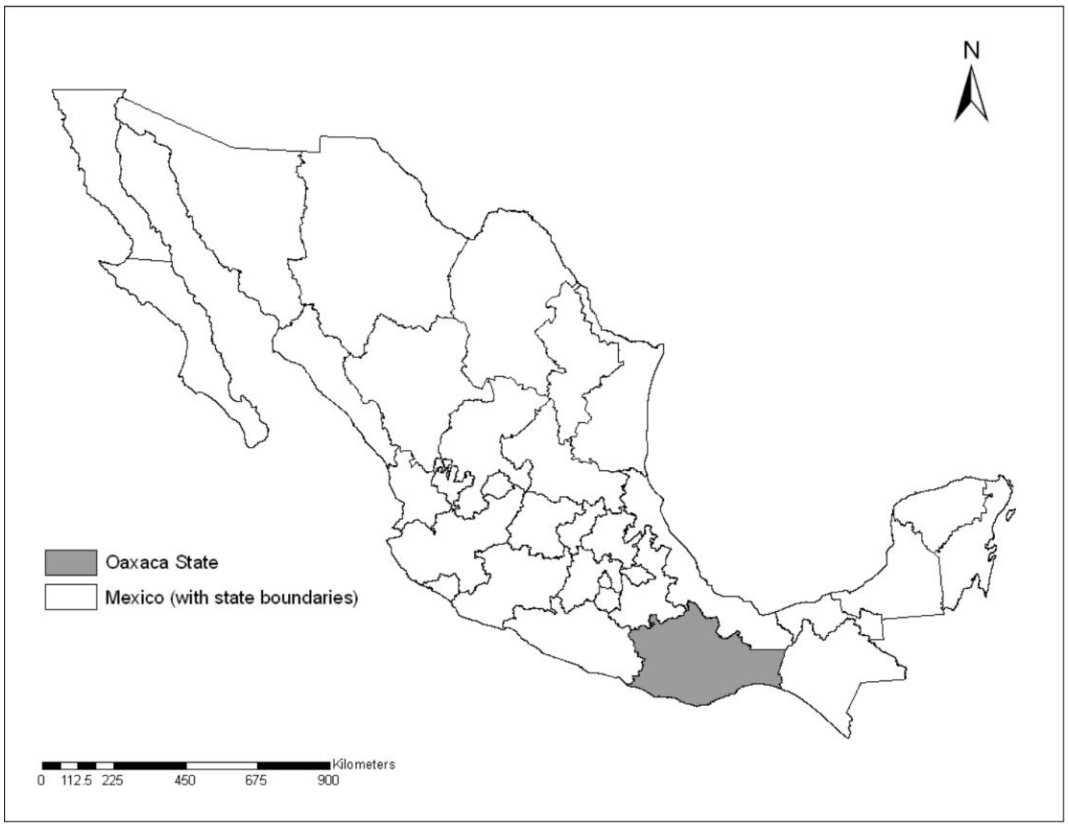
4. To investigate the longer-term adaptive strategies developed by the study communities to deal with current and projected out-migration, and safeguard local forest commons.

1.4 The Field Context

The State of Oaxaca (Map 1.1) provides the perfect setting and context for my thesis, thanks to the area's rich biological diversity, the extensive forest areas under community control, and the increasingly important role that migration plays in the local and regional economy (Cohen 2004a; Merino 2004; Mittermeier et al. 2005).

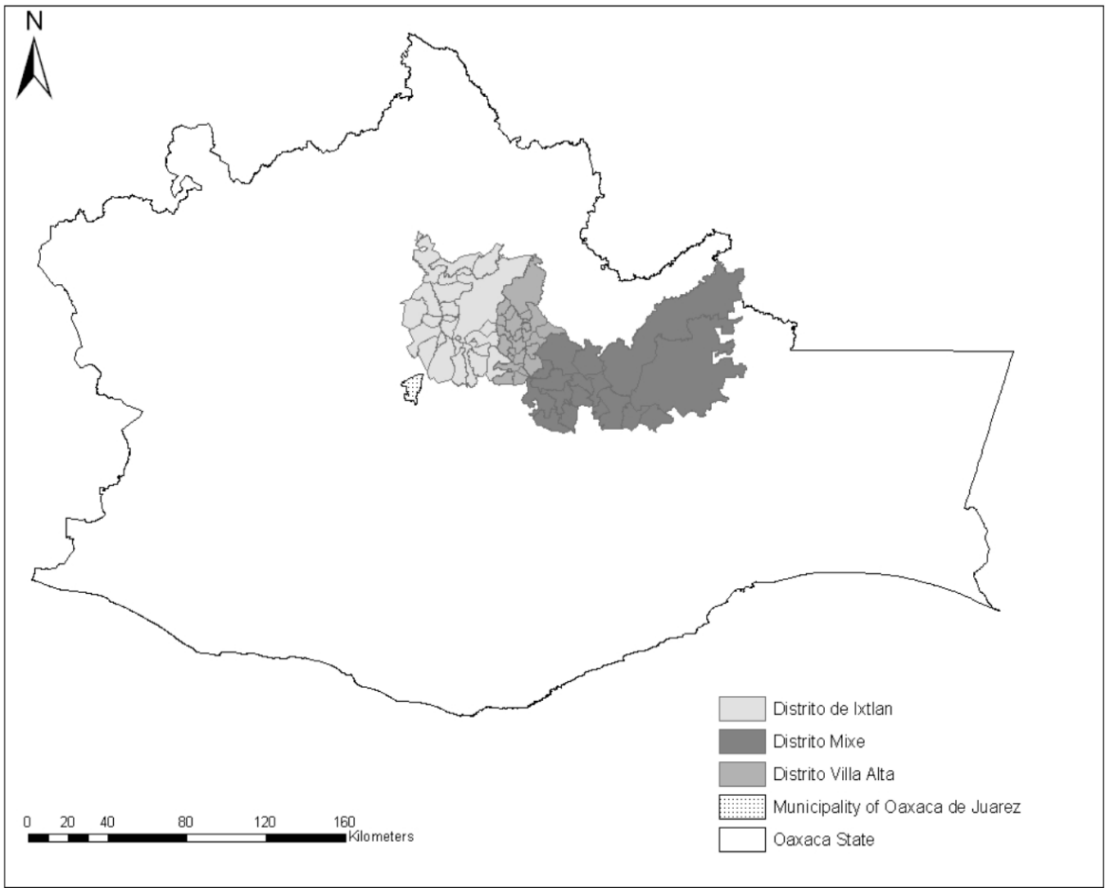
It is estimated that up to eighty percent of the state's forests are under the management and control of approximately fourteen hundred local communities (Merino 2004; Sarukhan and Larson 2001). The majority of these (more than three quarters) are indigenous communities, with far fewer *ejidos*[4] of mixed ethnic background (INI 2002). These communities exhibit high cultural diversity, with sixteen of Mexico's fifty-three indigenous groups represented (CDI-UNDP 2004).

[4] Formally guaranteed in Article 27 of the 1917 Constitution, *ejidos* form a system of inheritable communal lands assigned by the federal government to landless *campesinos* of varying ethnicities.



Map 1.1: State of Oaxaca, southern Mexico

The research took place in the Sierra Norte region of Oaxaca (also known as the Sierra de Juarez), which covers an area of 9,347 km2, or 9.8% of state territory (INAFED 2007) (Map 1.2). Forming the meeting point of the Sierra Madre Oriental and Sierra Madre Occidental mountain chains, this is a rugged, highland region. It constitutes part of the 'Madrean Pine-Oak Woodlands' biodiversity hotspot – an area classified as extraordinarily rich in both plant and animal species, with a high number of endemics (Challenger 1998; Conservation International 2007). Five indigenous groups are represented (Zapotecos, Chinantecos, Mixes, Mazatecos and Cuicatecos) (CDI-UNDP 2006); their presence in the region is long-standing and dates back to pre-Hispanic times. Administratively, the Sierra Norte is divided into sixty-eight municipalities and three districts – Villa Alta, Mixe and Ixtlan de Juarez. The study took place in the last of these; Ixtlan de Juarez. This district covers 2,921 square kilometres and its forests are regarded as the best conserved in the region (Merino 2003).



Map 1.2: Location of the Sierra Norte of Oaxaca

The vast majority of Ixtlan's 26 municipalities are home to Zapotec, Chinantec or Mixe indigenous communities, all of who maintain traditional organisational structures via a long-standing governance system known as *usos y costumbres (*uses and customs). More information on this system, which is officially recognised by the State of Oaxaca, along with the social institutions (*cargos* and *tequios*) that define it, is provided in Chapters 2 and 4. Over time, many of these communities have developed an intimate relationship with their forests and other natural resources (Chapela 2005; Robson 2007, 2009), making use of dynamic and innovative management practices to create what Berkes and Davidson-Hunt (2006) refer to as 'multifunctional, cultural landscapes'. Territorial planning is typically based on a mosaic of land uses that include forest protection, timber extraction, the harvesting of non-timber forest products (NTFPs) and, principally, maize or bean cropping systems (Chapela 2005; Gonzalez 2001). It is estimated that 73% of the region is forested, with 56% pertaining to temperate and tropical forest cover, 17% to secondary vegetation (created through rotation agriculture or the extraction of

firewood and building materials), while the remaining 27% corresponds to agricultural zones, urban areas and scrubland (De la Mora 2003). When managed well, these systems can improve rural livelihoods through the sustainable management of ecosystem productivity and diversity, while minimising negative ecological impacts (see McNeely and Scherr 2003).

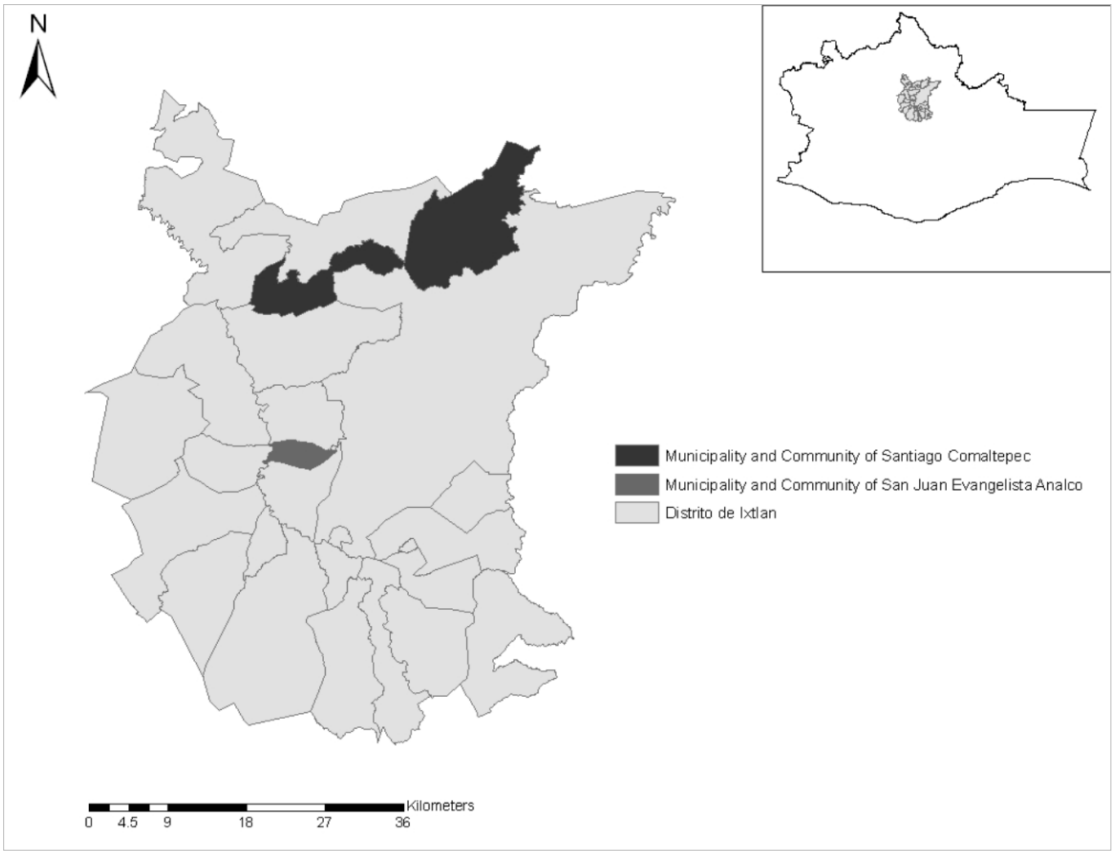
At the same time, a diversity of conditions can be found in the Ixtlan sub-region. While some communities continue to maintain a traditional economy dependent on subsistence and commercial agriculture, others are in transition with an increasing dependence on the market economy, the service industry, and migrant remittances (Martínez Romero 2005). These are what Kearney (1996) describes as 'post-peasant communities' – organizations intermeshed with traditional arrangements that have developed multiple identities to combine different sources of income with complex forms of reproduction in an interconnected, globalised world (Wolf 1982; Schuren 2003). This process can be seen in the rise of community forestry in the region, and the emergence of community forest enterprises (CFEs) (Merino 2004; Bray et al. 2005; Bray 2010).

Despite success in marrying resource productivity with conservation goals (Chapela 2005; Robson 2007), it is not apparent how land-use systems in the Sierra Norte, and the institutional arrangements that regulate them, are responding and adapting to new challenges in a contemporary setting. Out-migration, in particular, represents an important demographic and socio-cultural process among many of the region's communities (Martínez Romero 2005), with probable implications for land use cover and change. Indeed, it has been suggested that the depopulation of rural areas, along with a demographic shift toward an increased average age of remaining residents ("aging"), is a potentially irreversible process that represents serious threats to natural systems and resources locally (Meyerson et al. 2007). While a handful of studies in Oaxaca have looked at the link between migration and communal governance structures (Mutersbaugh 2002; VanWey et al. 2005), not a single one discussed in detail the environmental implications for sending communities. Martínez Romero (2005) made some inroads, and concluded that out-migration is likely an emerging constraint to resource management and self-governance among local forest communities.

1.5 Research Approach and Methods

The research was based on two in-depth community case studies. I chose to adopt a case study approach because I believe it offers an excellent way to look at change in social-ecological

systems and to investigate how societies deal with such change (some of the main reasons why this is so are given in Chapter 3). By looking at more than one community, I was able to gain a better understanding of, and thereby improve my ability to theorise about, a broader context than would have been possible through the use of a single case. The study communities selected were the Chinantec community of Santiago Comaltepec (**Comaltepec**) and the Zapotec community of San Juan Evangelista Analco (**Analco**) (Map 1.3). Selection was based in part on the results of previous work carried out by researchers at the National Autonomous University of Mexico (UNAM) (Martínez Romero 2005; Merino 2006), with final site selection made in collaboration with local partners. Fieldwork began in December 2007 and culminated in January 2010.



Map 1.3: Location of the two study communities

Interdisciplinary research is required to understand the complex processes that link migration and the environment in sending communities. As such, I used a set of research methods (applied qualitatively) that borrowed from cultural anthropology, sociology,

demography, ecology and human geography. They included participant observation, structured and semi-structured interviews, focus group discussions, territorial walking tours and forest sampling. These methods were interactive and responsive to local conditions, and helped provide me with a high level of detail about participants and their experiences. They were also gendered, taking into account the knowledge and practices specific and common to women and men, and participation in institutions by gender.

1.6 Main Contributions to Knowledge

Despite the emerging trend to frame commons as complex social-ecological systems, the literature has done a poor job of trying to understand the impact that drivers of change can have on commons institutions and the resource regimes they regulate. In particular, the impact of out-migration has been poorly studied from a commons perspective (Robson 2009; Robson and Nayak, forthcoming). The research undertaken here contributes to theory and debate in a number of ways:

1. The link between institutions and culture: From a commons perspective, the study investigates how well current theories hold up when predicting that out-migration will impact commons institutions by lowering participation, increasing inequalities and raising the cost of individual choices. This line of enquiry follows the work of cultural anthropologists, Fisher (1990), Stevens (1993) and Baker (2005), who show how culture can shape behaviour in ways that are not necessarily rational. Baker (2005) found that institutions can persist despite the absence of many of the attributes that commons theory stipulates. Much of this work resonates strongly with ideas of a 'moral economy', which focuses on the interplay between moral or cultural beliefs and resource activities (Thompson 1991; Scott 1977).

2. Cultural landscapes: The remarkably biodiverse landscapes of Oaxaca are cultural landscapes (Chapela 2005; Robson 2007). By dealing with how institutions respond to change and mitigate ensuing impacts, the thesis looks at how such processes are tied to changing resource management practice. By focusing on the link between institutions and practices, the thesis seeks to understand how human cultures interact with the land and shape it into multi-functional, cultural landscapes, where resources are maintained and renewed (Berkes and Davidson-Hunt 2006; Nazarea 2006). In this way, the work explores the notion that human behaviour is reflexive – whereby people observe both natural and social occurrences and modify

their behaviour on the basis of knowledge and their expectations about future occurrences (Ellen et al. 2000; Borgerhoff Mulder and Coppolillo 2005; Nazarea 2006).

3. The link between population and the environment: Conventional population-environment theory considers just two models that draw a linear and deterministic relationship between the environment and migration: migration to places where there is available land; and, out-migration in response to limited environmental resources in source areas. What these models fail to consider are the varying forms of migration, the selectivity of migration, or how social networks and social capital can be important variables for understanding the effects of migration on the environment (Curran 2002). This concerns how variation in age, life course stage, sex, and the human capital of migrants and those left behind might imply different environmental outcomes. In this way, the thesis assumes the relationship between migration and the environment to be non-linear and non-deterministic. It is unclear, for example, what impact increased forest cover may have on local biodiversity, which in highland regions of Oaxaca is found in a mosaic of forest and cropland exhibiting high environmental variability along altitudinal gradients. This study contributes to the growing body of work examining the consequences of depopulation on tropical landscapes (Kull et al. 2006; Myerson et al. 2007) and forest transition theory more generally (Klooster 2005; Rudel et al. 2005), by questioning the assumption (Grau and Aide 2007) that rural to urban migration stimulates ecosystem recovery and aids biodiversity conservation.

1.7 Applied Perspective

From an applied research perspective, enhancing social resilience and promoting sustainable resource use is an important policy goal, particularly for societies increasingly open to the uncertainties of globalisation, trans-nationalism and environmental change (Blauert and Zadek 1998; Kearney 2004; Myerson et al. 2007). The complex implications of migration and broader demographic and cultural change need to be unravelled if effective measures are to be employed. In this way, the research will improve our understanding of the link that exists between migration, culture and the environment in the context of rural Mexico. This is important within the broader context where a systematic planning approach to biodiversity conservation (after Margules and Pressey 2000) may target Oaxaca, and the Sierra Norte in particular, as the

federal government looks to realign the country's protected area (PA) system – in disregard of existing and effective community-based initiatives (Robson 2007).

1.8 Organisation of the Thesis

The thesis is organised into nine chapters. Following this introduction to the problem, purpose, and conceptual framework of the study, Chapter 2 examines the literature that contextualises the theories that underpin the research. Chapter 3 then explains the research philosophy, methodology and specific methods that guided the collection of primary and secondary field data. Chapter 4 is a context chapter, providing detailed background on the study region and the two study communities. Chapter 5 is split into two parts. Part I describes the historical and contemporary patterns of out-migration from both communities. Part II sets out the key demographic changes that these processes have driven, before analysing the impacts that population loss and changes in age-sex structures have had on the two social institutions (*cargos* and *tequios*) that form a central pillar of village life. Chapter 6 continues the 'impacts' theme, this time looking at the effect of demographic change (and associated cultural change) on territorial land use and resource practice. It concludes with a discussion of the possible implications for local biodiversity. Having described the nature of the driver and its socio-ecological impacts, Chapter 7 analyses community-level responses to out-migration, and comments on the emergence of trans-local institutional adaptations and innovations. Based on these findings, Chapter 8 discusses at length the phenomenon of out-migration from a commons perspective, and how it may be contributing to transformative changes among traditionally resource-dependent communities. Chapter 9 provides a summary of the study's findings, its theoretical contributions, and some recommendations for both future research and policy.

CHAPTER 2 – THEORY AND PRACTICE

2.1 Introduction

This chapter reviews the literature that covers the different theories and concepts that underpin the research presented in this thesis. It is organised into three main sections and, where possible, discussions are grounded in the context of the country (Mexico) and state (Oaxaca) under investigation. The first section focuses on migration, which is the central driver featured in this study. By exploring the key developments in this field, a platform is built upon which subsequent discussions are based. The second section provides an introduction to, and a critique of commons (or common property) theory. This is an area of scholarship that has significantly improved our understanding of the practices that govern the use of shared resources, and how the welfare of local users may be impacted through changes to local management regimes. As such, it is the main theory to which this study contributes. Given that conventional commons thinking has difficulty in predicting how an affected regime may respond to change through out-migration, 'vulnerability' and 'adaptive capacity' – as key properties of complex social-ecological systems – are used to identify the factors that can determine the susceptibility of sending (home) communities to such change. Finally, since this study concerns the impacts of out-migration on multiple aspects of specific commons regimes in northern Oaxaca, Mexico, the third section explores the forest landscapes that characterise this region. The concept of multi-functionality is used to explain the conservation benefits of local land use systems and resource practices; before a description is provided of the customary governance system and institutional arrangements that have evolved to administer communities' diverse territorial resources.

2.2 Migration, Development and Transnationalism

Migration has been identified by the Millennium Ecosystem Assessment (2005) as a principal driver of change impacting social-ecological systems, where demographic and cultural changes impinge upon both sending and receiving regions and countries. This thesis deals with the impact on sending communities, whereby out-migration is understood as population movement from rural areas, both permanent and circular, within and across national borders, although not exclusively in pursuit of employment or labour opportunities. In terms of international migration, the vast majority of Mexican migrants head into the U.S, where they

numbered almost 11 million by 2005 or close on a third of the foreign-born population in the country (http://www.migrationinformation.org/datahub).

Arango (2000) has argued that despite a plethora of conceptual models, frameworks and empirical generalisations, scholars are still struggling to develop a general theory of migration. Using examples drawn largely from central and southern Mexico, this section of the literature review covers the different perspectives that have contributed to our understanding of migration as a phenomenon since the second half of the twentieth century, when most serious investigation began. By focusing on three key debates – what drives people to migrate, the transnationalism paradigm, and the relationship between migration and development – the review acts as a theoretical and conceptual layer upon which many subsequent discussions are based.

2.2.1 Why people migrate? Evolving theoretical perspectives

In the 1960s and 1970s, most thinking on migration revolved around neo-classical (economic) explanations. Rooted in Lewis's (1954) idea of dual economies, where the modern sector connects with the traditional, migration was seen as a way for countries to get rid of surplus labour – the precondition for development. Migration was considered to be governed by the economics of rational choice, namely: utility maximisation, expected net returns and wage differentials – such that individual decision-making combined with a macro-counterpart of structural determinants to drive the flow of workers from labour abundant/low wage areas to labour scarce/high wage areas. The decision to migrate, according to this model, was thus made by actors based on cost-benefit calculations.

The shortcomings of this approach became apparent when migratory flows underwent profound changes in the mid-1970s. There was a shift from national to international migration, which increased both the heterogeneity and complexity of the phenomenon – thereby raising questions about some of the assumptions made by the neo-classical model. Why, for example, do more people not move from underdeveloped areas? Likewise, why is it that some countries enjoy high rates of out-migration, while others, structurally similar, do not? In tackling such questions, it became clear that the neo-classical model, based almost entirely on economic rationale, was unable to incorporate divergent political and cultural contexts, non-economic factors, and the increasingly heterogeneous nature of migrant societies. Thus, as international migration took precedence, new ways of thinking emerged. As Massey et al. (1998) state, this created a "variegated mosaic" of perspectives rather than any single new paradigm.

Oded Stark's (1991) 'New Economics of Labour Migration' model enriched the neo-classical explanation with one key amendment; that the rational actor was now the household rather than the individual (Wood 1981:338-339). The 'Dual Labour Market Theory' of Michael Piore (1979), on the other hand, placed the focus on the receiving end of migration, where outward flows of workers were caused by a permanent demand for foreign labour, and thus tied to the characteristics of advanced industrial societies. This view was closely aligned to 'World Systems Theory' (Wallerstein 1974), which classed migration as the product of the domination exerted by core countries over peripheral ones (Portes 1978). Migration was thus seen as stemming from inequalities, an idea that Sassen (1990) took in framing migration as a global labour supply system.

The above perspectives, however, were all still driven by economic thinking. Among sociologists and anthropologists, there was a great deal of dissatisfaction with how this (largely) macro-approach portrayed migrants not as active agents but as "passive reactors manipulated by the world capitalist system" (Brettell and Hollifield 2008:104). This backlash resulted in a new form of theorising, along social and institutional lines, based on the articulation between sending and receiving societies. In particular, there was great interest in the concept of 'Migrant Networks', which was developed most notably by the work of Douglas Massey (1987, 1990). Massey defined these networks as "sets of interpersonal relations that link migrants or returned migrants with relatives, friends or fellow countrymen at home" (Massey 1990:7), which reduced the costs (financial and emotional) and uncertainty of migration, while acting as a new layer of social capital held by affected households and communities (Davis et al. 2002; Curran and Rivero-Fuentes 2003). Networks are now considered to play a central role among most contemporary investigations and explanations of migration. In the context of Mexican migration, Curran and Rivero-Fuentes (2003) found that migrant networks are more important for international moves than for internal moves, with Massey and Garcia España (1987) showing that the likelihood of men moving increases significantly when at least one member of their household had previously migrated to the United States. Massey and Espinoza (1997) also found that kinship networks play an important role in increasing the odds of first and subsequent migrations for heads of household.

In becoming one of the most important explanatory factors behind migration, networks have helped to move explanations of migration from an economic to a more cultural model. In

their 1987 classic '*Return to Aztlan*', Massey and colleagues described migration as a dynamic social process involving six main stages:

1) Migration originates in structural transformation of sending and receiving societies;
2) Once begun, migration eventually develops a social infrastructure that enables movement on a mass basis;
3) International migration becomes more widely accessible, and it is increasingly adopted by families as part of larger survival strategies;
4) International migration is strongly disposed to become a self-sustaining social process;
5) No matter how temporary a migration flow may seem, settlement of some migrants within the receiving country is inevitable; and,
6) Networks are maintained by an ongoing process of return migration, where recurrent migrants regularly go home for periods and settled migrants return to their communities of origin.

Within this cultural model, networks are one of the mechanisms by which migration can become a self-perpetuating phenomenon (Portes and DeWind 2007; Curran and Rivero-Fuentes 2003) – in the sense that they explain the continuation of migration independently from the causes that led to the initial movement. This idea of *cumulative causation* was first suggested by Gunnar Myrdal (1944) in relation to the increasing impoverishment of Afro-American communities in the U.S. The concept was applied to migration when Massey (1990) argued that the first wave of migration changes reality in a way that induces subsequent moves through a combination of socio-economic processes and transformations. Despite increasing acceptance among migration scholars, the theory of cumulative causation is not without its problems. For example, while networks and cultural ties are expressed in the powerful ideology of return migration, little is understood about what may happen when mobility is restricted – as is the case currently with Mexico-US-Mexico migratory flows through increased border control and enforcement.

The divergent perspectives presented here serve to highlight the complex and multi-faceted nature of migration, which makes the phenomenon resistant to theory-building. Arango (2000) is right to point out that most existing theories tend to be partial and limited; they are useful for explaining no more than a dimension or facet of why people choose to migrate. At the same time, it should be noted that scholars have a much more complete understanding of migration today than they did fifteen or twenty years ago, benefiting from years of empirical observation to appreciate how migratory dynamics evolve and change over time. In the context

of international migration, there is now a widely-accepted notion about how migrant flows develop as the situation in sending and receiving countries change (Figure 2.1).

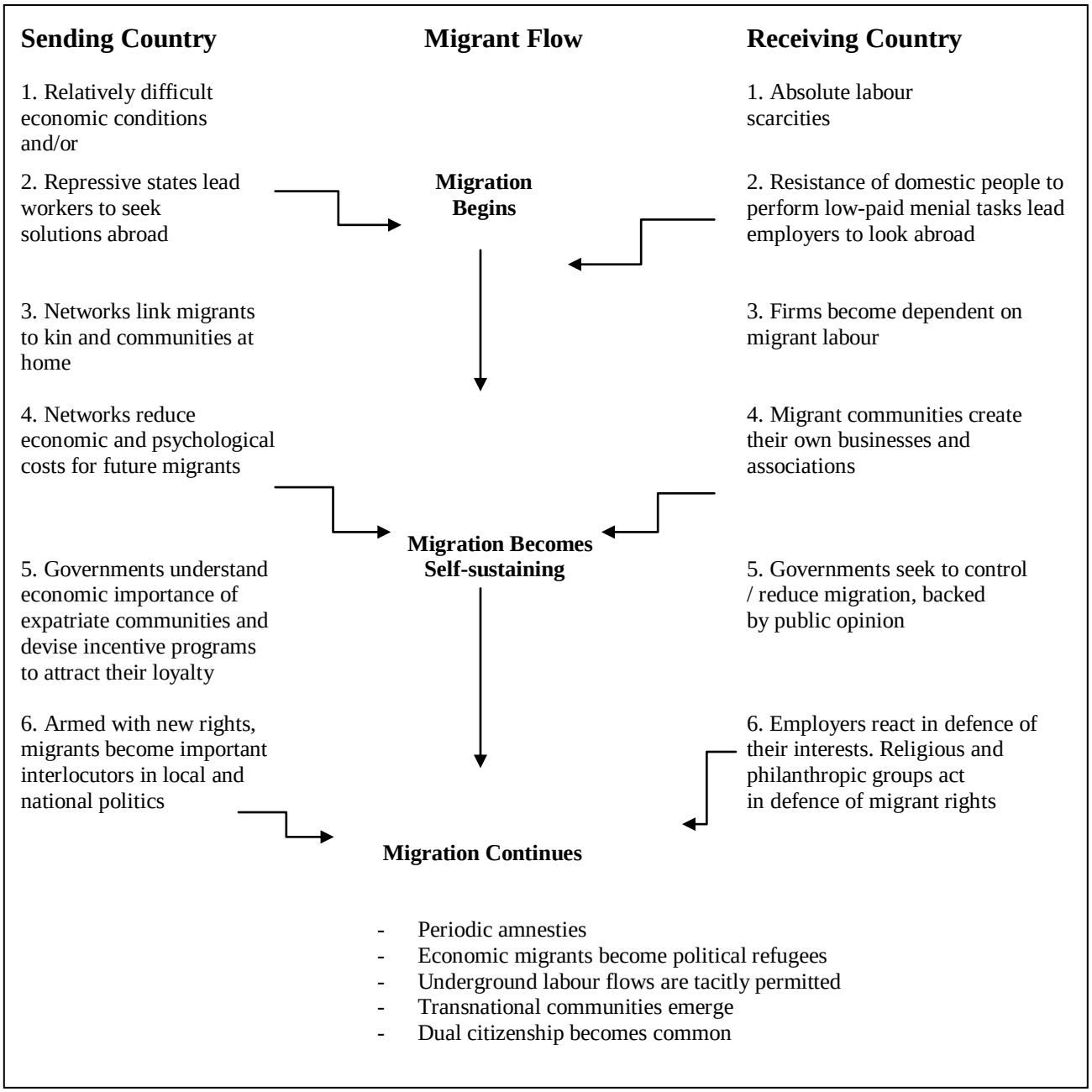


Figure 2.1: Development of migrant flows over time and relationship to sending and receiving countries (Adapted from Portes and DeWind 2007:8)

At the bottom of Figure 2.1, one sees how the interplay of competing forces can lead to unanticipated effects. In particular, the impact of regulatory regimes in state, market, welfare and

cultural domains of receiving countries (Portes and DeWind 2007) can be offset not only by dual citizenship, but also by other ties that migrants sustain with their homeland. This last area conforms to increasing theoretical and research interest in the rise and consolidation of transnational or trans-local communities, which connect immigrant diasporas with their sending regions.

2.2.2 Transnationalism: Towards a new collective voice

As Levitt (2004, http://www.migrationinformation.org/Feature/display.cfm?id=261) states, "the assumption that people will live their lives in one place, according to one set of national and cultural norms, in countries with impermeable national borders, no longer holds true… in the twenty-first century, more and more people will belong to two or more societies at the same time". This is what many anthropologists and sociologists refer to as transnational migration or 'transnational living' (Guarnizo 2003; Smith 2006). As a widely-used term in academia, transnationalism first appeared almost forty years ago. In the 1973 book *Transnational Relations and World Politics,* a landmark publication in the field of international relations, Keohane and Nye describe global interactions among multinational businesses, revolutionary movements, non-governmental organizations (NGOs), trade unions, and academic-scientific networks as transnational relations, and assess their impact on interstate politics. Talk of the 'trans-nationalization' of world affairs, or the so-called globalised economy, began at roughly the same time.

It was not until the early 1990s, however, that *transnationalism* became a buzzword in the social sciences (and migration studies in particular), in reference to activities carried out either by individuals, groups or organisations that somehow transcend the state dimension. Throughout the 1990s, the concept was used to describe the dynamics of contemporary migration, particularly from Mexico and the Caribbean basin to the United States. In this context, Basch, Glick Schiller and Szanton-Blanc (1994:7) defined transnationalism as "the processes by which immigrants forge and sustain multi-stranded social relations that link together their societies of origin and settlement". In other words, transnationalism deals with the dynamic field of social interactions and practices that connect migrants with their communities of origin, in such a way that local happenings are shaped by events occurring many miles away and vice versa. Anthropologists and other social scientists have since debated how to conceptualize transmigrant activity – whether as networks, circuits, or interlinked networks – where

communities are connected to each other through ties of kinship, *compradazgo* (Stephen 2007:97), and trans-border forms of cooperation such as hometown associations.

Transnational migration is not new, of course, and precedes scholarly use of the term. Levitt (2001) shows that as early as the 1900s, European immigrants returned to their home countries or remained active in the political and economic affairs of their homelands from their places of residence in the U.S. However, what has changed over the past half century is the ease of transportation and communication, the ways in which migrants are inserted into the labour market, and the increasing importance of remittances (Levitt 2004). These factors have combined to drive the number of transnational migrants (and the communities they belong to) and increased scholarly attention to these processes. As Stephen (2007:21) points out, when we talk about transmigrants, we actually refer to migrants of varying types and duration, return migrants, and nonmigrants in the same discussion. While the term suggests a more or less permanent state of being between two or more locations, "some people may spend a good part of their lives engaging in this state of being, others may live for longer periods of time in one place or another, and others still may leave their home communities only one time or never… [but] all of the people are living within a transnational social field" (Stephen 2007:21).

The question arises, therefore, as to how many migrants may be considered transnational migrants? Clearly, not all migrants who take part in transnational practices do so all of the time; some are more active than others. Studies by Portes et al. (1999) reveal that only 5-10% of the Dominican, Salvadoran, and Colombian migrants surveyed in the U.S regularly participated in transnational economic and political activities. Most migrants are occasional transnational activists. As Levitt (2001, 2004) explains, at some stages in their lives they are more focused on their countries of origin while at other stages they are more involved in their countries of reception. In this way, transmigrants climb two different social ladders, moving up, remaining steady, or experiencing downward mobility, in various combinations, with respect to both sites. However, in combination, the regular activities of a few with those who participate periodically, do add up. Together they can transform the economy, culture, and everyday life of source-country regions and, in doing so, they challenge notions of gender relations, governance, democracy, and what states should and should not do.

Through the establishment of hometown associations and the flow of remittances, ideas, behaviours, identities and social capital, migrants build social fields that cross geographic,

cultural and political borders, and allow the transnational community to have an effective impact on specific issues in localities of the home country, bypassing the state/national dimension (Sassen 1992; Ostergaard-Nielsen 2003). Basch et al. (1994) argue that transnationalism has moved us away from the concept of a nation-state defined in terms of people sharing a common culture within a bounded territory. Indeed, Kearney (1991) sees transnationalism as a reordering of the capitalist nation-state, calling it the "end of empire". Others argue that the phenomenon undermines the salience of national sovereignty and citizenship, creating de-territorialised and post-national communities, alternative to – if not in conflict with – bounded national polities (Harvey 1989, 1996; Soysal 1994). In what can be termed the "illegalization of migration", Dauvergne (2008:2) argues that the worldwide crackdown on extralegal migration is a reaction to state perceptions of a loss of control over policy initiatives and constitutes a reinterpretation of the "highly malleable concept of sovereignty". Similarly, Stephen (2007:20-21), for purposes of analysis, prefers the concept of 'social field'[5] (after Glick Schiller 2003; Levitt and Glick Schiller 2004) over nation-state, because it offers a way "around the binary divisions, for example, of global/local and national/transnational… and provides a new way of conceptualizing the lives of people who move across many borders and live multi-sited lives". In trying to understand the complete nature of what people are moving or 'transing' between, Stephen actually feels that 'translocal' is more appropriate than 'transnational' to describe the movement of place-specific culture, institutions, people, knowledge, and resources within several local sites and across borders. Translocal in this sense refers to the ties that people retain in their communities of origin and to new communities they establish as they migrate in search of work[6].

The notion of the *national* still holds importance, however. Empirical studies have shown that transnational communities often work as locations for nation-building processes and even generators of nationalism (Gabaccia 2000; Laliotou 2004; Smith 1998). At the same time, states maintain an active role in promoting forms of transborder activities that should not be underestimated, as pointed out by the "neo-institutionalist" perspective (March and Olsen 1984; Hall and Taylor 1996). Sending states' institutions, political parties and organizations shape transnationalism by means of their policies for expatriates, citizenship policies, electoral laws,

[5] Defined by Levitt and Glick-Schiller (2004:9) as "a set of multiple interlocking networks of social relationships through which ideas, practices, and resources are unequally exchanged, organised, and transformed.

[6] In the context of this thesis, with migrants from northern Oaxaca heading to both Mexican and U.S. destinations, *translocal* would appear the more appropriate term to use. Both "transnational" and "translocal" can be considered subsets of transborder movements (after Wiest (2010:23).

and strategies (Bauböck 2003; Ostergaard-Nielsen 2003). Macro-level factors in both the U.S and Mexican economies continue to play a central role in people's decision to migrate or return, while U.S. immigration policy remains focused on controlling the flow of undocumented migrants, with often unexpected consequences[7]. In 1986, an amnesty law under the Immigration Reform and Control Act (IRCA) conferred legal status on nearly three million illegal immigrants in the U.S., turning them into important family and community resources for future migrants (Stephen 2007:145). The Mexican government – at municipal, state and federal levels – also plays a crucial role in creating transnational public life (Smith 2006), by creating programs to strengthen links with Mexicans abroad, to support public works, to keep remittances flowing, and to control the transnational political participation of Mexicans in the United States.

In summary, it is clear that the transnational paradigm is still in development. Some even comment that usage of the term *transnationalism* is in danger of outpacing the ability of scholarly practice to theorise about it (Smith 2006). Nevertheless, the achievements are still considerable. Migrant activities are now conceived and studied as processes involving both sending and receiving countries, which in turn create a cross-national social space or field for the purposes of analysis (represented in Figure 2.2). In this way, the transnational paradigm remains one of the best attempts to respond to and reflect on wider processes of globalisation[8]. It shows that rather than regarding and portraying migrants as workers in a global division of labour, there are many different identities that shape people's actions and consciousness. Migrants are indeed providers of labour for capitalist production in a world economy, but they are also political and social actors. In particular, the paradigm improves our understanding of how trans-border processes drive the economies of sending communities through the exchange of ideas, skills and resources. The debate as to whether these processes benefit or disadvantage local development forms the final sub-section of this part of the literature review.

[7] The increased militarisation of the California-Mexico border (Shelley 2007) has pushed would-be migrants east into Arizona and into the hands of 'coyotes' or people smugglers. Work by Cornelius and Lewis (2007), however, has shown that these changes have yet to significantly limit numbers of undocumented entrants, which totaled well over 11 million during 1990-2005, with 40% arriving in the 2000-2005 period. Massey and Capoferro (2007) reported that the number of Mexicans entering the U.S. increased 450% in the 1990s. While numbers entering the U.S. remain high, tighter border controls have limited the ability of undocumented workers to make return trips to Mexico and participate in circular migratory flows (Cornelius and Lewis 2007).

[8] Major cities like Los Angeles, where many trans-border migrants are concentrated, emerge as strategic sites for globalised economic processes, the concentration of capital and new types of potential actors (Sassen 1990, 1991).

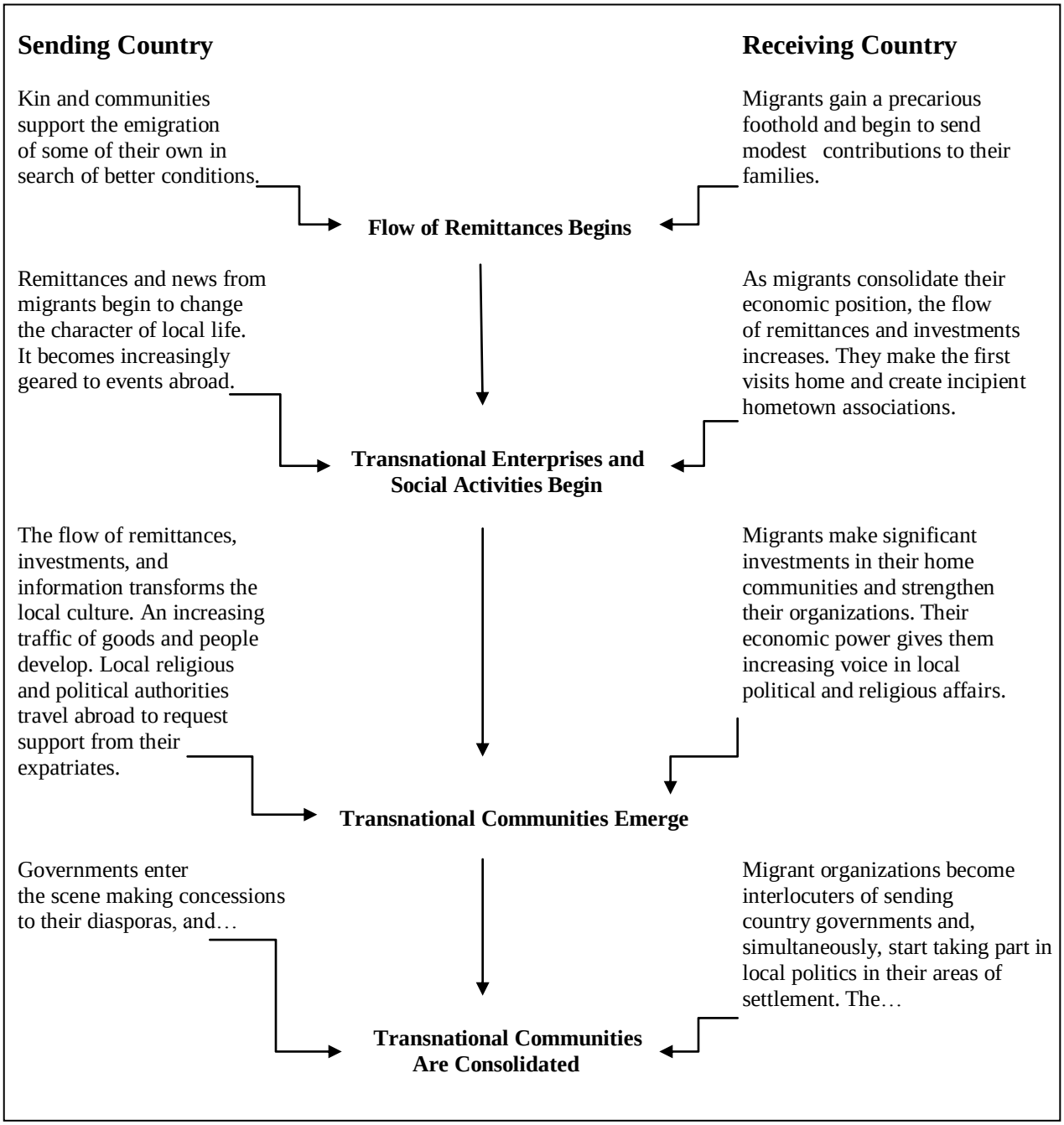


Figure 2.2: The process of transnationalism (adapted from Portes and DeWind 2007:12)

2.2.3 Migration versus development

While migration is seen by some as an opportunity to pull areas out of under-development, others see it as a mechanism of exploitation (Wiest 1983). This conflict lies at the heart of discussions between two divergent schools of thought – the Functionalist and the Structuralist – that argue for and against the role of migrant remittances in promoting rural

economic development. Notwithstanding the 2008 and 2009 global recession[9], remittance flows have increased considerably over the past two decades. According to the World Bank's report, *Global Economic Prospects 2006*, remittances to low- and middle-income countries were US$31 billion in 1990. By 2005, they had reached a staggering US$200 billion, with 25% corresponding to Latin America and the Caribbean. Mexico received US$25 billion in remittances in 2007; making the country the third largest recipient in the world after China and India. This figure accounted for almost half of all outward remittance flows from the U.S. (World Bank 2008). Once employed and free of debts, migrants begin to remit dollars back to their community of origin, and the enormous amounts sent back by migrant workers in recent decades present considerable development potential. As Hielmann (2006) notes, they are especially important for rural development since they flow directly to the periphery rather than the centre of the capitalist system.

The so-called Structuralist school – Leigh Binford, Joshua Reichart and Raymond Wiest, among them – all believe that the influx of dollars have distorted rather than developed rural economies, exacerbating social conflict and economic differentiation. Binford (2003) believes that the debate on remittances has been misconstrued due to too narrow a focus on economic issues – neglecting how remittances can transform local and regional social fields. Reichart (1981) found that legal migrants represented 18% of households but owned 60% of agricultural land, leading to inequalities and social tensions. Similarly, Wiest (1984) pointed to socio-economic divisions and inflated land prices. Structuralists conclude that remittances are generally consumed rather than invested, with migration forming part of a global economic system and framed within the context of dependency theory. They see the reduced labour costs offered by migrants as an essential part of the process of capitalist expansion. The class interests and social inequalities that form such a central part of dependency theory are simply mirrored in

[9] While remittances are seen as more resilient in an economic downturn than aid and investment flows, the World Bank expected some of the major migration countries to see an "outright decline" in remittance receipts as a result of the recent global recession (The Economist, 2009). After remittances to Latin America surged 117% from 2002 to 2007, Mexican remittances were down nearly 3% in the first half of 2008 (Economist, 2009). The same Economist article mentions that "in January 2009, the Migration Policy Institute (MPI) published a study on the impact of recession on migration in the U.S, and concluded that the foreign-born population there has already stopped growing, after years of rapid expansion". However, it remains unclear what impact can be expected from a "coordinated global downturn at a time of historically high migration". As economies such as Mexico's have also been affected, the push to export migrants could also rise quickly. Indeed, the very same MPI report estimated that if "real wages in Mexico slip by 10%, U.S. authorities should brace themselves for a 6.4-8.7% rise in attempted illegal migration".

the divisions that present themselves in sending communities. In Smith's (2006) study of the mature migrant community of Ticuani, located in the Mixteca region of Oaxaca, the remittance economy has exacerbated inequalities by "dollarizing" the local economy – inflating prices as migrant families pay for goods with dollars, and widening class differences, which become defined by whether one has relatives in the United States and how much they earn and remit. He claims that "migration has altered the previous class structure beyond recognition", producing both a "remittance bourgeoisie" and a "transnational underclass" who receive no remittances. This underclass is very poor and cannot afford to migrate; they earn in Mexican pesos, but have to purchase goods in a "dollarized" economy (Smith 2006:49-50).

In the 1990s, however, researchers began to draw more positive conclusions about the potential of remittances – where they are invested in agriculture, productive activities and human capital, and circulate in ways that reduce income disparities. The functionalist, developmental or revisionist school – Douglas Massey, Jorge Durand and Jeffrey Cohen, among them – offers a far more positive picture of the impact of migration on local development in sending regions and communities. As investment increases demand, more labour is needed locally and workers spend their salaries, leading to an increase in the indirect, or *multiplier effects* of migration. On the issue of inequalities, Cohen (2003, 2005) shows that class differences can decrease even as remitting continues. He argues that Structuralists have failed to properly acknowledge that rural Mexican communities were socially and economically stratified long before the onset of migration. Of particular relevance to this thesis, Cohen (2004) found that rates of community participation and support do not differ in meaningful ways between migrants and non-migrants. Geography may also have a bearing on the impact and use of remittances. Durand and Massey (1992) argue that location near an urban centre can further encourage local investment and successful development. In Oaxaca, communities with better access to the state's capital show a higher rate of remittance investment than more isolated and rural communities (Cohen 2005). This is no more apparent than in Waterbury's (1999) study of communities that lie on the fringes of Oaxaca City. Here, with growing consumerism, peasant communities have improved their material conditions by shifting production and investing their resources in new technology and production techniques.

Among other things, remittances have been reported to foster business starts, stimulate spending that supports existing businesses and community development, encourage productive

agricultural activities, reduce gender inequality by providing women with greater bargaining power, and reduce intra-community and inter-regional differences (Curran 2002; Mutersbaugh 2002). Some view investments of this kind as a reinstatement of such 'grassroots' principles as small-scale, local control and cultural preservation (Jones 1998). Indeed, the systems of remittances (or *envios*) go beyond that of economic resources into the realms of social capital and cultural capital (Grieshop 2006). While social capital pertains to connections, relationships, and roles that shape the social interactions of a system (trust, shared values and practices), cultural capital represents non-economic forces including family and community background and class. Further support is provided by the emergence of translocal ties and civic participation via hometown associations, which can direct remittances into community, rather than household-level investments. Remittances of this nature are considered a principal means by which migrants express their commitment to 'home'. The portion of remittances that go in support of a community is often dependent upon the existence and degree of activity of these associations, which act as conduits between source and migrant communities[10].

In light of such findings, Binford (2003:322-323) responded to the challenges laid down by Cohen and others to accept that "migration contributes to local economic development when the direct and indirect effects of remittances help to structure local economic activity in such a way that the incidence of future international migration declines". However, he maintains that the majority of affected households are still caught up in what is termed the 'Migrant Syndrome' (from Reichart 1981), in which their current standard of living can only be maintained via a constant flow of remittances[11]. Likewise, Wiest (1975, 1983) had previously pointed out that while the surface effects of migration can generally be considered beneficial, the most significant underlying effects (class relations, production process, local labour market) often elude analyses. In his study of the Mexican town of Acuitzio, in the State of Michoacan, migrants formed a mobile rural proletariat whose trips were often dependent on forces beyond their control (Wiest

[10] Doubts remain as to whether translocal ties will continue to foster remittance flows to sending communities, or whether they will fade as second- and third-generation migrants enter the social worlds of their predecessors. Will these linkages transcend generations? This depends upon whether the children of indigenous migrants born in the U.S. or Mexico City can effectively gain knowledge of sending community material practices, governance processes, and discursive conventions. Mutersbaugh (2002) has shown how indigenous governance systems in Oaxaca involve a long apprenticeship, something that far-flung networks may struggle to maintain.

[11] Since migrants to the U.S. earn considerably more than they could in Mexico, they must continue to migrate to sustain a higher standard of living, and exhibit patterns of consumption that induce others to migrate.

1975)[12]. Both Binford and Wiest conclude that globalised capital and markets homogenise and differentiate, which exacerbates divisions between and among migrants and non-migrants. Otero (2004) has argued that such external dependencies have devastated rural Mexico, leading masses of workers (unable to find employment locally) to migrate to the U.S. In Binford's (2003:306) view, the revisionist perspective has therefore done little more than put "a happy face on a dismal situation rather than investigate the effects of neoliberal economic policy". The issue for Binford is not whether successful cases exist – he acknowledges that they do – but how frequent and long-term these successes are.

Given such divergent opinion, it would appear too simplistic to argue that migration is either good or bad for sending communities. There is plenty of empirical evidence to show that migration can benefit certain aspects of community development. Yet, it is also the case that proponents of the functionalist approach still tend to ignore, or fail to comprehend for political/ideological reasons (Wiest, personal communication), the structural conditions that underpin local economy. As with many socioeconomic phenomena, migration involves activities that generate trade-offs for a range of actors operating at different levels. Philip Martin (1998) argues that those trade-offs will look different in each community, such that the development impact of remittances depends on the local context. As Wiest (personal communication) adds, "what side you take largely depends on what you are trying to explain…", and more specifically, peoples' understanding of what 'development' means. For the researcher, therefore, both approaches offer something when analysing migration and remittance outcomes, and so consideration needs to be given to these different perspectives. In practical terms, this means that migration should not be conceptualised in terms of a single dimension (whether economic, social, historical or demographic) but rather the developmental impact of remittances, skills and knowledge should be considered at multiple levels that range from the individual, through to the household, the community and the region.

[12] Kearney (1995) and Otero (2004) eventually came to characterise Mexico's rural populations as post-peasant, in that rural people are no longer in the process of *proletariansation* (becoming workers in wage labour markets); rather, they are considered fully part of the capitalist market system.

2.3 Commons, Complexity, and Drivers of Change

How do the multiple changes brought about by out-migration impact long-standing management regimes where communal resources are governed by a system based on shared norms, values and the active participation of local users? The two indigenous communities that feature in this study are examples of commons regimes, where users have crafted and evolved a set of formal and informal institutions to administer use of the resources to which they share access. This section of the literature review introduces the basics of conventional commons theory, provides detail on alternative frameworks for understanding commons institutions and their persistence over time, and lastly introduces the idea that commons are complex social-ecological systems which are subject to uncertainty and change. Given that drivers (such as out-migration) have been a poorly studied aspect of commons regimes, the emergent literature on social vulnerability and adaptive capacity is reviewed so as to identify the different ways in which these regimes can be susceptible to or buffer associated change.

2.3.1 Conventional commons theory

Common-pool resources (CPRs) are resources that are subtractable (subject to depletion) and for which exclusion is difficult (McKean 2000). In many areas of Mexico, including Oaxaca, the physical nature of local forests makes exclusion difficult and costly, while their appropriation by one user decreases the amount of timber and non-timber products available to others. CPRs can be found under any one of four broad classifications of property regime: private property, government or state property, common property and open-access (where there is an absence of property rights). In Mexico, common property systems dominate the rural landscape, with two models of community organization in existence: the *ejido*[13] and the *agrarian* (indigenous) *community*[14] (Sarukhan and Larson 2001). In this way, the country exhibits a mixture of common property experiences; both long-standing indigenous regimes that have been reformulated through twentieth century agrarian reform, and *ejidos*, which are far newer entities created since the 1930s.

[13] Formally guaranteed in Article 27 of the 1917 Constitution, *ejidos* form a system of inheritable communal lands assigned by the federal government to landless *campesinos* of varying ethnicities (Klooster 2003).

[14] In the case of agrarian communities, these systems refer to the ancestral territories of indigenous groups or other peasant communities that pre-date the Mexican Revolution. As part of the agrarian reform process, the Mexican government restored to these communities lands that had been dispossessed during the colonial period.

From Malthus (1798) to Hardin (1968), via Gordon (1954) and Scott (1955) and Olson (1965), conventional resource theory has dictated that the tension between individual gain and collective good would lead resource users to act out of their short-term interest to diminish the long-term value of CPRs. Hardin's (1968) seminal article, "The Tragedy of the Commons", is perhaps the best-known and most widely cited scientific text supporting this view. The logic of the tragedy argument calls for the privatisation or enclosure of commons to ensure their long-term survival. In response, the 1980s and 1990s saw a raft of theoretical and empirical work showing that small groups of users were capable, under the right conditions, of resolving Hardin's commons dilemma (Ostrom 1990; Bromley 1992; Baland and Platteau 1996). This body of work provided some of the best-known arguments in support of self-organised resource management systems, and suggested that there is no "deterministic logic" to instituting private property or privatising nature (Agrawal 2005).

These studies found that users had evolved institutions to regulate and conserve their shared resources, with collective action a requirement to formulate, implement and enforce these rules (Meinzen-Dick et al. 2006). Institutions, in this sense, can be defined as the formal rules and informal norms that help to shape and govern human interaction and behaviour by defining the set of choices available to groups or individuals (North 1990, 2005). Whether formal or informal, these rules and norms help to reduce uncertainty by providing a structure or framework to any social, political, environmental or economic activity. While Ostrom (1990) used game theory to illustrate the challenge of getting individuals to act collectively, subsequent institutional work focused on the importance of incentive structures and group dynamics (Keohane and Ostrom 1995). In this way, commons theory used a rational choice framework to explain individual participation in collective action in terms of the costs and benefits of their participation, whereby rules, sanctions and other organisational attributes reduced the cost of exchange between individuals within any given property regime (Ostrom, Gardner and Walker 1994). By making use of this framework, scholars were able to derive a set of resource and resource user attributes associated with successful commons management systems (Text Box 2.1).

Ostrom (2001b:23-24) argued that the key to further theoretical integration was to understand how these attributes interact in complex ways to affect the basic benefit-cost calculations of a set of appropriators using a resource. In a simple formula, she described how

each appropriator (i) has to compare the expected net benefits of harvesting using the old rules (BO), with the benefits he or she expects to achieve using a new set of rules (BN). Each appropriator (i) must then ask whether his or her incentive to change (D_i) is positive or negative. If D_i is negative for all appropriators, no one has an incentive to change. If D_i is positive for some appropriators, they then need to estimate three types of costs: the up-front costs of time and effort spent devising and agreeing on new rules; the short-term costs of adopting new appropriation strategies; and the long-term costs of monitoring and maintaining a self-governed system over time. If the sum of these expected costs for each appropriator exceeds the incentive to change, no appropriator will invest the time and resources needed to create new institutions and, consequently, no change occurs.

Text Box 2.1: Attributes associated with successful commons management systems

Attributes of the Resource

R1. Feasible improvement: Resource conditions are not at a point of deterioration such that it is useless to organise or so underutilised that little advantage results from organizing.
R2. Indicators: Reliable and valid indicators of the condition of the resource system are frequently available at a relatively low cost.
R3. Predictability: The flow of resource units is relatively predictable.
R4. Spatial extent: The resource system is sufficiently small, given the transportation and communication technology in use, which appropriators can develop accurate knowledge of external boundaries and internal microenvironments.

Attributes of the Appropriators

A1. Salience: Appropriators are dependent on the resource system for a major portion of their livelihood or other important activity
A2. Common understanding: Appropriators have a shared image of how the resource system operates (attributes R1, 2, 3, and 4 above) and how their actions affect each other and the resource system.
A3. Low discount rate: Appropriators use a sufficiently low discount rate in relation to future benefits to be achieved from the resource.
A4. Trust and reciprocity: Appropriators trust one another to keep promises and relate to one another with reciprocity.
A5. Autonomy: Appropriators are able to determine access and harvesting rules without external authorities countermanding them.
A6. Prior organizational experience and local leadership: Appropriators have learned at least minimal skills of organization and leadership through participation in other local associations or learning about ways that neighbouring groups have organised.

Source: Ostrom (2001b:22)

Appropriators in the field, however, rarely face a setting that generates such clear-cut benefit-cost ratios (Ostrom 2001b), and so it is not necessarily the case that most appropriators using common-pool resources will undertake self-governed regulation. In many cases, appropriators will overuse the resource unless efforts are made to change one or more of the variables affecting perceived costs or benefits (Ostrom 2001b:27). In addition, given the number of variables that affect these costs and benefits, external interventions can enhance or reduce the probability of appropriators agreeing on and following rules that generate higher social returns. Conversely, when the benefits of organising are understood by participants to be very high, then appropriators lacking many of these attributes may still be able to overcome their liabilities and develop effective agreements (Ostrom 2001b:28).

Of particular relevance to this study is the work looking at how commons regimes have survived over time. While some studies have shown that self-governed commons regimes can maintain themselves and flourish for centuries (Netting 1976; Ostrom 1990; Stevens 1993), others tell a story of systems that falter and fail (Tainter 1988; Baker 2005). Consequently, considerable agreement now exists about the design principles that characterise the configuration of rules (institutions) typical of long-enduring commons regimes (Text Box 2.2).

Text Box 2.2: Design principles characteristic of long-enduring commons institutions

1. Clearly Defined Boundaries
2. Congruence
3. Collective-Choice Arrangements
4. Monitoring
5. Graduated Sanctions
6. Conflict Resolution Mechanisms
7. Minimal Recognition of Rights to Organise
8. Nested Enterprises

Source: Ostrom (1990:90)

For Ostrom (1990:90), these design principles can be defined as "an essential element or condition that helps to account for the success of these institutions in sustaining the resource and gaining the compliance of generation after generation of appropriators to the rules in use". In

Mexico, Merino´s work (2004) has suggested that successful cases of commons management are dependent on the presence of at least five of Ostrom's eight design principles:

- The participation of appropriators in the formulation of rules that regulate resource use
- The participative monitoring of resource conditions
- Transparency in resource management decision-making
- Spaces for discussing and resolving problems (conflict resolution)
- Strong social capital within the community and past experience and knowledge

In a contemporary setting, how are these variables being affected by the multiple changes brought about by ongoing out-migration? As Young (2002) notes, the logic of the design principles requires that commons regimes are, by and large, small, well defined and homogeneous – all characteristics that may alter under conditions of demographic and cultural change. Group size and heterogeneity, however, are two highly contested variables understood to affect collective action. While Ostrom (1990) suggested that cooperation was more likely to emerge and be sustained in smaller rather than larger groups, a number of subsequent studies have found no statistical relationship (Tang 1992; Ostrom 2005). In terms of heterogeneity, collective action theory suggests that greater heterogeneity within the user group makes self-governance more difficult. Once again, empirical studies have come across institutional designs that cope effectively with such challenges (Varughese and Ostrom 2001; Poteete and Ostrom 2004).

2.3.2 Rethinking commons institutions

The main critiques of commons theory to emerge from outside the collective action school surround the literature's narrow definition of, or explicit focus on, institutions (rules-in-use) as the principal mechanism for shaping social behaviour. In continuing to use institutions as the focus of their analysis, some feel that commons theorists have failed to understand that individual and rational choice are embedded in larger contexts, which can only be understood by delving into the history, politics, culture and social structure of study communities (Peters 1987; Prakash 1998; McCay 2002). Indeed McCay (2002:393) insists that, "how people relate and respond to common-pool resources requires knowing more about their "situations" and how

property rights and other institutions have been specified within those historical, ecological and cultural situations".

One consequence of this critique has been to expand the definition of institutions to include not just rules-in-use but norms and values as well. Cultural anthropologists such as Stevens (1993) and Baker (2005) have been among the most vocal in highlighting the importance of customs, values and cultural traits in commons regimes. Through long-term studies of mountain communities in the Indian and Nepali Himalaya, they have shown how culture can shape behaviour in ways that are not necessarily rational. Baker (2005) provides a fascinating account of the kuhls of Kangra, in Himachal Pradesh, which have persisted despite the absence of many of the attributes that commons theory has stated are required for successful commons regimes. Much of this work resonates strongly with ideas of a 'moral economy', which focus on the interplay between moral or cultural beliefs and resource activities (Thompson 1991; Scott 1977).

In general, there has been little emphasis placed on the historical or political context of individual commons regimes. In Oaxaca, for example, the historical struggles of indigenous groups during both colonial and pre-Hispanic times have resulted in a sense of resistance to centralised power, and the retention of cultural traits and autonomy. Merino (2004) and Chapela (2005) both point to the historical context in Oaxaca as being key to understanding contemporary commons regimes in this part of the country. History plays an important role in defining regional social movements and the development of social capital, as well as any larger debate on resource appropriation. From a political perspective, Agrawal (2005) has made the point that many of the resource attributes that commons theory adheres to are affected by the type of larger political regime in which users are embedded. It is a view supported by Goldman (1998), who believes few commons scholars have been able or willing to look beyond territoriality or locality. He suggests that struggles over nature are inherently political and that those who can affect 'local' commons are often non-local actors. While the government in Mexico has devolved a range of forest governance functions and ownership rights to local communities, it still retains a sizeable degree of regulatory control at the federal and state levels.

Viewing the wider political, historical and cultural context is therefore an essential part of understanding communities' experience with institutions, and to see how local people view, implement, modify, or ignore rules. Common to the critiques of McCay (2003), Baker (2005)

and Goldman (1998) is the belief that by concentrating on universal principles, conditions or rules that characterise successful regimes and institutions, the commons literature has circumvented the plurality of contexts, beliefs, norms and values involved in interactions between resource users. In this sense, institutions need to be considered socially-sculpted entities rather than simple rules-in-use, while also recognizing that institutional arrangements operate within a multi-level world that links the local with the regional, national and global (Berkes 2002; Young 2002).

2.3.3 Commons as complex social-ecological systems

Despite making considerable progress, commons theory requires further development. The diversity of specific rules identified in the case study literature on commons regimes, along with the *embeddedness* of institutions in larger social, political and economic contexts means that it is neither possible to develop an optimal set of rules for solving commons dilemmas, nor come up with a generalisable commons theory. In other words, the empirical research that has so comprehensively challenged Hardin's tragedy argument has also served to highlight the complexity of historically evolved and socially sculpted resource tenure arrangements.

Ostrom (2005) and others (Anderies et al. 2004; Berkes 2006; Wilson 2002) are beginning to find that to help solve commons dilemmas, one needs to deal with complexity and the idea of linked social-ecological systems (SES). Complexity can be defined as a measure of the number of distinct parts or components of a system and the extent to which the functions of individual components are distinct (Young 2002). Commons regimes are multidimensional and, like other complex systems, are seldom linear and predictable; rather, they are characterised by nonlinearity, uncertainty, emergence, multiple levels, and self-organisation. The shift in thinking among commons scholars is perhaps best illustrated by the change in Ostrom's own views regarding the design principles she developed for building robust commons institutions (Ostrom 1990). While she still stands by these principles, they are no more than a starting point that describe the broad structural similarities among those systems that have been robust to social, economic and ecological disturbances occurring over time (Ostrom 2005). This new perspective reflects the realisation that threats always challenge the robustness of commons regimes, no matter how well they may fit the design principles. By framing commons regimes as complex systems, one may consider institutional changes as experiments where there is no set formula (Ostrom 2005). In this sense, institutions emerge, flourish, or fail within social, biophysical and

political fluxes that shape motivation, incentives, and perceptions of costs and benefits. Institutions that work well result from a process of crafting arrangements that fit specific situations and are flexible to processes of change.

2.3.4 Commons institutions and drivers of change

Despite the re-conceptualisation of commons regimes as complex social-ecological systems, the literature is only now beginning to understand the impact that human-induced stressors can have on commons institutions, and how these institutions are responding to such change (Agrawal 2002). In fact, the study of susceptibility and response to change has been described as one of the most neglected and least understood aspects in resource management science (Gunderson and Holling 2002; MEA 2005). In the case of demographic change, while the impacts of rapid migration on receiving communities have been documented (Agrawal 2001; Gibson, Ostrom and McKean 2000), the impacts on sending communities have received far less attention. A review of the twelve hundred or so papers presented at the last three global conferences of the International Association for the Study of the Commons (IASC) unearths just five that tackle the issue of out-migration and commons regimes. In Mexico, despite playing a very important role in governing resource management practices, and thus acting as critical capital for the sustainable use and conservation of forests and other commons (Merino 2004; Bray and Merino 2004), we know very little about how the country's commons institutions are adapting to demographic and (associated) cultural change.

Conventional commons theory (based on a rational choice framework) predicts that demographic change through out-migration could change the viability of a commons regime due to the loss of those who contribute needed resources (Baker 2005; Ostrom 2005). Both declining participation and increased inequality among users can stress regimes by increasing the costs of and controls over individual choices and collective action. These changes, in addition to evolving cultural attitudes, could have an important impact upon the traditional governance system and social institutions that are such a fundamental part of community identity, community cooperation, and common resource management in rural Oaxaca (Merino 2004; Cohen 2004b). The fear is that open access situations could arise as rights and obligations are weakened or eroded by these external pressures and changes. How are these systems and institutions responding to such challenges? While out-migration in Oaxaca is not a new phenomenon, it is not clear whether communities have sufficient experience to anticipate the full array of possible

consequences, or understand what actions to take to effectively cope with any problems that may arise. Although the response of a commons regime will depend upon the effects of change on individual choices and the internal structures that regulate them, a conventional framework cannot easily predict why and how a stressed regime will either persist unchanged, transform to endure, or collapse (Baker 2005). It may be that cultural factors are strong enough to supersede or override the rational decision-making of individual actors, and enable regimes to endure despite debilitating population loss.

In order to better understand the effect of change and disturbance on complex and uncertain commons regimes, Young et al. (2006) suggest the need to move beyond conventional notions of risk, stability and control, and instead shift attention to the dynamics of vulnerability, resilience (as the flipside of vulnerability) and adaptability, or adaptive capacity.

2.4 The Vulnerability and Adaptive Capacity of Complex Commons Regimes

2.4.1 Vulnerability and adaptive capacity: Commonalities and fit

As a concept, vulnerability has its roots in the study of natural hazards and poverty, while research on vulnerability has tended to deal either with issues at the international or global level or at the community or local level. The international climate change literature provides one of the most widely recognised definitions: "the degree to which a system is susceptible to or unable to cope with, adverse effects of (climate) change, including (climate) variability and extremes" (IPCC 2001). In other words, vulnerability is the extent to which a system is exposed to an event and its capacity to be harmed. Vulnerability is also viewed as a function of a system's adaptive capacity and the Intergovernmental Panel on Climate Change (IPCC) has identified various determinants of adaptive capacity including technology, social capital, resource availability, human capital, institutional decision-making capacity, and public perceptions of change.

The IPCC's conceptualization, however, has been criticised for failing to recognise the greater complexity in the meaning of vulnerability. A central tenet of vulnerability research is the identification of conditions that make people or places vulnerable to change and, thus, vulnerability can be considered a social condition (Cutter et al. 2003). Social scientists (Adger et al. 2004; O'Brien 2004; Brooks 2003) have consequently argued that the definition of vulnerability for social systems must be distinct from that of biophysical systems, and in particular needs to place greater emphasise on the characteristics of the system that allow it to

cope with change. Consequently, Adger (2006) defines social vulnerability as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt" (Adger 2006: 268). In this way, rather than being viewed as a set of impacts arising from a particular event, social vulnerability is considered a dynamic and evolving process.

In the literature, social vulnerability is normally taken to be a function of three major elements, which happen to refer to the first, second and fourth objectives of the research presented here:

- System exposure to stress;
- Sensitivity to stress (or coping capacities); and,
- Longer-term resilience to future stresses (adaptive strategies).

The combination of these elements results in a more holistic approach to vulnerability assessment than was the case for previous work on biophysical vulnerability (Cutter et al. 2003), represented by the set of socio-economic factors that determine people's ability to cope with stress or change (Brooks 2003). In a commons scenario, vulnerability to external stresses may be determined by factors such as inequality, participation, institutional capacity, and marginalisation. At the institutional level, vulnerability can be understood as the attributes of resource users that enable them to cope with the impact of disturbance. While resource users may be able to adjust to slow changes – when substantial feedback is provided about the consequences of these changes – as key variables change more quickly, institutional adaptation will become more difficult (Ostrom 2005). This last component, more generally known as 'adaptive capacity', concerns the opportunities that disturbance provides in terms of reconfiguring structures and processes, bringing about system renewal, and the emergence of new trajectories (Folke 2006:263). In assessing vulnerability, questions must therefore be asked about the adaptive capacity of affected social groups and their institutions to deal with the stresses associated with social, political and environmental change.

However, before talking about a system's vulnerability and adaptive capacity, one must specify the type of stress or shock to which it is vulnerable and to which it must adapt. According to Brooks (2003), there are three broad categories: discrete recurrent stresses or shocks; continuous stresses or shocks; and, discrete singular stresses or shocks. In complex SESs, these disturbances can trigger reactions across numerous spatial and temporal scales, while

system dynamics will be affected dependent upon the persistence of the disturbance as well as the size of its impact. Exposure of commons regimes to demographic and associated cultural change will thus be a function of the magnitude and persistence of out-migration. Adaptation, however, does not occur instantaneously (Brooks 2003). Rather, a system requires time to realize its adaptive capacity as adaptation, and so adaptive capacity represents potential rather than actual adaptation and is a determinant of future vulnerability. In the context of this study, vulnerability to a stress such as out-migration is thereby a function of the system's ability to adapt incrementally and responsively, and its vulnerability to increased stress in the future will be a function of its ability to anticipate and pre-empt that stress via appropriate planned adaptation strategies. The temporal scale is thus an important measure of a system's adaptive capacity, and is particularly pertinent in the case of out-migration in Oaxaca, which is an ongoing and (seemingly) long-term stressor.

2.4.2 Community vulnerability and institutional capacity

Social vulnerability has most often been described using the individual characteristics of people. There has been less research, however, on community vulnerability or the factors that influence or shape the susceptibility of communities to harm and govern their ability to respond (MacKendrick and Parkins 2005). Cutter et al. (2003) suggest that these factors can include a lack of access to resources (including information, knowledge and technology); limited access to political power and representation; social capital, including social networks and connections; rules, norms, beliefs and customs. Within the context of the research presented here, these factors could help explain why some communities are more sensitive to out-migration than others. It may be the case that communities with high levels of out-migration will have less than expected vulnerability, owing to various capacities inherent in the community, while in other areas with low to moderate out-migration, vulnerability is elevated owing to the relative absence of such capacities.

This study focuses on communities' experience with out-migration, and their ability to perceive, respond to, cope with, recover from, and adapt to lower participation, increasing inequalities, a new community demographic and changing cultural attitudes. In reducing their vulnerability through adaptation, an important decision made by communities is how to reduce exposure, decrease sensitivity, and increase resilience, or which of these to prioritise in any given situation. Both coping and adaptive strategies at the community level will rely heavily on social,

political and institutional capacities. For example, of the seven indicators of social vulnerability identified by Adger et al. (2004), one is the 'willingness of key institutions to invest in adaptation'. This institutional component concerns how institutions are expected to plan for and respond to change and mitigate ensuing impacts. Institutions are thus considered one of the determinants of adaptive capacity and contributors to community vulnerability and adaptation efforts, with institutional adaptation the outcome of institutions evolving in response to external and internal forces. Adger et al. (2004) describe institutional evolution as a function of both decision-making and "non-decision making", with non-decision being a process where issues are prevented from entering the political domain.

Few have examined these processes empirically in order to identify the key determinants. One important factor may be social capital and cultural cohesion, due to their role in enabling collective action (Adger et al. 2004). In Oaxaca, social capital has been identified as a key component for ensuring successful commons management (Merino 2004; Chapela 2005). In particular, the existence of, and participation in, systems of obligatory labour (*tequios*) and service through positions of responsibility and authority (*cargos*) are both seen as strong indicators of organization and cohesiveness in many Oaxacan communities (Merino 2004; Chapela 2005). How are these and other important cultural ties being affected by the social and economic devaluation of rural life, lands, and resources brought about or exacerbated by ongoing out-migration? In addition to strong social capital and organisation, there are other factors that may be important: do economic diversity, community autonomy and leadership and forest dependence contribute to greater community resilience and lower community vulnerability? How important are the public perceptions of impacts from out-migration? In assessing vulnerability at the community level, some authors have identified risk perception as a critical factor because it links knowledge and understanding to the actions required to mitigate risk, and is based on the idea that if a community is aware of change then it is more likely to respond (MacKendrick and Parkins 2005).

While the research focused on institutions as a determinant of community vulnerability, by adopting a holistic definition of commons institutions that stresses the importance of social relations, cultural norms and values, this study required all of these factors to be considered. Such an approach responds to the complex nature of Oaxacan commons regimes and helps to identify the range of institutional characteristics and experiences that frame how a community

may respond and adapt to out-migration over time, and how resource practices are thereby affected or modified. In particular, it allows for translocal links and institutions to play a key role.

2.4.3 Community vulnerability in a multi-level world

An additional component to this study concerns interaction between endogenous and exogenous processes across social and geographical scales or levels, whereby the factors that determine whether or not adaptation occurs can involve interactions between individuals, groups, institutions, and systems of governance. From an institutional perspective, Berkes (2002) and Young (2002) have shown how horizontal and vertical linkages connect the local to the regional, national or international, the individual to the community, the household to the community, and the community to outside agents. As such, one cannot view systems as closed, nor can one assess a system's ability to adapt without considering the role of obstacles to adaptation that might be determined by processes operating outside of the system or subsystem in question. By talking about both endogenous and exogenous factors, one is able to address not only those processes operating at the sub-system scale, but also the wider social, economic, political and environmental contexts within which commons institutions are embedded.

This also means that care is required when referring to a community's adaptive capacity because it can lead to an emphasis on processes operating at the community level to the neglect of larger-level processes. It may not be the case that a community with high adaptive capacity will automatically adapt. As a way of dealing with this uncertainty, Brooks (2003) talks about "adaptation likelihood". Here, the likelihood of adaptation refers to both the system and sub-system level, and includes the exogenous factors that facilitate or inhibit the realisation of sub-system capacity. This is particularly important in a globalised world, where rising connectedness, increased speed, spatial stretching and declining diversity are leading to greater impacts on both a system's resilience and vulnerability (Young et al. 2006). Out-migration fits many of the traits associated with globalisation, where social relations and institutions can become stretched across space as the community's sphere of influence crosses borders and moves beyond a single geographical locality (Basch et al 1994; Kearney 1995, 2004).

In summary, the capacity of a community to adapt and respond to change – its capacity to mobilise new resources, access new opportunities, and influence higher level processes – is influenced strongly by its location within the broader socio-political context. This study therefore

considered the role of polycentric governance structures and multi-level linkages in helping (or hindering) communities to cope with the impacts of demographic and cultural change through out-migration. In this way, while predominantly based at a community level, it also explored the links connecting villages, regions, nations, and the world system.

2.5 Oaxacan Forest Landscapes

One of the main goals of this research has been to examine the impact of out-migration on the two study communities' territorial (forest) resources and practices, the institutional arrangements that administer these resources, and what demographic and cultural change may imply for local biological diversity. As such, the final section of the literature review: (i) introduces the concept of multi-functional, cultural landscapes; (ii) looks at the conservation benefits of the kind of land use system employed in the study region; (iii) details the rise of community forestry in Oaxaca; and, (iv) introduces the customary governance system that underpin these regimes. In this way, discussion is grounded within the context of the forest communities where the research took place, and introduces the key institutions around which much subsequent analysis is based.

2.5.1 Multifunctional landscapes and biodiversity conservation

Conventional landscape ecologists tend to treat human communities and their roads, cattle, crops and logging operations as exogenous disturbances, focusing instead on the biophysical processes that shape landscape patterns. In contrast, scholars in other fields have written extensively on the integral relationship that exists between between humans and nature (Naveh 1982; Robson and Berkes 2010), arguing that biological and cultural diversity go hand in hand (Borgerhoff Mulder and Coppolillo 2005), and claiming that, across the globe, species richness is highly patterned and concentrated in areas of high cultural and linguistic diversity (Posey 1999; Maffi 2001). A realisation that biodiversity can be maintained through customs and practices that limit or disperse ecological impacts (Phillips 1998, 2002) helps to reinforce the notion that landscapes are shaped by human culture as well as the forces of nature (after Carl Sauer 1925). While Sauer placed humans outside of natural systems, Cronin (1995) argued that there is no clear distinction between nature and culture, since both interlink and should be regarded as co-produced.

Such points of view fuel the move towards a trans-disciplinary landscape science that bridges the gap between the natural sciences, the social sciences, the arts and the humanities (Naveh 2005; Nassauer 2005), and presents an evolving perspective that acknowledges the role played by local knowledge, customary regulations, institutions, and cultural/religious beliefs. After a long-standing focus on biophysical and ecological parameters, a more holistic approach has emerged that deals with people living in, using and shaping the landscape. This marks a shift that fits within the broader context of the "scientific revolution" (Kuhn 1970) based on general systems theory, and moves away from the reductionist and mechanistic paradigms that Capra (1997) critiqued in his seminal publication, *The Web of Life: A New Scientific Understanding of Living Systems*. For landscape ecologists, this new focus is evident in the writings of Turner (2001), Wiens (2005), Brandt and Vejre (2004) and Ryszkowski (2002), all of whom have developed approaches that situate habitat patches in a complex arrangement of forests, agricultural or agro-forestry plots, pasture areas and urban spaces. From a conservation perspective, their work suggests that most, if not all areas of a landscape should be considered important for the potential role they play in maintaining biodiversity. As Ryszkowski (2002) explains, with increasing recognition of a landscape's basic processes, such as energy fluxes, organic matter cycling, and other mechanisms, it is the way in which natural resources are used, not the fact that they are used, that leads to either their degradation or protection.

If we apply this emerging concept of multifunctionality to the highlands of northern Oaxaca, we can see that a complexity of site factors such as altitude, slope direction, soil type, temperature, and rainfall are all driving forces behind the traditional diversification of agricultural and resource practices. From the Andes to the Himalaya, this has resulted in an organically interlinked system of land-based activities based on farming, forestry and animal husbandry (Bebbington 1990; Stevens 1993). In the study region, it is a similar variation in environmental conditions that has impeded the use of a single model to manage the land. Instead, through what Chapela (2005) terms "cultural evolution", communities have developed a set of techniques and practices to adapt to such diversity. In these areas, high biodiversity is found within working landscapes that integrate logging, agricultural and conservation areas[15]. Here, the

[15] Using the UZACHI communities as his case study, Chapela (2005:107-108) describes how land use planning has led to the integrated management of nearly 29,000 hectares of territory among the four member communities. This is large enough an area to talk about management at a regional scale, and covers habitat for viable populations of both flora and fauna. Chapela (2005) contends that without this system of communal management, it is likely that the

physical, chemical, and biological processes that form the natural basis for landscape function are interwoven with the economic, social, cultural, and political spheres of human activities (Brandt and Vejre 2004).

By focusing on all aspects of the landscape, including those areas under intensive management and use by local people, the *multifunctional* approach differs from other, more established landscape ecology models. Land use strategies in Oaxaca, for example, tend to fit poorly with the models proposed by MacArthur and Wilson (1967) and Forman (1995). MacArthur and Wilson's theory of 'island biogeography', in which much landscape ecology thinking is rooted, is based on the notion that the area in between patches of habitat (the 'matrix') are totally unsuitable for resident biota. Forman's more recent 'patch-corridor-matrix' model, which does consider the matrix to be a functional component of the larger landscape, still obscures the richness of these areas, which themselves are a source of different patch types and land uses. A number of ecologists have suggested that a 'mosaic' landscape model would be a better way of describing the contemporary resource systems found in most tropical countries, including Mexico (Gutzwiller 2002; Wiens and Moss 2002, 2005).

As we will see in Chapter 4, a whole range of resource and environmental practices take place in these integrated systems. A multitude of recent studies suggest that such activities can create new habitats and maintain patterns of resource use that actually facilitate the continued renewal of ecosystems (Bhagwat et al. 2005; Davidson-Hunt and Berkes 2003). Berkes and Davidson-Hunt (2006), for example, argue that biodiversity is conserved by resource practices that (directly or indirectly) maintain successional stages, create patches and gaps, create edges (ecotones), and conserve and even enhance vertical diversity. Recent empirical work on resource systems that are managed to increase food production and farmer incomes, and conserve biodiversity and other ecosystem services, supports this view. In Asia and Latin America, research has shown the biodiversity benefits of agricultural systems that 'mimic' the structure of natural forest ecosystems, and show that the diversity of trees, birds and macro fungi can be as high in managed landscapes as they are in formal protected areas (Leakey 1999; Schroth et al. 2004; Bhagwat et al. 2005; Pineda et al. 2005; Diemont et al. 2006).

---

forest would have become fragmented among the thousand families that make up the five member communities. Instead, there are forest areas that extend for more than twelve kilometres without interruption.

As one example, timber management practices are not normally considered compatible with a functional level of biodiversity. While this can be the case, it is also true that disturbances, including logging, may produce a shifting mosaic of successional habitats that has spatial and temporal dynamics to which ecological communities respond (Schroth et al. 2004). UZACHI[16] has incorporated this line of thinking into its forest management plan and cutting cycles, encouraging member communities to move away from the single species focus favoured by previous logging operations, to an ecosystem approach that seeks to protect natural forest processes and functions. This alternative silvicultural system (known in Mexico as the *Metodo de Desarrollo de Silvicultura*) incorporates clearings and regeneration cuts that imitate the effects of forest fires to help with pine regeneration and reproduce processes of ecological succession (Bray and Merino 2004). Among the UZACHI communities, this shift to "emulation forestry" (Perera et al. 2004) appears to have had a positive effect, with forest area in 2000 greater than it was in the early 1980s, and increased forest biomass volumes recorded in the communities of Capulalpam de Mendez and La Trinidad (CCMSS 2002)[17].

The above mentioned studies and examples suggest that agro-ecosystems and ecologically sensitive forest management can help connect natural habitat fragments with other landscape habitats, and thus represent a functional resource for biodiversity that serves as a complement to natural ecosystems in a modified mosaic landscape. Such thinking has led McNeely and Scherr (2003) to argue that multifunctional land use systems should be given a far more prominent role to play in biodiversity conservation efforts. However, some of the positive biodiversity impacts of Oaxacan land use systems and practices still tend to be assumed rather than substantiated through empirical study (Robson 2007, 2009). This highlights the need for more research to show how the spatial configuration and functional dynamics of local landscape mosaics influence species predation, dispersal, population dynamics, nutrient distribution or disturbance spread, among other factors. No matter the type of landscape model followed, conservation still requires that such areas provide the right habitat quality, amount and configuration for species persistence over the long-term. In some regions, the negative impact of changing land use on forest cover (see Velazquez et al. 2003; Gomez-Mendoza 2006) acts as a

[16] *Union de Comunidades Zapoteco-Chinanteca* (UZACHI) is an organisation of three Zapotec communities and one Chinantec community from the Sierra Norte. While each of these communities is autonomous and has its own internal governance mechanisms, UZACHI was created as a regional body to support community forest management strategies and face common problems collectively (Chapela 2005).

[17] It should be noted, however, that increased forest cover is also due to a reduction in areas under cultivation.

reminder that communal land use systems in Mexico do not constitute, by themselves, a model of rational and ecologically-sound resource use (Sarukhan and Larson 2001).

2.5.2 Common property regimes and the rise of community-based forestry

A number of scholars have claimed that Mexico and Oaxaca represent a unique case, a country and region whose common property, community-managed forests appear at a scale and level of maturity unmatched elsewhere in the world (Bray et al 2003; Bray et al. 2005; Bray 2010). This section provides a brief history of common property regimes and the forest concessions period, the subsequent rise of community forestry, and a critical evaluation of the importance of this sector for today's communities.

Prior to the Mexican Revolution of 1910-1917, the imposition of private property on the pre-Hispanic system of communal ownership and management of indigenous lands brought a number of changes, including the conversion of many of these lands into haciendas and state properties (Klooster 2003). The Revolution, and subsequent agrarian reform, helped to reverse this trend including official recognition of the rights of indigenous communities over their ancestral lands (legislated in Article 27 of the 1917 Constitution). Despite this, the means by which communities actually took back possession of their forestlands was realised through successive degrees of control (Klooster 2003; Matthews 2004). Indeed, for much of last century, Mexican communities still only held putative claims to the forests on their lands because the government claimed rights to the disposition of forest resources, awarding them as logging concessions to private companies and state-owned enterprises (Bray et al. 2003).

In Oaxaca, the first concession began in 1945 and affected the forest of Ixtlan de Juarez in the Sierra Norte. Two years later, *Compania Forestal de Oaxaca* (CFO) began to extract timber from the community forest of Zimatlan, located in the Sierra Sur (Merino 2004). This was just the beginning of a forest concession period that would run until the early 1980s. In the Sierra Norte, the *Fabrica de Papel Tuxtepec* (FAPATUX) was awarded commercial extraction rights for a 25-year period (1957-1981). Under the concessions, companies were guaranteed access to raw timber and the exclusive right to log in designated areas. In return, they had to pay the owner communities a logging fee (*derecho de monte*), an amount fixed and administered by the Agrarian Department rather than by the communities themselves. In addition, only 30% of this fee was actually paid to the community, with the remainder deposited in a national fund. Almost all profits from the forestry operations flowed outside of the community (Merino 2004).

As affected communities came to appreciate the asymmetrical and unequal nature of their relationship with the concession companies, they became increasingly unhappy; a feeling of discontent that was exacerbated by the negative impact that logging had on local forests. Since cutting was based mainly on selective extraction, both the commercial and natural quality of forests quickly diminished even though forest cover was maintained. Areas of pine (the most commercially-valuable species) were quickly replaced by oak, as selective cutting did not provide the kind of larger forest openings that pine requires for its natural regeneration. With the first concession period coming to an end, regional community organizations in both the Sierra Norte and the Sierra Sur were formed to fight the indefinite renewal of forest concessions in Oaxaca. These grassroots mobilisations, combined with reformists in the government forestry agency, were successful in helping refocus government policy. The forest concessions were not renewed, and communities were thus able to (finally) explore the potential of commercial timber production under local management regimes.

Over the next twenty years or so, cases of community forest management initiatives would grow dramatically. In 2004, community forest enterprises (CFEs) in Mexico numbered between 288 and 740 (depending on the definition being used and the source being consulted), and were mainly found in the temperate pine-oak forests of Oaxaca, Michoacán, Guerrero, Puebla, Durango, Jalisco and Chihuahua (Bray and Merino 2004). Oaxaca holds approximately 850,000 hectares of commercially viable forest, with some 70% of the state's forest production concentrated in the northern and southern Sierras. Forestry accounts for around 10% of Oaxaca's GDP (Anta 2004), with a reported 86% of authorised volume coming from community-owned forests (Merino 2004). The most successful CFEs have moved into the vertical integration of forest production and are developing the capacity to make the transition to more competitive international markets, while taking measures to maintain forest productivity, biodiversity and forest cover in their communities (Antinori 2005; Merino 2004). In the Sierra Norte, for example, the forestry operations of Ixtlan provide jobs for up to 280 workers, with the majority working in a brand new industrial park (Bray 2010).

In summary, numerous commentators (Bray et al. 2003; Anta 2004; Merino 2004, Bray et al. 2005; Chapela 2005) note both the practical and symbolic importance of the community forestry sector in Mexico. In Oaxaca, community forest management (CFM) has led to the emergence of institutional arrangements that, while often innovative, remain based on the

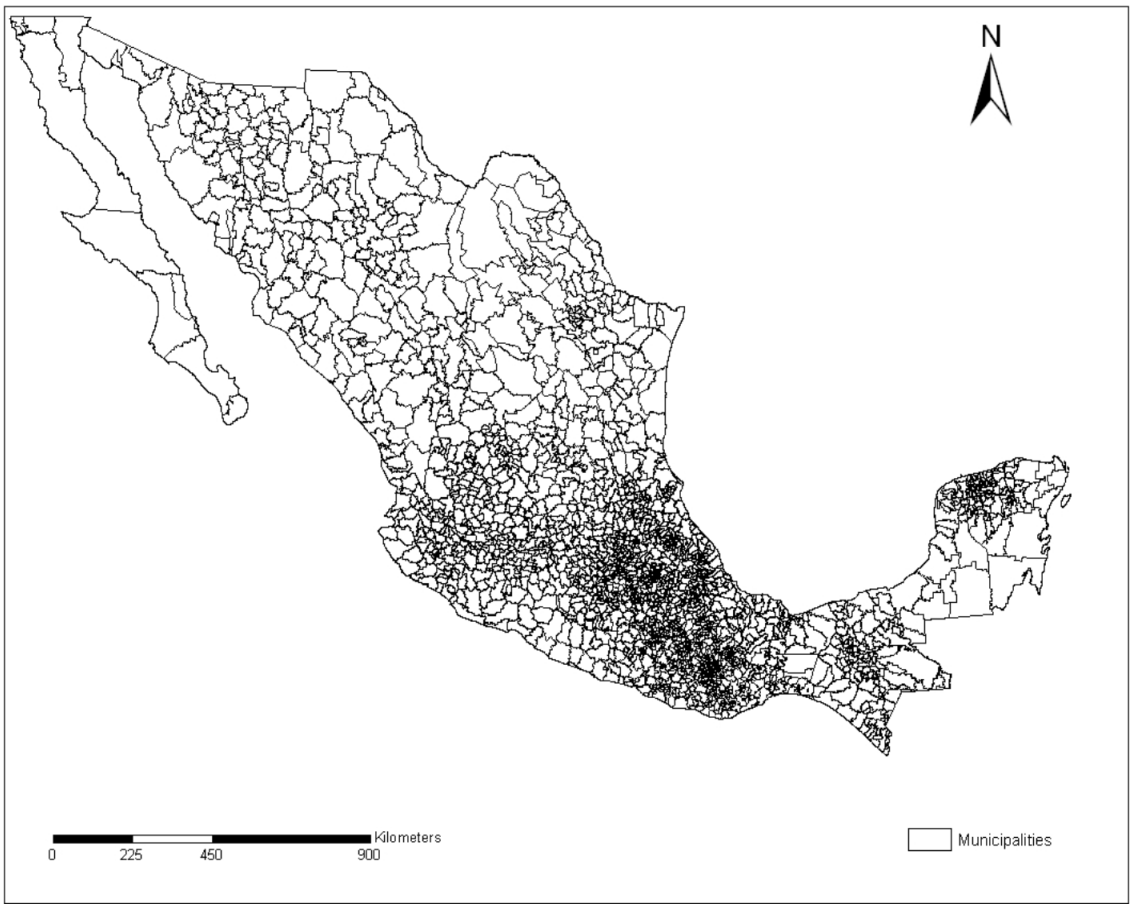
traditional governance structure that dominates locally. These have emerged as a result of changing forest policy, a tradition of rural activism, and the social capital embedded in many of the state's rural communities. Through this process, an important two-way relationship has developed between CFM and community social cohesion and organisation, whereby the development of community-based forestry has served to strengthen the very social structures and local capacities that made the establishment of CFM possible in the first place (Merino 2004). In particular, the creation of CFEs has allowed new organisational and participatory spaces to emerge, while strengthening communities' capacity to regulate forest areas and encouraging new (conservationist) perspectives to emerge among the local populace.

2.5.3 Oaxacan commons governance and institutions

Combined with an integrated resource use strategy (based upon the multi-functional nature of the surrounding landscape), communities have possessed a network of institutional and social arrangements to support local livelihoods. Resource management institutions, for example, determine when, how, and where resources are used, and who uses them (Ostrom 1990). At the household level, these may take the form of informal rules to determine crop and livestock selection and the timing of agricultural activities and herd movements, while at the user group and community level, it is typically a mix of formal and informal institutions that govern the specific and general use of the community's territory and natural resources. Additional rules are required to ensure compliance (Ostrom 1990). Local knowledge and cultural values provide the basis for the development of many of these rules, while it is through the participation of community members that rules are accepted and management responsibilities defined. There is now strong evidence suggesting that sustainable resource management and conservation depends upon how these institutions are established, monitored and enforced (Agrawal 2002; Berkes 2004; Merino 2004), while governance arrangements provide the necessary conditions for ordered rule and collective action, including how decisions are made and power is shared.

In Oaxaca, it is the system of governance employed locally, along with associated institutional arrangements that play a key role in the reported success of local commons regimes (Merino 2004; Chapela 2005). In the Sierra Norte, governance typically revolves around family, community and regional organizations, forming a system in which the three levels of organisation mutually depend upon each other in what may be thought of as "circles of interdependence" (Chapela 2005). This traditional governance system, known locally as "*usos y*

costumbres" (or 'uses and customs'), considers the community assemblies (both municipal and communal) as holding the maximum authority within their jurisdiction[18]. Elected posts are accountable to the assembly rather than state or federal government, and the assemblies are free to devise and approve norms to govern life in these small municipalities, including activities related to the use and conservation of communal forest resources (Robson 2007). Oaxaca currently has 570 municipalities, which accounts for over a fifth of the country's total (Map 2.1). This so-called 'mini-municipalismo' has allowed for an important closeness to form between civic and communal governance.



Map 2.1: The municipalities of Mexico, showing a particularly high concentration in the South of the country (Oaxaca, Veracruz, State of Mexico)

[18] *Usos y costumbres* was legally recognised under the 'Rights of the Indigenous Peoples and Communities of the State of Oaxaca', a law brought into force in 1998 (Velasquez 2000).

Usos y costumbres is essentially a codification of the normative structures that have existed among indigenous peoples in Oaxaca (and Mexico more widely) since pre-colonial times. However, the system is by no means a relic from some ancient past but rather has evolved through the vagaries of centuries of hispanisation and integration with mainstream Mexican society. Arturo Warman (2001, 2003) provides one of the best and most extensive explanations of the historical developments and influences that have come to shape the profile and identity of indigenous communities in contemporary Mexico.

While communities continue to be bound by Mexican agrarian law, at the municipal level, leaders in indigenous Oaxacan villages maintain control over land management issues and the actions of community members primarily through communal *estatutos* or written laws[19]. Such an autonomous system exhibits many of the characteristics of polycentric governance (Alcorn and Toledo 1998), with users able to experiment with rule combinations, access local knowledge, obtain rapid feedback from their own policy changes, and learn from the experience of other parallel units. It also meets many of the criteria considered important for sustainable resource management and conservation: local officials are elected by resource users, communities can self-evaluate their actions, communities are able to network with each other, communities have appropriate institutions to manage and regulate natural resource use, and, most importantly, community institutions are recognised and authorised by municipal, regional and national government authorities (Chapela 2005). Such systems, composed of multiple units at multiple scales or organisations, are considered to be less vulnerable to many types of external stresses than centralised systems (Ostrom 2001a).

The *usos y costumbres* system is defined by two social institutions – known as *cargos* and *tequios* – that articulate the link between community members and their common resources, and act as a form of (unpaid) compensation that all active and able-bodied *comuneros* ('commoner' or common property rights-holder) must provide in return for the goods and services they receive from community membership. Generally, all able-bodied *comuneros* aged 18-60 are obliged to participate in these systems, with an earlier "retirement" age permitted in some communities. Specifically, the *cargo* system refers to a traditionally hierarchical structure of posts of responsibility (the aforementioned *cargo*) by which functions of communal and

[19] *Estatutos* (Statutes) regulate the socioeconomic and environmental activities within the community, including use of and access to territorial resources, in both general and specific terms.

municipal government are performed. *Cargos* are assumed as soon as members receive the title of *comunero* or *comunera*, with its attendant rights and obligations. Each *comunero* typically begins with a low-level *cargo* and then, upon successful completion, will progress to a higher-level position with greater responsibility. This institutional structure is known locally as the *escalafon* (or ladder). *Cargo*-holders are answerable to the General Assembly of *Comuneros* and rules exist to sanction non-compliance. Medium to high-level posts are customarily held for a three-year period, at which point newly elected village members replace the outgoing authorities. When the resident population is sizeable, *comuneros* would expect to enjoy several years 'rest' between being given *cargo* duties to perform.

Cargos permeate all aspects of community life. Religious *cargos*, for example, have played a prominent role for centuries, covering the operation and maintenance of the village temple, the organisation of religious festivities and rites of passage. Municipal *cargos* cover the traditional governance functions found in the rest of the country, as well as *cargos* more particular to Oaxaca, including *juez* (judge) and *topiles* (a form of community police). Other *cargos* relate to the management of the community's common property resources, including local forests. Conservation initiatives and other forms of land use tend to involve considerable administrative labour at the local level, and such work is carried out under the auspices of two village-elected community authorities: the *Comisariado de Bienes Comunales* (Commissioner of Communal Resources) and the *Consejo de Vigilancia* (Surveillance or Oversight Council). These same community institutions also represent the interface between state and community, with incumbents of high-level *cargos* acting as brokers or intermediaries with state institutions. The *Comisariado de Bienes Comunales*, for example, is the community body that deals with both government and non-governmental environmental agencies and is responsible for applying for project funds and accessing conservation monies or technical support on behalf of the community.

However, as Bray (2010) mentions, "if these *cargo* functions were not onerous enough, there are also traditional community physical labour service obligations, called *tequios*". These *tequios* refer to a system of voluntary (unpaid) labour days unique to Oaxaca, which is used to complete projects within the community that require the participation of large numbers of people. This may include the maintenance and improvement of the community's basic infrastructure or the conservation of its natural resources. Within a forest context, *tequio* is used

to provide manual labour for forest restoration, fire fighting, and forest road building, among other projects. All able-bodied active *comuneros* are expected to participate in these labour obligations, which may add up to 20, 30, 40 days per year, and together they not only form part of the structural base from which the governance system operates, but act as mediating variables between the population and the pattern of resource use and management that takes place locally.

From a commons standpoint, *cargos* and *tequios* are the institutional arrangements that enable collective action problems to be resolved. In this study, a central question concerns how these institutions are dealing with a reduced labour pool as people leave their villages[20]. With less people to participate locally, and the generation of new cultural attitudes that may increase the tension between community function and individual needs, how are these systems being impacted and how are they responding? It is important to remember that these institutional and governance arrangements have been developed and modified over a long period of time, and will continue to develop in response to new conditions and challenges. Cohen (2004b) believes that while communities in Oaxaca are engaged in an expanding and complex system of changing social, demographic and economic realities, many have been able to maintain a sense of independence and uniqueness that belies their involvement in global markets and transnational processes. He argues that *usos y costumbres*, and the *cargo* and *tequio* systems, have been crucial to communities' continued success in contemporary settings. However, in the context of ongoing population loss, the ability of rural communities to balance and reinvent traditions may be a growing challenge to local cultural, social and environmental resources. Alatorre (2000), Merino (2004) and Garibay (2007) have pointed to sources of tension in communities' institutional systems, in particular the contradictions that exist between the obligations set by the *usos y costumbres* system and the needs and private interests of community members.

2.6 Summary

This chapter has reviewed past and present literature drawn from diverse areas of scholarship, from migration and transnationalism through to commons, social vulnerability and the emerging concept of multifunctionality (as it pertains to the landscape sciences). Such an interdisciplinary mix of theories and concepts reflect the complex nature of the relationship that

[20] This is the opposite of Cancian's (1965) work in Chiapas, which documented the dilemma associated with too many people to choose from to serve in the *cargo* system.

links migration with the environment in source areas, and provides the foundation upon which the arguments central to this thesis are constructed.

CHAPTER 3 – METHODOLOGY AND METHODS

3.1 Introduction

As Creswell (2009:5) notes: "in planning a study, researchers need to think through the philosophical worldview assumptions that they bring to the study, the strategy of inquiry that is related to this worldview, and the specific methods or procedures of research that translate the approach into practice". This chapter describes the philosophy and approach that guided my time in the field, and the methods I used for data collection, validation and analysis. I close with a timeline that map out my movements to multiple field sites over a two year period.

3.2 Research Philosophy

Based on Guba's (1990, in Creswell 2009:5) definition of worldview as "a basic set of beliefs that guide action", Creswell identifies four principal worldviews (Table 3.1) that, he contends, will likely determine the methodological approach adopted by the researcher for his or her study.

Table 3.1: Four philosophical worldviews (Creswell 2009:6)

Post-positivism	**Constructivism**
• Determination • Reductionism • Empirical observation and measurement • Theory verification	• Understanding • Multiple participant meanings • Social and historical construction • Theory generation
Advocacy/Participatory	**Pragmatism**
• Political • Empowerment Issue-oriented • Collaborative • Change-oriented	• Consequences of actions • Problem-centered • Pluralistic • Real-world practice oriented

When I think about the worldview I most adhere to, more than one of the four stands out. While I may not be a post-positivist – despite acknowledging the worth of 'empirical observation and measurement' – there are characteristics listed under each of the remaining three categories that ring true. I am not sure where that leaves me (a pragmatic-constructivist maybe?) but such a

mish-mashing of worldview elements lends credence to the argument that inquiry methodology can no longer be treated as a "set of universally applicable rules or abstractions" (Guba and Lincoln 2005).

Of most importance, the researcher needs to think carefully about why their study is designed and applied in a certain way, and what, in particular, underpins the views that led to the design decisions being taken. In my case, some such views were in place long before I entered academia – forming part of the moral and ethical values that my parents instilled in me, and how I was taught to relate to, and respect, other people. Other aspects of my 'worldview' have been shaped by my time at the University of Manitoba, by the literature I have read, and through the ideas and perspectives of peers and thesis committee members. However, of most significance were the five years I spent living and working in Mexico prior to starting the Ph.D. – which included periods interacting with indigenous forest communities in the centre and south of the country. These trips provided me with invaluable insights into the functioning of societies with cultural beliefs and practices quite different to my own, and were experiences I drew upon time and again before, during and after the fieldwork conducted for this study.

It was such grounding and prior experience that convinced me that research in rural settings, particularly research pertaining to environmental and resource management science, needs to be interdisciplinary and, where possible, participatory, if it wants to create a broader and more integrated understanding of the 'what' and 'why' of the topic under investigation (O'Riordan 2000). Interdisciplinary research embraces both physical and social systems and is a response to traditional (positive) science's inability to share with other cultures of knowing and understanding, and an attempt to merge knowledge into common concepts for real-world problem solving. For my study, I saw the adoption of an interdisciplinary research paradigm as essential for understanding the complex social-ecological processes that link migration and the environment in marginalised mountain communities. This is reflected in the overall project design, the literature reviewed, as well as the specific methods that I used for data collection and analysis. These borrow from cultural anthropology, sociology, human geography, demography and ecology to form a robust qualitative methodological toolbox.

While my study is based on reflexive science – where engagement with informants is the key to insight (after Smith 2006:280) – it would be churlish of me to describe the research itself as participatory. While community members sanctioned the work, and some were involved

actively in the collection, generation and discussion of data, this was my project and not 'driven' by those I was studying. As such, it falls some way short of replicating the 'place-based learning' framework that researchers working in cross-cultural settings should ideally aim for (Davidson-Hunt and O'Flaherty 2007; Shearer et al. 2009; Robson et al. 2009).

3.3 Strategy of Inquiry and Site Selection

Strategies of inquiry are "types of qualitative, quantitative, and mixed methods designs or models that provide specific direction for procedures in a research design" (Creswell 2009:11). For my research, it was clear that a **case study** design or model would be appropriate, since it offers an excellent way to look at change in social-ecological systems and to investigate how societies deal with that change. A case study would enable me to study in detail the contextual conditions that surround each community under investigation – providing the freedom to gather different types of evidence, focus on multiple sources of data, and benefit from the prior development of theoretical propositions (Yin 2003; Berg 2007). The goal of the research was to uncover and inform theory as a consequence of data collection and the interpretation of that data. Smith (2006:281) argues that case studies "acquire theoretical importance through three dialogues: between the researchers and informants; between the local dynamics of the subject under study and the larger structures within which it is embedded; and between analysis of the case and theory". They make this possible by allowing a deep understanding of phenomenon, events, people, or organization that opens the door to "sense-making" (Weick 1995), or the way in which societies make sense of the stimuli with which they are confronted.

Case studies are not without their limitations, however. They have been criticized for being unrepresentative and unable to generate larger insights. While on one level this is true, Smith (2006:281) argues that such criticism "displays a powerful lack of imagination, a lack of knowledge of how cases do their analytical work and the preoccupation of positive science with representativeness to the exclusion of other dimensions of analysis". To improve insight into how out-migration may be affecting the wider region, I knew that more than one study community would be needed. While indigenous communities in northern Oaxaca are governed under the same system, previous work had taught me that there is notable variation across communities in the rules governing village life, enforcement of those rules, territorial resources, population, and levels of social capital and social organisation. Individual and community

experiences with migration can also vary considerably (Martinez Romero 2005). In deciding to study more than one community, I hoped that a broader context would allow for greater theorising and, as Yin (2003:46) argues, research findings that are "considered more compelling and… more robust".

3.3.1 Study sites

I always had the Sierra Norte of Oaxaca in mind as the regional focus for my study. Its constituent communities have – both collectively and individually – garnered a great deal of attention for the impressive level of social organisation evident at community and inter-community levels (Chapela 2005), for the sustainability of local environmental practices (Merino 2003; Chapela 2005; Robson 2007), and the successes of indigenous conservation strategies (Robson 2007; Bray et al. 2008). It was an area I knew reasonably well – having worked there on several occasions between 2003 and 2006. While the issue of out-migration was clearly an important one for local communities, I knew of few such studies looking at this topic within the region, and certainly none that incorporated an environmental component. If out-migration was impacting 'robust' commons regimes in Oaxaca, and I wanted to understand the social-ecological consequences, then where better to look than these 'model' communities in the north of the state. From the pool of Zapotec, Chinantec and Mixe communities, I identified and selected three potential study sites based on a range of criteria (Table 3.2).

Although not envisaging a strict comparative study, I wanted to select two quite different high out-migration communities to contrast with one another and tease out the commonalities and differences that would aid theorising as to how commons regimes are impacted by, and respond to particular drivers of change. Santiago Comaltepec (**Comaltepec**), with a large, diverse communal territory (comprised of several localities) and vertically integrated community forestry enterprise (CFE), and San Juan Evangelista Analco (**Analco**), a much smaller territory with a single locality and no forestry operation to date, appeared to fit the bill. I sought a second opinion from Mexican research partners – Ariel Arias Toledo (now at COINBIO-Oaxaca) and Leticia Merino at the IIS-UNAM, and Francisco Chapela and Yolanda Lara at the Oaxaca NGO, *Estudios Rurales y Asesoria* (ERA) – who agreed that they would make interesting cases.

Table 3.2: Study community selection criteria

Community	Out-migration rate (Martinez Romero 2005)	Territorial size (Ha)	Level of forest production and integration	Conservation Value (FSC classification)
Santiago Comaltepec	High	18,366	Procymaf Type IV	High Conservation Value Forest
San Juan Evangelista Analco	High	1,658	Procymaf Type I	High Conservation Value Forest
Capulalpam de Mendez	Low	4,328	Procymaf Type IV	Not confirmed

With a 'home' base close to Oaxaca City, I made the two-hour drive to Analco in November 2007 for introductory meetings with communal and municipal authorities, and again in early December to further discuss project design and implementation. The community was initially reticent (only in recent years have they begun to attract the attention of researchers), but after listening to my presentation I was given the go ahead, a contract was drawn up (see Appendix I), and work began almost immediately. Comaltepec was a little more complicated because the communal authorities were preparing to leave office when I arrived towards the end of 2007. As such, I had to wait until the turn of the year (January 2008) for formal introductions to take place, and to invite their participation in the study. They asked me to return two weeks later, at which point they confirmed that the research topic was of interest to the community and I was welcome to begin work.

The two study communities of Comaltepec and Analco are described in detail in Chapter 4, and so I will refrain from providing any further information here. If we return to Table 3.2, however, you will see that I initially selected a third community; Capulalpam de Mendez. This was going to act as my low out-migration case; to contrast with the two high out-migration cases. However, and as Section 3.10 explains in more detail, I was forced to drop Capulalpam as a study site because I did not have sufficient data to adequately meet all four research objectives. Despite this setback, I still draw upon initial findings from the community in the thesis – in particular, to enrich discussions in Chapter 8. It is a community that I had worked in before, and thus reasonably well versed in its history, profile and current alignments.

3.4 Interactive, Adaptive Research

Before running through the methods that I used for this research, it is worth saying a little about the approach that underpins how those methods were applied and how the research was conducted in more general terms. With prior experience working in Oaxaca and Mexico, I have come to appreciate that when undertaking community-based research in a cross-cultural setting, it is important that the researcher understands that most knowledge is context and place specific, and so requires an understanding of cultural discourses, social relationships, and the broader historical, political and economic contexts within which data is collected and discussed (after Hammersley and Atkinson 2005). To be reflexive in this way requires the researcher to engage with the culture of their informants, which I achieved in part through what Oaxacans call *convivencia* – the name given to a form of co-existence that, in this instance, involved living with local families for extended periods of time, participating in daily activities, and sharing experiences on a regular basis that allows for the interplay of cultural ideas and perspectives. By doing this, the intentions and objectives of both researcher and informant are combined to determine the content of the knowledge produced.

My practices in the field were thus guided and informed by local expectations, while many of the methods I adopted were shaped through interactions with local people and their institutions, rather than being preconceived. This ties to what Nelson (1991) calls an 'interactive, adaptive' approach, where a better understanding of the local context improves use of the methodological toolbox. It is an approach that helps the researcher deal with the varied, rich and challenging world in which they work, and helps determine how best a certain method may be used, as well as steer the researcher away from relying on fixed, preconceived notions and expectations. The 'interactive' component involves working with local actors to supplement knowledge and improve the design of research methods, while the 'adaptive' involves the constant scoping of the research context in order to respond, and make any necessary changes to the theory and methods guiding the work. As part of such an approach, I maintained a reflexive journal to help me recognise my own biases and subjectivities.

3.5 Research Methods

I adopted a qualitative methodological approach, which provided me with a high level of detail about participants and their experiences. I begin by describing each method and why they

were useful to my study, before Section 3.6 lists the specific methods (and research questions) that informed each of the four research objectives.

3.5.1 Setting the scene: The use of IFRI methodology

Key to providing me with detailed (social-ecological) contextual data on the two study communities was use of a methodology developed by the International Forest Resources and Institutions (IFRI) Research Program (Ostrom 1998). This methodology (http://sitemaker.umich.edu/ifri/home) allows researchers to explore the complex relationships between communities (socioeconomic conditions, demographic circumstances, institutional arrangements) and their forest resources. A full IFRI study was applied in both Comaltepec and Analco, and generated data of direct relevance to the topic under investigation, informed and underpinned some of the subsequent methods that I used, and enabled a more complete picture of how each community functioned in terms of land use, forest use and conservation[21]. The richness of this contextual information is evident throughout the document, and in Chapter 4 in particular.

Relying on rapid appraisal and traditional interview methods, each IFRI research instrument or Form (summarised in Table 3.3) includes variables that can be used to understand the connection between the physical characteristics of natural resources and human interaction with the environment. The different forms or research instruments are connected to each other, with the relationships and linkages shown in IFRI's conceptual model (Figure 3.1). User groups are a part of settlements; forest associations are formed by user groups; user groups utilize forests. Some relationships are so crucial to understanding the sustainable, productive use of forests as a communal resource that a separate research instrument is used to capture elements of the relationship (IFRI Manual 2008). Forms R and G, for example, capture information about how user groups relate to forests.

[21] Despite an obvious focus on the management and use of forest resources, IFRI methodology provides an excellent overview of resource management and institutions in Oaxaca because all territorial resources (be they forests, agricultural land, water) are considered common property and governed under the same system.

Table 3.3: Summary explanation of IFRI forms used in the study

IFRI Form	Information recorded
Form O *Site Overview Form*	Map of major physical features of the area and general information about the site (local wage rates, units of measurement for forest products etc.)
Form F *Forest Form*	Defines a forest as a surface area with woody vegetation of at least 0.5 hectares, exploited by at least three households, and governed overall by the same legal structure. The size, ownership, internal differentiation within the forest, forest products harvested, and uses made of organic and inorganic forest products are recorded on this form. Changes in density of trees, grasses or ground cover and changes in forest area are recorded here. Also addresses rules related to entry, maintenance, and monitoring of the forest, and penalties for breaking these rules.
Form P *Forest Plot Form*	Used to collect botanical information in random plots composed of three concentric circles. In the first circle (1-meter radius), woody seedlings and herbaceous ground cover are sampled. Shrubs, saplings, and woody and herbaceous climbers are identified and counted in the next circle (3-meter radius). The diameters and heights of woody stems between 2.5 and 10 centimeters in diameter are recorded. In the largest circle (10-meter radius), stems greater than or equal to 10 centimeters in diameter at breast height (DBH) are identified and counted. The DBH of each is measured and its height estimated.
Form S *Settlement Form*	Identifies a settlement inhabited by one or more forest user groups. Elicits demographic information about a settlement and its relation to external markets and administrative centres. Captures information on climatic features, soil types, vegetation, topography, and elevation of the settlement and surrounding area
Form U *User Group Form*	Identifies the size, social-economic status, and related attributes of a group of people who harvest from, use, and/or maintain a forest or forests. It also records how they share the same rights and duties to products from the forest(s), even though they may or may not be formally organised.
Form A *Forest Association Form*	Captures some of the information required to analyze institutional arrangements for forest governance and management at both the local and federal level. A user group may have developed formal or informal rules that determine the activities of the group with respect to use of the forest(s), thereby becoming a forest association. This form records the activities the association has arranged, coordinated, or adopted rules about, such as the governance and structure of the association, the general membership of the association, and the types of records maintained by the association or submitted to a higher authority. This form also contains information on resource mobilisation and account keeping, governance and constitutional choice processes and internal relations within the association.
Form G *Forest-User Group Relationship Form*	Gathers information about products harvested by the user group from a particular forest. It codes all forest products that the user group harvests from the forest and identifies the three products that are most important to the user group.
Form R *Forest Product Form*	Records specific details about a product harvested from a particular forest by the user group. This form identifies the uses made of the product, temporal harvesting patterns of the forest product, alternative sources and substitutes for the product, and tools and techniques used to harvest the product. The form also codes information about harvesting rules (when, how much, where, and what restrictions exist for harvesting practices), and penalties imposed for breaking a harvesting rule.
Form V *Forest Governance Form*	Obtains information about any organisation that designs rules, policies, and/or guidelines about or influences the utilisation of the forest (harvesting, maintenance, monitoring, etc.), but does not itself use or harvest from the forest. This form addresses governance and structure, officials, resource mobilisation and account keeping, and constitutional-choice processes of the organisation.

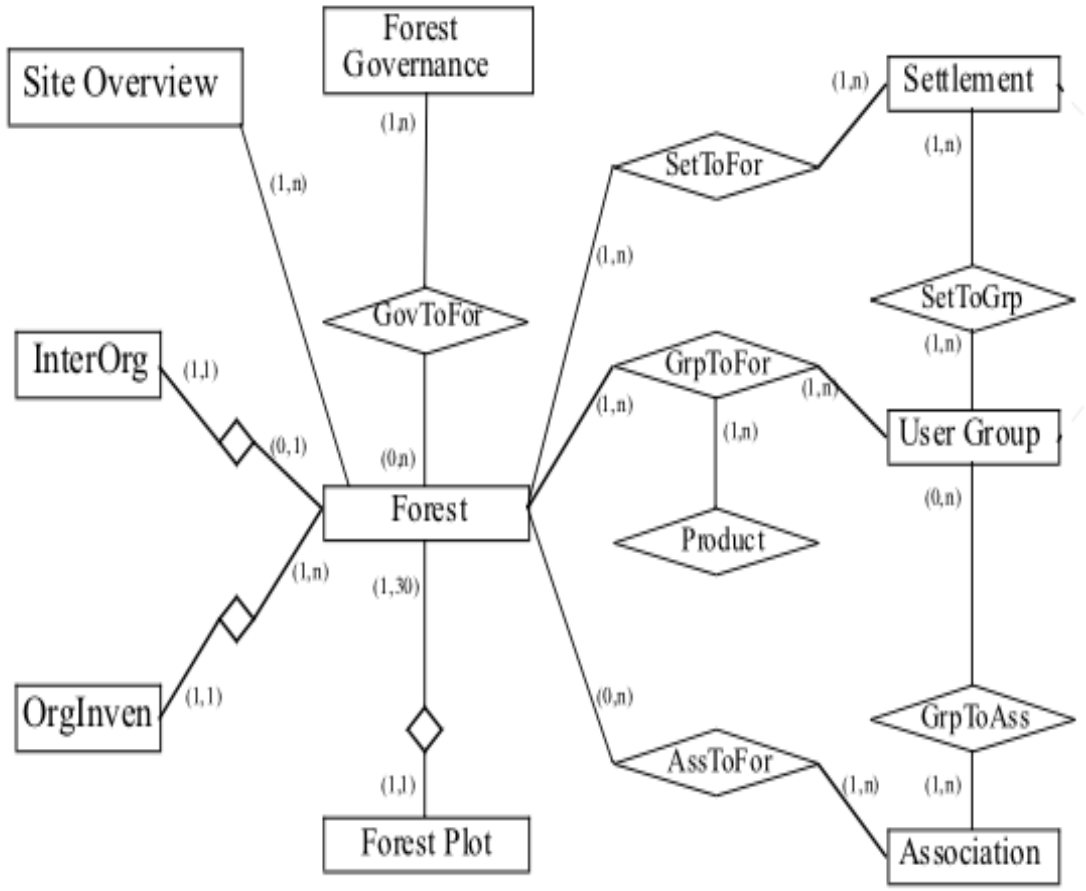


Figure 3.1: IFRI Conceptual Model (IFRI Manual 2008)

At the heart of this thesis is an assumption that the relationship between people and the natural environment is mediated by the formal and informal institutional arrangements designed to control access to territorial land, govern resource use, and regulate specific resource practices. As such, in addition to 'setting the scene', the IFRI studies were particularly useful in helping to identify the key institutions, highlight their specific roles, and determine the horizontal and vertical linkages with other institutions of relevance to the study. This institutional mapping was a critical first step for subsequent analysis (captured in Chapters 5 and 7) that looked at the impact of demographic and cultural change on key social arrangements, and how those institutions have responded in kind.

3.5.2 Participant observation

Going hand in hand with an interactive, adaptive approach (Nelson 1991), is the use of participant observation (PO). DeWalt and DeWalt (2002) define participant PO as a "research method that aims to gain a close and intimate familiarity with a given group of individuals and their practices through an intensive involvement with people in their natural environment". In the context of my work, this involved talking to people, watching what they do and taking part in their everyday activities – achieved through what I previously referred to as *convivencia*. PO helped provide me with a clearer understanding of the broad cultural context within which the research was being carried out. In addition, it helped to determine how some of the other methods (household surveys in particular) that I hoped to apply could best be used, and also to identify potential informants with whom to collaborate. All of this required spending a considerable amount of time in the field, and using everyday conversation as a technique to record general observations, with informal, unstructured interviewing the method of choice (after Bernard 2002). As part of an interactive, adaptive approach, PO formed a useful ally in the continual reassessment of my research strategy, including the development of new approaches as insights in the field occurred.

PO was not restricted to the initial fieldwork phase of my study but took place throughout my time in Oaxaca. Data from participant observation were collected through the use of field notes, which were either written up at the time that data were generated or at the end of the day. Specifically, these notes took the form of descriptive notes to record what was happening in the community in relation to migration and some of the responses to subsequent demographic and cultural change; methodological notes to identify possible informants, to determine how research methods and tools were working, how they may be improved, and when they required changing; and, finally, more analytical notes that pieced together what I observed and learnt from the use of different data collection processes.

3.5.3 Structured interviews

3.5.3.1 Structured interviews and surveys

The structured (or standardised) interview uses a formally structured schedule of questions, where each informant is exposed to the same stimuli. In this way, the researcher can control the input that triggers people's (verbatim) responses so that their output can be reliably compared

without the need for coding or categorization (Martin 1995; Bernard 2002). In using this technique, researchers assume that the questions scheduled in their interview instrument are sufficiently comprehensive to elicit nearly all information relevant to that topic of specific interest to the study. For my research, structured interviews were used to collect qualitative data in the following ways:

(i) A general household survey (Appendix II) that provided a socio-demographic, socio-economic and socio-environmental analysis of each study community. This survey was developed for SANREM[22] and proved an excellent tool for generating not only general household data but also garnered information on territorial land use, forest use and conservation, as well as local people's perceptions of their natural environment. Much of this data found its way into Chapters 4 and 6;

(ii) A household survey (Appendix III) to determine migration dynamics and trends, and record local people's perceptions of migration and the impact on different areas of village life. This survey informed much of Chapters 5 and 6; and,

(iii) A questionnaire with communal authorities (Appendix IV) to determine migrant *comunero* numbers, level of compliance with migrant obligations, and investments at a community level. This provided data for Chapters 5 and 6.

As Martin (1995) notes, some researchers shun surveys because they consider them an impersonal way of collecting data. They argue that because surveys are based on brief interactions between the researcher and a number of respondents, it is difficult to establish the rapport that a fieldworker usually builds up with local people during a conversation and PO. While this can be the case, I feel it only holds true if surveys are the sole method being used to collect data. When they are employed with other methods, and carried out after the researcher has become better acquainted with the community under study, surveys become a most useful tool for gauging the variation of responses between individuals and groups in complex societies.

[22] SANREM CRSP stands for the Sustainable Agriculture and Natural Resource Management Collaborative Research Support Program, funded by the US government through USAID. The objective of the Program is to assist "decision makers in developing countries by providing access to appropriate data, knowledge, tools, and methods of analysis; and by enhancing their capacity to make better decisions to improve livelihoods and the sustainability of natural resources" (http://www.oired.vt.edu/sanremcrsp/). The research is organised by an innovative nested landscape systems approach beginning with field level systems, building through farm, enterprise, and watershed systems nested in broader ecological, governance and policy systems. The survey used in the present study was developed for the SANREM project entitled 'Decentralization Reforms and Property Rights: Potentials and Puzzles for Forest Sustainability and Livelihoods'.

For my research, they provided robust data that could be compared with other qualitative information garnered from one on one semi-structured and unstructured interviews.

3.5.3.2 Sample size and method of application

The two household surveys were applied in Analco and the three main villages that comprise Comaltepec (Santiago Comaltepec, La Esperanza and San Martin Soyolapam). I did not plan to carry out a statistical analysis of the data collected, but rather included enough households in each village to make the qualitative data I collected as representative and robust as possible. As such, I had planned to survey at least a fifth of households in both communities. The level of coverage is shown in Table 3.4. For reasons given later (Section 3.10), I was unable to survey enough households in the head village of Santiago Comaltepec and was left just short of 20% coverage for the community overall.

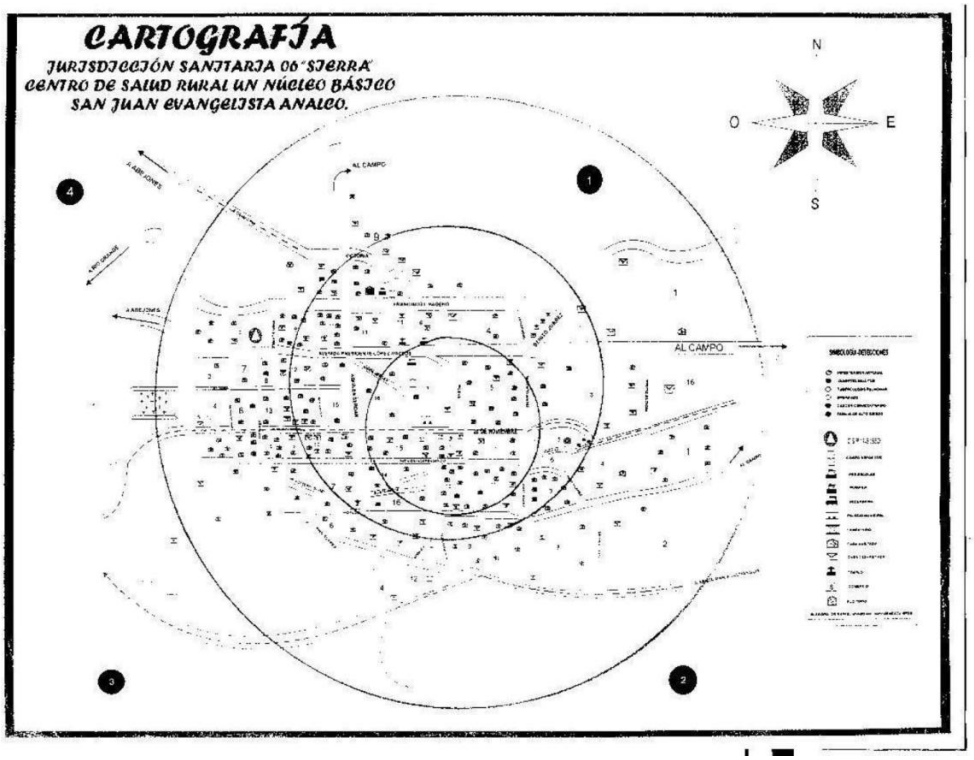
Table 3.4: Number of households included in each survey (by locality)

Village / COMMUNITY	Number of households surveyed	Total number of households	Coverage (%)
Santiago Comaltepec	31	207	15
La Esperanza	9	45	20
San Martin Soyolapam	10	24	42
COMALTEPEC	50	276	18
ANALCO	29	126	23
Total	79	402	20

In the head village of Santiago Comaltepec and in the community of Analco, I used concentric sampling to select respondent households in central, intermediate and peripheral urban zones. Within each circle, I visited every third or fourth house in Analco and every sixth or seventh house in Santiago Comaltepec. If nobody was in, I would either return later in the day or go next door. I considered this concentric sampling technique the most appropriate method given the socio-economic divisions that exist in Oaxacan highland settlements (with poorer households generally located on the periphery of villages). I was aided in this work by maps produced by the local health centre that showed the exact location and distribution of occupied and unoccupied houses. These maps acted as the template upon which the concentric circles were drawn (see Map 3.1). This selection method was not feasible in the considerably smaller localities of La Esperanza (45 resident households) and San Martin Soyolapam (24 households), which are spread out in a much more linear fashion. Here, I simply walked from one end of the village to

the other; applying the survey in every fourth house in La Esperanza and every second house in San Martin Soyolapam[23]. Since there was no point in comparing the findings from the two surveys (they each generated thematically distinct data sets), I tried to avoid 'repeat' respondents. It is therefore purely coincidental if any individual household was included in both surveys.

The general household survey (SANREM) did not require a pilot phase, since it had been tried and tested in numerous forest communities in central and southern Mexico by colleagues from IIS-UNAM. I did, however, test an initial version of the migration survey in Analco, during a five-day period in December 2007. This led to some modifications (questions dropped, or line of questioning improved) prior to the survey's full application in the two study communities. I conducted the vast majority of interviews myself. However, I was assisted in the general household survey by members of a research team from UNAM; in February 2008 in Comaltepec and in May 2008 in Analco.



Map 3.1: Concentric sampling used for the application of the household surveys in Analco

[23] Statistically speaking, my overall sample in the community of Comaltepec was biased towards the smaller villages of La Esperanza and San Martin Soyolapam.

For both surveys, I tried to pick a time of day when household members would be amenable to my visit. This would normally mean mid-morning, after workers had finished their *almuerzo* (mid-morning meal) or in the late afternoon/ early evening when residents had finished lunch and were coming towards the end of the working day. Unless invited to do so, I rarely visited homes later in the evening, given that at that time most people are tired or relaxing with their families. I designed the migration survey so that it could be completed quickly if need be (within 35 minutes). At the same time, I incorporated a number of open-ended questions into the questionnaire, so that if the interviewee(s) showed great interest in the topic under discussion, I could extend the survey. Some would consequently run to two hours or more. Another point worth making is that some sections of the survey (household activities and expenses, for example) were better answered by women, while male respondents were generally more adept at answering questions relating to farming, forest practices and resource rules. As such, while I tried to pick a time of day when both husband and wife would be at home, this was not always possible. Consequently, I mixed up the times of my visits so that I roughly had as many men as women responding to the surveys. This issue of balanced gender representation is often difficult to deal with, given that researchers are often pressed for time and unable to make such adjustments to their schedules.

3.5.4 Semi-structured interviews

Semi-structured interviews are located somewhere between the extremes of completely standardised and completely un-standardised interviewing structures (Berg 2007). This type of interview involves the implementation of a number of predetermined questions and special topics. However, while the questions are typically asked of each interviewee in a systematic and consistent order, the interviewers are allowed freedom to digress; that is, to probe far beyond the answers to their prepared standardised questions (Berg 2007:95). New lines of questioning may also arise during the course of the conversation. Here, intuition and experience become the best guides to gathering information (Martin 1995). As with all open-ended conversations, these moments help to develop a sense of what may be asked in subsequent meetings. For my research, semi-structured interviews were used extensively throughout the fieldwork: to gather data on migratory patterns and the impact of associated demographic and cultural change, evolving resource practices, as well as communities' institutional responses and longer-term adaptive strategies to such change (Objectives 2 and 4). This type of questioning also contributed to

general ethnographic accounts of each study community and its culture. As mentioned, the household survey on migration dynamics also incorporated a number of open-ended questions; giving respondents the chance to provide detailed qualitative data on a number of key issues. Table 3.5 lists the number of semi-structured interviews conducted in each fieldwork locality.

Table 3.5: Number of semi-structured interviews (and interviewees[24]) by locality

Locality	Number of interviews	Number of interviewees
Santiago Comaltepec	16	15
La Esperanza	8	7
San Martin Soyolapam	4	4
COMALTEPEC	28	26
ANALCO	25	20
CAPULALPAM	13	12
Los Angeles	6	6
Others (NGO, UZACHI, Gov)	8	8
Total	80	72

Interview guides or schedules were based around pre-established research themes and questions. These were further developed and enhanced once I began work in the communities through a combination of participant observation and, in some cases, discussing their design with community authorities. Before any given interview, I would always prepare a checklist of topics and questions that I wanted to cover. As discussions got underway, new lines of enquiry would naturally arise and some of the prepared questions would fall to the wayside; often left for future discussion. Participant observation and *conviviencia* helped me ask culturally appropriate questions, understand answers and improvise follow-up enquiries[25]. The vast majority of interviews were held in Spanish, although a few of the interviewees in San Martin Soyolapam were monolingual (local Chinantec dialect) and so a local translator was required. Some informants were identified prior to commencing the research, but the vast majority were selected after discussions with community authorities and through my own observations during the initial phase of the study. They included: *comuneros* (rights holders), elected community leaders, staff at the community forest enterprise (CFE), women, migrants and migrant leaders, returned migrants, and government officials.

[24] In the majority of localities, the number of interviews exceeds the number of interviewees due to some respondents being interviewed more than once.

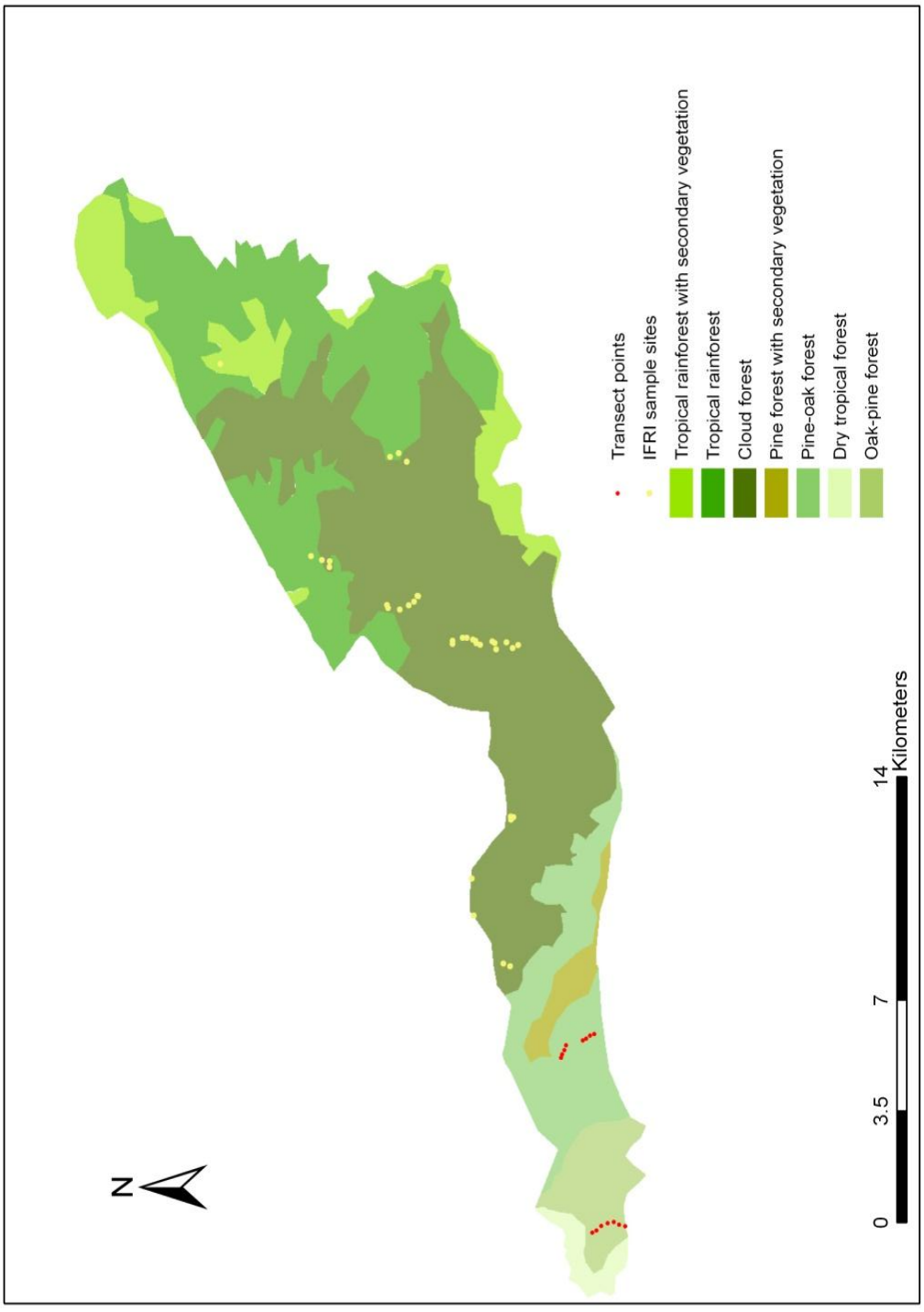
[25] Given the cultural context, as well as the nature of the subject matter, most interviews were not audio-recorded. Rather, I took detailed notes during the meeting, adding detailed observations to my notes immediately following conclusion of the interview.

3.5.5 Focus group discussions

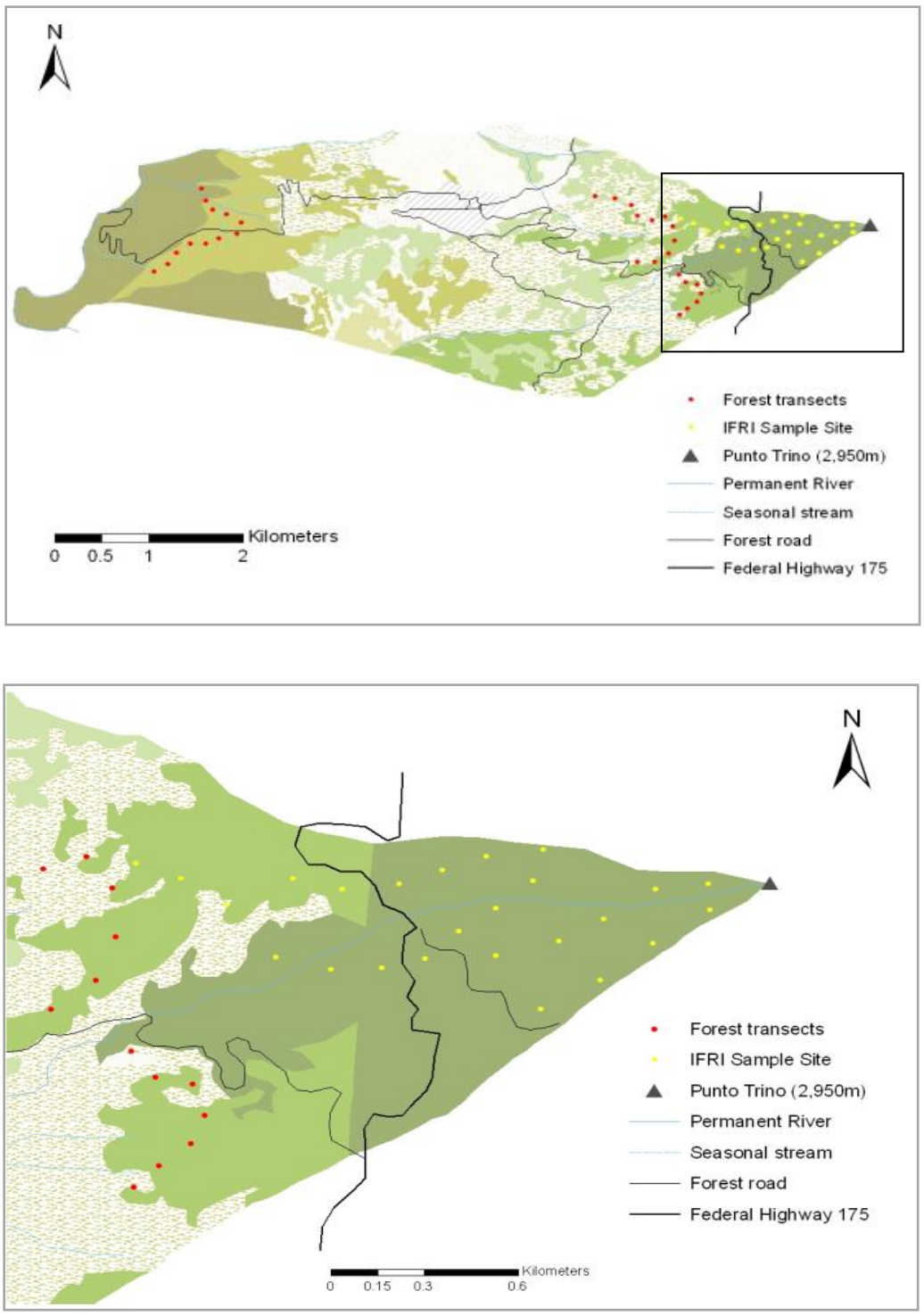
A focus group is a qualitative research method in which a group of people are asked about their views with regards a concept or an idea. Since questions are asked in an interactive group setting where participants are free to talk with other group members, this method can allow for a far larger number of issues, topics and solutions to be discussed and generated than through individual conversations (Berg 2007). A focus group was organised in each community during the initial phase of fieldwork, to help generate ideas and learn more about the basic issues and relationships under investigation. This involved between five and six members from the communal authorities. A second focus group discussion was organised with the involvement of a group of migrants in Los Angeles, which allowed for a number of important lessons to be teased out regarding migrant expectations and future movements. Unfortunately, I was unable to organise the focus groups that I had planned in order to generate data for the final objective that looks at community adaptations to out-migration and future scenarios.

3.5.6 Forest sampling and forest transects

In an inter-disciplinary study that deals with the complex changes impacting upon terrestrial SESs in Mexico, forest sampling work and forest transects become important methods to provide a rapid assessment of local vegetation diversity and overall forest condition. Forest sampling followed IFRI guidelines and both the sampling method and rationale behind site selection are explained in Appendix V. Specifically, a combination of factors – including elevation, steepness of slope, aspect, and proximity to roads and agricultural areas – were taken into account to ensure as representative a sample set as possible. Where forest sampling was not possible because of time constraints, I undertook 1200 metre-long transects with local guides, noting, at 150-metre intervals, forest structure, indicators of conservation, and evidence of forest use. I was accompanied on all such trips by knowledgeable local guides who supplemented my observations with information on land use history in the area. All locations were marked by GPS for mapping purposes (Chapter 6). Map 3.2 and 3.3 show the location of these sampling and transect sites in the two communities.



Map 3.2: Location of IFRI sites and transects in the forests of Comaltepec



Map 3.3: Location of IFRI sites and transects in the forests of Analco.
Inset (bottom) shows sample sites in Analco's pine-oak forest

3.5.7 Territorial walking tours

During the fieldwork phase, I took every opportunity to get out onto the land and appreciate the layout of each community's diverse territory. Such a setting was also very conducive to asking appropriate and context-specific questions to the knowledgeable local guides who accompanied me. As I describe in greater detail in Chapter 4, *serranos* recognise and name land use units in their local environment, with these units often characterised by their distance from the home. Conceived of in this way, land use systems in Analco and Comaltepec can be expressed as a series of widening circles – the home is found in the centre, surrounded by the community, cultivated fields, ranches and wild areas (after Martin 1993, 1995). The only way to grasp the interrelatedness of these areas is to take a walk through the countryside and learn about them first-hand. These walking tours are also opportunities to talk about other issues of interest, as well as gain personal information about the guides and their families (De Leon and Cohen 2005:203).

Plates 3.1 and 3.2: Guides accompanied me on territorial walking tours through diverse forest lands
Photo: Jim Robson

Territorial walking tours also acted as a specific method for mapping areas of agricultural abandonment and new forest growth. The data collected were used to help meet the third research objective and informs a major part of Chapter 6. Based upon prior discussions with land users and the communal authorities, I identified the areas around each village that were no longer used for farming and had been left for pasture or natural regeneration. Local guides would then accompany me on walking tours through as many of these areas as possible, where I would mark each point by GPS and note down the history of land use (year of, and reason for abandonment)

as well as current status and condition (use and vegetation type). This information was supported by photographic evidence.

3.5.8 Community workshops

Workshops provide the best opportunity to gather together a wide cross-section of community membership. Such meetings can be very useful for disseminating information out to a large audience and/or to tackle specific issues that are of importance and relevance to the community as a whole. I had wanted to use a community workshop for two main purposes. The first was to discuss local views on the longer-term adaptive strategies that each community is adopting or planning to adopt in the face of changes brought about by ongoing out-migration. Unfortunately, this was not possible because of poor health (see Section 3.10).

3.5.9 Document review

Before, during and after the fieldwork period, I undertook a document review in order to better understand the historical, political, geographical, environmental and social context of the region where the study took place. This involved a review of working papers, government documents and monographs produced by researchers, academic institutions and government agencies, the geographical and environmental atlas produced by the Ministry of Environment, biodiversity data for Oaxaca held by CONABIO (National Commission for the Use and Knowledge of Biodiversity), the demographic statistics for Oaxacan municipalities and localities published by the *Instituto Nacional de Estadística y Geografía* (INEGI), and other (economic) census data available for the state. In addition, the library at the Welte Institute in Oaxaca City provided great historical and political background on the region, along with ethnographic studies on Zapotec and Chinantec indigenous groups. At a community-level, secondary sources were consulted for socio-economic, demographic and farming data; including the local census (carried out annually by the workers at the community health centre), communal statutes, and current land use plans.

As with any piece of work, these documents were analysed with a critical eye to ensure that all information included in the thesis was as accurate as it could be. Verification of such data was an ongoing process.

3.6 Methods and Questions for Specific Research Objectives

The tables below summarise the methods and research questions applied to meet each research objective.

3.6.1 Objective 1

To carry out a socio-demographic and socio-economic analysis of the study communities to determine the nature and level of exposure to out-migration at multiple levels

Migration can be understood as an extremely varied and complex manifestation and component of equally complex economic, social, demographic, and political processes taking place at local, regional, national, and international levels. In this sense, it is hard to define, difficult to measure, multifaceted and multiform (Arango 2000:295), and thus a mix of methods are needed to paint as detailed a picture as possible.

Methods employed	**Key research questions**
INEGI population and household data for 1970, 1980, 1990, 2000, in addition to the 1995 and 2005 population counts, to estimate migration flows over time (level of exposure)[26]; IFRI forms and SANREM surveys provided a broad socio-economic description of each study community (education, employment, population structure). Household-level surveys and semi-structured interviews employed (with migrant and non-migrant families, return migrants) to determine the nature/characteristics of out-migration within the study community.	What kind of migration is taking place (internal or international)?; Is there a trend towards more definitive (permanent) migration?; Who is leaving?; How is movement related to access to financial capital, age, gender and education?; What is driving people to leave?; What kind of jobs do people work in?; How many households depend on income from migrant remittances?; Is there a migrant community in the area of employment?; Are migrant networks important?

3.6.2 Objective 2

To document, at multiple levels, the impact that out-migration is having on the study communities' social organization and institutional arrangements, and to examine their response to such change

For the purposes of this research, I focused on the community-level social institutions – the system of *cargos* (community posts) and *tequios* (voluntary labour days) – that are an

[26] INEGI data are only available for municipalities and not for individual communities. However, given that the study communities (like most others in the District of Ixtlan) were also their own municipalities, the data presented a reasonably clear picture of demographic change in the study communities themselves.

integral part of local governance and land use planning and administration. In figuring out how migration is impacting these institutions, I considered the effect of lower participation, a changing community demographic, the generation of new cultural attitudes that may increase tensions between community and individual needs, and increased inequalities between migrant and non-migrant households.

Methods employed	**Key research questions**
A mixture of structured and semi-structured interviews with community leaders, resource user groups, *comuneros* and *comuneras* (rights-holders), migrant and non-migrant households were used to (i) document the key social institutions; (ii) investigate the multiple impacts that demographic and cultural change have had on these pillars of community life. Structured interviews with the communal authorities and migrant leaders were used to determine current numbers of resident and non-resident *comuneros* and *comuneras*.	How is the traditional governance system (*usos y costumbres*) being impacted by, and responding to, the changes driven by out-migration? How are the social institutions of the *cargo* and *tequio* systems being impacted by, and responding to, lower participation, a new community demographic, and changing cultural attitudes? Is the study community losing fundamental human resources, including heads of households and community leaders? How do migrants and their children remain part of traditional community processes? Is migration reducing the social capital and labour needed for sustainable local development?

3.6.3 Objective 3

To investigate the implications of demographic and cultural change on the continuity of local resource and conservation practices

Direct impacts on the forest and territorial resources will come through changing land use practices. These can take the form of agricultural intensification or deintensification, increasing or decreasing livestock numbers, reduced participation in forestry and abandonment of forest activities (or the opposite), increased incidences of illegal logging, longer rotation cycles for agricultural plots, and the reduced surveillance of forest resources.

Methods employed	Key research questions
For data on specific resource practices, rules and territorial planning, semi-structured interviews (IFRI) were carried out with *comuneros* and resource users, staff from the CFE, and, in the case of Comaltepec, technical forestry officials (UZACHI). Forest sampling (following IFRI methodology; 35 plots in cloud forest of Comaltepec and 24 plots in pine-oak forest of Analco) and forest transects (in oak-pine domestic forest zone of Santiago Comaltepec and Analco) were used to measure tree diversity and general forest condition. Household surveys and IFRI forms were used to identify changing agricultural practices. This information was supplemented by territorial walking tours to locate (using a GPS) and identify different and changing land uses and resource practices across each community's territory. Local guides provided information on when areas were abandoned, why, and what was being grown there. Notes were taken on the age and structure of new forest and vegetative growth[27]. Structured and semi-structured interviews were held with UZACHI technical staff and Mexican government officials (CONAFOR-Oaxaca, COINBIO-Oaxaca) to determine the likely impact on forest use, management and policy.	Is there a reduced reliance on agriculture? Has increased migration led to lower demands on the resource base? How are specific resource institutions (rules-in-use) dealing with lower participation and a changing community demographic? In what way do changes to these institutions affect the uses and users of the resource system? How is migration affecting people's perception of the forest? How is migration affecting the evolution and transmission of local ecological knowledge? Does forestry offer an opportunity to provide jobs to keep people at home? Is lower participation affecting the community's ability to maintain forest surveillance or any other forest-related activity? Is this leading to lower investment in their management and protection?

3.6.4 Objective 4

To investigate the longer-term adaptive strategies developed by the study communities to deal with current and projected out-migration, and safeguard local forest resources

Migration from the Sierra Norte is a relatively recent phenomenon, yet one that appears (or appeared) to be increasing in intensity for many local communities (Martinez Romero 2005). Consequently, any study of community vulnerability to the changes brought about by out-migration must consider not only what is happening now, but perhaps more importantly, what may happen in the future. In this way, a key component of the research looked to understand communities' vulnerability to these stresses over the next 5, 10 and 15 years. This included an examination of what each study community has done or is planning to do over the long-term in

[27] I had hoped to access aerial maps of the area (from 1970s onwards) to provide for a time analysis of land cover change. Unfortunately, the only usuable aerial photos available for that part of Oaxaca were taken in 1995. INEGI apparently took more photos in 2005 but these were still unavailable to the general public when I went to INEGI's offices in January 2010.

response to the demographic and cultural changes being driven or exacerbated by out-migration. It must also consider the possibility of increased return migration to the villages as situations change in principal migrant destinations.

Methods employed	**Key research questions**
Focus group discussions with women's groups, resource user groups and high school children to get a handle on communities' perception of the risks and opportunities associated with migration Semi-structured interviews with migrants, resident *comuneros* and *comuneras*, and community leaders to document and discuss responses to migration – to determine whether these should be considered short-term, reactive coping mechanism or longer-term adaptations designed to manage current and future migration flows. Semi-structured interviews with key government officials, NGOs and other actors at the municipal, state and federal level to discuss future scenarios related to the impacts of migration on forest conservation across the region and the likelihood of community adaptation. In particular, I questioned a number of officials as to the likely response of the Mexican government to the changes that regions such as the Sierra Norte have been experiencing.	Why has the community not been able to keep people from leaving? How can the community act to shape the timing and rhythm of migration? How can communities encourage or coerce migrants into providing remittances for community projects? Can migration create an opportunity to strengthen community through positive changes to the governance system and the institutions that regulate community life? How do stay-at-homes stake a claim in defining the meaning of absence? How is migration affecting cultural attitudes and values towards the community and its territory over time? How important is community size? Do smaller communities feel the effect of migration more, or are smaller communities better placed to respond and adapt to change? From a gender perspective, how is the role of women in the community changing, and can this strengthen community identity and performance?

3.7 Consent and Anonymity

In each community, permission to carry out the study was granted by the communal and municipal authorities, after consultation with their members. A contract was drawn up and signed by the communal authorities, Leticia Merino (collaborating UNAM researcher and thesis committee member) and myself, which set out the responsibilities of each party (see Appendix I). For fieldwork conducted in Los Angeles, I required a letter of introduction from the community authorities (Appendix VI).

Once fieldwork began, individual participants were not asked to sign a consent form giving permission to use the information collected through interviews and other methods. Instead, participants were asked to consent orally. In Mexico, consent forms can be problematic for a variety of reasons, including literacy levels and a suspicion on behalf of participants as to

the motives of the researcher. For the interviews, I met with participants in a setting of their choice; normally their home environment or a community space. All information has been kept confidential and (along with my Mexican and Canadian advisor) I am the only person with access to the raw data. Participants are able to withdraw information upon request during the course of the research. All transcribed data are kept in secure computer files. Some data has been left out of the thesis document either to protect the anonymity of informants or the village/community as a whole.

3.8 Validation and Reliability of Data

Throughout the research process it had been my intention for knowledge to be shared with and validated by local participants. This involved triangulating information and results by comparing the responses from multiple participants and information provided by local documentation. Where possible, information was checked with at least two other sources to ensure validity and reliability and to provide greater context. This process was constant throughout my fieldwork, which meant that I had fewer holes to fill or doubts to check during return visits. Upon completion of principal data collection and analysis, an interim report (August 2008) was prepared and submitted to the communal authorities in Comaltepec for review. Errors and comments were then incorporated into the dissertation writing process. My analysis of data relied on categorisation methods (coding and thematic sorting). This technique, combined with critical self-reflection on my part, also helped to eliminate bias in the research. In December 2009, I returned to Analco to fill a number of data gaps (which had become apparent during the writing process) and validate other information that I was less than happy with.

Regarding the reliability of data, I would repeat Martin's (1995:104) claim that "no matter where they go and how they live in a foreign land, [researchers] still retain cultural filters – their own personal ways of looking at the world, conditioned by how they were raised and educated". In this sense, it is impossible to be a truly objective observer. However, there are ways for the researcher to diminish his or her subjectivity during fieldwork. Following Martin's (1995) lead and drawing upon previous research experience in the region, I endeavoured to be a good listener and speak with people in a way that allowed them to freely express their ideas and opinions. I did not rush people, but was aware when they grew impatient. I was particularly sensitive to this during the household surveys, which I had designed in such a way that they

could be completed quickly if the respondent was not particularly forthcoming. Prior experience in Mexico had taught me that overlong and overcomplicated surveys frustrate and tire respondents to such a degree that the data suffers and becomes unreliable.

The detection of erroneous data is an ability that comes with experience and sharpened through repeat visits. After spending some time in each study community, I began to develop a feeling for which answers were most valid and which people were the most sincere. At the same time, there is an important difference between erroneous data and divergent opinion. Spending time in the villages before applying more formal methods helped to make the questions I asked during interviews more precise, encouraging people to discuss their knowledge and provide their opinion in an accurate and elaborate manner. My choice of informants and interviewees was equally important. As Martin (1995:97) points out, it is easy to speak to the first person encountered or interview anyone who is willing to talk to you; including men, elders, the wealthy or the highly educated. While each village provided me with a number of key informants who I interviewed multiple times, on most other occasions I tried to speak to a cross-section of people who embodied a representative sample of the study community – such that my informants would not be biased in favour of any particular social group. As mentioned, I purposively mixed up the times when conducting the household surveys to ensure that I spoke to as many *amas de casa* (housewives) as male heads of household. I also understood that not all prominent players (community leaders, for example) were 'know-it-alls'. Given their position of authority, it would be easy to take what they say as gospel, but the truth is that they are not necessarily more knowledgeable than other community members of a similar age. The issue of migration, for example, is a phenomenon that stretches geographical and cultural boundaries and understandings, and thus the net needs to be cast far in order to garner a clearer picture of what is going on.

Doubts over the reliability of data extended to secondary as well as primary sources. It was very useful, for example, to have access to local census data, which is collected annually by the community health centres in Analco and Comaltepec. These censuses not only provided me with up-to-date (2008) data, but they could also be used to compare against, and thus check the reliability of population and household counts carried out by the *Instituto Nacional de Estadística y Geografía* (INEGI) as part of the national censi. Some researchers in Oaxaca have

commented that INEGI census data is not always sourced with the same care and precision as that collected by researchers or local people (Martin 1995; Hunn 2008).

3.9 Analysis of Data

Survey data were tabulated in Excel spreadsheets for straightforward analysis and ranking. Qualitative data from semi-structured and unstructured interviews were categorised by means of coding and thematic sorting. Data were analysed at multiple levels: individual, household, village and community. Analco was the most straightforward since the community consists of a single locality (village). However, in the case of Comaltepec, the community resides in a head village (Santiago Comaltepec) on the leeward (dry) side of the range, and two smaller villages (La Esperanza and San Martin Soyolapam) located on the windward (humid) side of the Sierra. Soon after arriving, the differences that exist between these settlements made it clear that data should be considered from the perspective of both community and individual localities. Firstly, these localities are representative of three distinct ecological zones with differing sets of land uses and practices. Secondly, the settlements are all quite different in terms of resident numbers, such that the impacts of migration on local governance would be expected to vary considerably. If the viability of a smaller, more isolated locality is threatened by out-migration then this would likely have ramifications at the community level in terms of both territorial security and resource conservation. Finally, groups of migrants from each villages are responsible for maintaining their own '*mesa directiva*' (hometown association), and so decision-making on migrant investments occurs at a village rather than community level. If the data were analysed at the community level, then a lot of these (often subtle) differences would likely be missed. Consequently, multiple levels of analysis were used to study the impact of out-migration on: (i) the number of active and non-active *comuneros*; (ii) *tequio* and *cargo* institutional arrangements; (iii) migrant investments; and, (iv) territorial land use (including aspects of forest management and conservation).

3.10 Changes

Before running through the research timeline, there were some unforeseen events that cut short the time I spent in the field. At the end of April 2008, I contracted *leptospirosis* (a serious bacterial disease) whilst working in the village of San Martin Soyolapam. Although I recovered from the acute phase of the disease, I continued to suffer post-infection complications throughout

the remainder of the year. My health worsened and I eventually stopped fieldwork in November 2008. Unable to continue working in Mexico, I returned to England early 2009 to seek further medical support. While a full recovery is expected, it can take a number of years, and so I began writing up the thesis using the data I had collected up to that point.

These difficulties had three main impacts on my work. First, while the original plan was to spend 14-18 months in the field, in the end I spent a little under 10 months in total, taking in different periods between November 2007 and January 2010. Second, data collected to meet my first and fourth research objectives were less comprehensive than I would have liked. For example, I was unable to survey the number of households I had wanted in the head village of Santiago Comaltepec. In addition, I was unable to organise the workshops to discuss community responses to the changes driven by out-migration (for meeting objective 4), nor interview all of the external actors (such as the Sierra Norte Natural Resource Committee and certain government officials in Oaxaca) which would have helped provide a more comprehensive regional perspective. Third, I decided to drop Capulalpam de Mendez as a study community given a lack of data collected. Rather, some of the initial findings from work conducted in Capulalpam inform discussion in Chapter 8.

Despite these deficiencies, I remain confident that they do not significantly weaken the principal findings and conclusions presented in this document.

3.11 Research Timeline

The fieldwork began in late 2007 and ended in January 2010 as per the timeline (Table 3.6) on page 79. Rather than working in one community at a time, my fieldwork schedule developed on a more *ad hoc* basis. This flexible working arrangement was helped by the fact that I had my own transport and the head villages of each community were only an hour's drive away from each other. In retrospect, it also allowed me to tease out and understand some of the similarities and differences between the two communities in 'real time'. In Comaltepec, November 2007 was spent meeting community leaders, introducing them to the project, working with the community to further develop and customise the methods to be employed, and identifying potential informants. In Analco, fieldwork began in December 2007 with IFRI forest sampling and transects. The principal phase of qualitative data collection began in January 2008 and involved further participant observation; spending time interacting with local people to better

understand the environment, their activities and specific resource practices. In each community, initial weeks were spent observing general characteristics of the local culture and daily activities, with exploratory interviews conducted to attain familiarity with basic concepts and trends associated with the topic being studied.

Table 3.6: Research timeline according to field site

Field Site	Nov 07	Dec 07	Jan 08	Feb 08	Mar 08	Apr 08	May 08	Aug 08	Sep 08	Nov 08	Dec 09	Jan 10
Santiago Comaltepec	X		X	X					X	X		
La Esperanza			X	X						X		
San Martin Soyolapam						X						
Analco		X		X	X		X		X		X	
Capulalpam	X	X	X				X		X			
Oaxaca City						X			X		X	X
Los Angeles								X				

More formal methods (surveys and semi-structured interviews) were then applied to collect specific data for objectives 1, 2, 3 and 4. In Comaltepec, this work took up much of February, March, April, August and November 2008. This included the IFRI study[28] that comprised most of February 2008, and an eight-day visit to Los Angeles in August 2008 to interview migrants, their families, migrant employers and representatives from two hometown associations. In Analco, most of the data for objectives 1, 2, 3 and 4 were collected during April and May 2008, which included completion of the IFRI study that had begun in December 2007. In addition, migrant Analqueños were interviewed in Los Angeles in August 2008 and further data collection and verification was carried out in September 2008. In December 2009, another trip was made to Analco to coincide with their annual fiesta. This allowed me to carry out some

[28] For the two IFRI studies, I coordinated five-to-six person teams of researchers from UNAM. As well as benefiting from the knowledge and expertise of researchers from several different disciplines, their assistance enabled me to gather data during two 10-day periods (per community) that would have taken three months to collect if I had been working on my own.

final verification work and chat to migrants from both Mexico City and the U.S. who were visiting the home village during the Christmas holidays.

3.12 Dissemination

In October 2010, I returned to Oaxaca to hand back products of the research to the two study communities. This comprised of:

- A poster presentation (in Spanish) given to the communal authorities of Analco and Comaltepec, which explained the main findings of the research;
- Submission of a plain language summary version (in Spanish) of the thesis, copies of which were / will be distributed among interested community members and local NGOs; and,
- The latest version of the full thesis document (once bound, copies of the final version will be sent to both communities).

CHAPTER 4 – THE STUDY REGION AND COMMUNITIES

4.1 Introduction

This chapter begins by providing background information on the State of Oaxaca and the Sierra Norte region. It then describes, in detail, the two study communities of Santiago Comaltepec and San Juan Evangelista Analco. This is a long section, one could argue overly long for what is essentially a context chapter – information that you often find squeezed into the methods chapter of a masters or doctoral thesis. However, in this case, it is essential for the reader to receive a firm grounding in the social-ecological setting under investigation, if he or she is to fully understand the impacts of out-migration as discussed in subsequent chapters.

4.2 The State of Oaxaca

Oaxaca, in southern Mexico, is the name given to both state and capital city, and is derived from the Nahuatl (Aztec) word, *huaxyacac*, which means 'on the nose of the *guaje*'. In Zapotec, it is known as *luula* (or 'place of *guajes*'). In both cases, reference is made to the flat green pods (*guajes* or *huajes*) of the acacia tree (*Leucaena sp*), an abundant species in the central valleys where the colonial city of Oaxaca de Juarez was founded by the Spanish in 1522. The State of Oaxaca is the fifth largest in Mexico, covering a little over 9.5 million hectares or 4.8% of national territory (INEGI 2009). It borders the States of Veracruz and Puebla to the north and northeast; Chiapas to the east; Guerrero to the west; and, the Pacific Ocean to the south. Oaxaca is divided into eight geo-political regions: Canada, Costa, Istmo, Mixteca, Papaloapan, Sierra Norte, Sierra Sur, and Valles Centrales. Administratively, these regions are divided into 30 districts, 570 municipalities and over 10,000 localities (INEGI 2009). The very high number of (predominantly small) municipalities – almost a quarter of the country's total – is a consequence of the state's difficult mountainous terrain and divisions that exist among and between its principal ethnic groups.

The first evidence of human presence in Oaxaca dates to 10,000 B.C. Originally hunter-gatherers, Barabas et al. (2003) describe how these small family bands left behind a nomadic existence to form the first permanent settlements around 1,500 B.C. – to coincide with success in domesticating maize, bean and other cultivars. Today, the state is home to sixteen, or roughly a quarter of the sixty-two distinct ethno-linguistic groups found in Mexico (CDI 2008) - many of

which continue to thrive (Winter 1990). Indigenous people number 1.5 million (CDI 2008) or approximately 43% of Oaxaca's total population of 3,438,765 (INEGI 2009). This compares with an indigenous population at the national level that makes up less than 10% of Mexico's current estimated total population of 111 million (CDI-PNUD 2006, CIA 2009). Of Oaxaca's 570 municipalities, 552 include a portion of the local population who speak an indigenous language. Zapotec is the most commonly spoken (by 34.8% of indigenous speakers); followed by Mixtec (22.3%), Mazateco (14.7%); Chinanteco (9.4%); and, Mixe (9%) (INEGI 1996). From a total of sixteen language families, including Zapotec and Chinantec, a significant number encompass a variety of regional dialects, making for a much more diverse picture than initially apparent (Frizzi 2000). Close to twenty percent of the indigenous-speaking population are classified as monolingual (i.e., not Spanish-speaking). Each ethno-linguistic group possesses a distinct set of characteristics that both brings them together and sets them apart: centuries old histories; common identities; shared and differentiated cultures; and, governance of communal territories.

Plate 4.1 (left): Mixe settlement of Coatlan, Sierra Norte in the nineteeth century (Starr 1899)
Plate 4.2 (right): Chinantecs of San Pedro, Sierra Norte (Starr 1899)

In addition to impressive cultural-linguistic diversity, Oaxaca (along with Chiapas, Veracruz and Guerrero) forms part of the most biologically diverse region in Mexico (Garcia-Mendez et al. 2004). There are two main reasons for this. First, it marks the confluence of the neo-arctic and the neo-tropical biogeographic regions. Second, Oaxaca is situated where the country's two main mountain chains, the Sierra Madre Occidental and the Sierra Madre Oriental, meet. Together, this has created a uniquely complex physiographic landscape, where peaks that

rise above 3,000 metres above sea level (m.a.s.l) punctuate deep canyons and valleys. These factors combine to produce a highly varied mix of topographic, geological and climatic conditions, which are reflected in an incredible range of forest ecosystems. In total, the state is home to 12 vegetation types, 8431 species of vascular plant and close to 4,500 species of terrestrial vertebrates and invertebrates (SERBO 2010; Garcia-Mendez et al. 2004). Of these, 702 plants and 128 vertebrates are endemic to Oaxaca (SERBO 2010).

Despite this rich biological and cultural heritage, from a socio-economic standpoint, Oaxaca is one of most impoverished and marginalized states in Mexico. At the national level, the state has the second highest mortality rate in the country (and third-highest for infant mortality), the second-highest proportion of households without drainage, electricity or potable water, and its inhabitants enjoy the second-lowest level of schooling in the country (after Chiapas) (INEGI 2000, INEGI 2005). Oaxaca is the most rural state in Mexico, with less than half (47.1%) of its population living in localities with 2,500 or more inhabitants (INEGI 2009). Many, if not most of these rural communities suffer from higher than average rates of illiteracy, low agricultural productivity, inequitable market access for agricultural and forest-based products, below average incomes, and inadequate sanitary conditions. A reported 26.9% of the working population do not receive a wage (INEGI 2008). In 2007, the per capita gross domestic product in Oaxaca was $35,252 Mexican pesos, the second lowest of any state in the country (INEGI 2009).

Restricted employment opportunities and low wages have encouraged hundreds of thousands of men and women to migrate to other parts of the country and further north into the U.S. Over the past decade, Oaxaca has joined a small number of Mexican states (Michoacán, Zacatecas, Durango, Chiapas, Guerrero, Sinaloa and Tabasco) to become net exporters of migrant labour (INEGI 2009). The Mexico-United States corridor is the largest migration corridor in the world, having accounted for 10.4 million migrants by 2005 (World Bank 2008). To highlight the increased importance of migration to the economy of sending communities, remittances to Mexico have risen sharply since the turn of the century – from US$7.5 billion in 2000 to US$25 billion in 2007. In Oaxaca, remittances represented 40% and 35% of the total assigned state budget for 2004 and 2005 respectively (Alfaro Salas and Perez Morales 2006).

4.3 The Sierra Norte: A Biological and Cultural Crossroads

In Oaxaca's *Sierra Norte* or northern Sierra, also known as the *Sierra de Juárez*, flora and fauna associated with temperate mountainous regions mix with species typical of more humid, tropical climes. The region's altitudinal gradient runs from 100m to 3300m above sea level, making it one of the largest corridors of natural forest and jungle in Mexico. Consequently, it is also one of Oaxaca's most representative regions in terms of environmental and biological diversity, and considered a priority conservation area at the national level (Conanp-Conabio 2007). It forms part of the *Mesoamerican Pine-oak Forests Eco-region*, one of the World Wildlife Fund's *Global 200* priority eco-regions for conservation. The region is home to 197 families, 990 genera and 2,382 species of plants. Of Oaxaca's total floristic richness, up to 30% of the state's species are found here. The Sierra Norte is also home to 38% of Mexico's native and non-native bird species (Rzedowski 1993; SERBO 2010; Garcia-Mendez et al. 2004).

This biological diversity embraces seven types of terrestrial vegetation (Rzedowski, 1978). At lower altitudes (200m to 1,200m) on the windward (northern) flanks of the Sierra, tropical evergreen forest dominates, characterized by abundant lianas and epiphytes and home to populations of jaguar, tapir and spider monkey, among other large mammals. On a daily basis, clouds rise up from the Gulf of Mexico and accumulate on the slopes' higher reaches (1,300 to 2,400m), providing some areas with up to 4500-5500mm of rain a year. Here one finds unbroken tracts of cloud forest, where giant ferns congregate and the trunks and branches of trees act as cover for a diversity of mosses, orchids and creepers. Floristically, these forests are home to a mixture of neo-tropical and Holarctic elements, including affinities with South America and Asia (Meave et al. 2006). Despite comprising some of the richest assemblages of plant species in the Sierra, these montane cloud forests remain understudied. Above 2,400m, pine is dominant, sharing habitat with stands of oak and fir. Higher still (above 2,900m), trees thin out and give way to sub-alpine hawthorn and meadow. On the leeward (southern) side of the range, pine-oak forest dominates in higher zones but as one drops below 2,200m, lower precipitation and rocky soils poor in organic matter are ideal conditions for dry oak forest, rich in bromeliads. Lower still (1,700m down to 1,250m), less than 1,000mm of rain a year provides for diverse dry tropical forest, with an understory of spiny shrub and cactus.

The Sierra Norte covers 400,000 hectares of these diverse forestlands, which are controlled by Zapotec, Chinantec and Mixe indigenous communities, through approximately 70

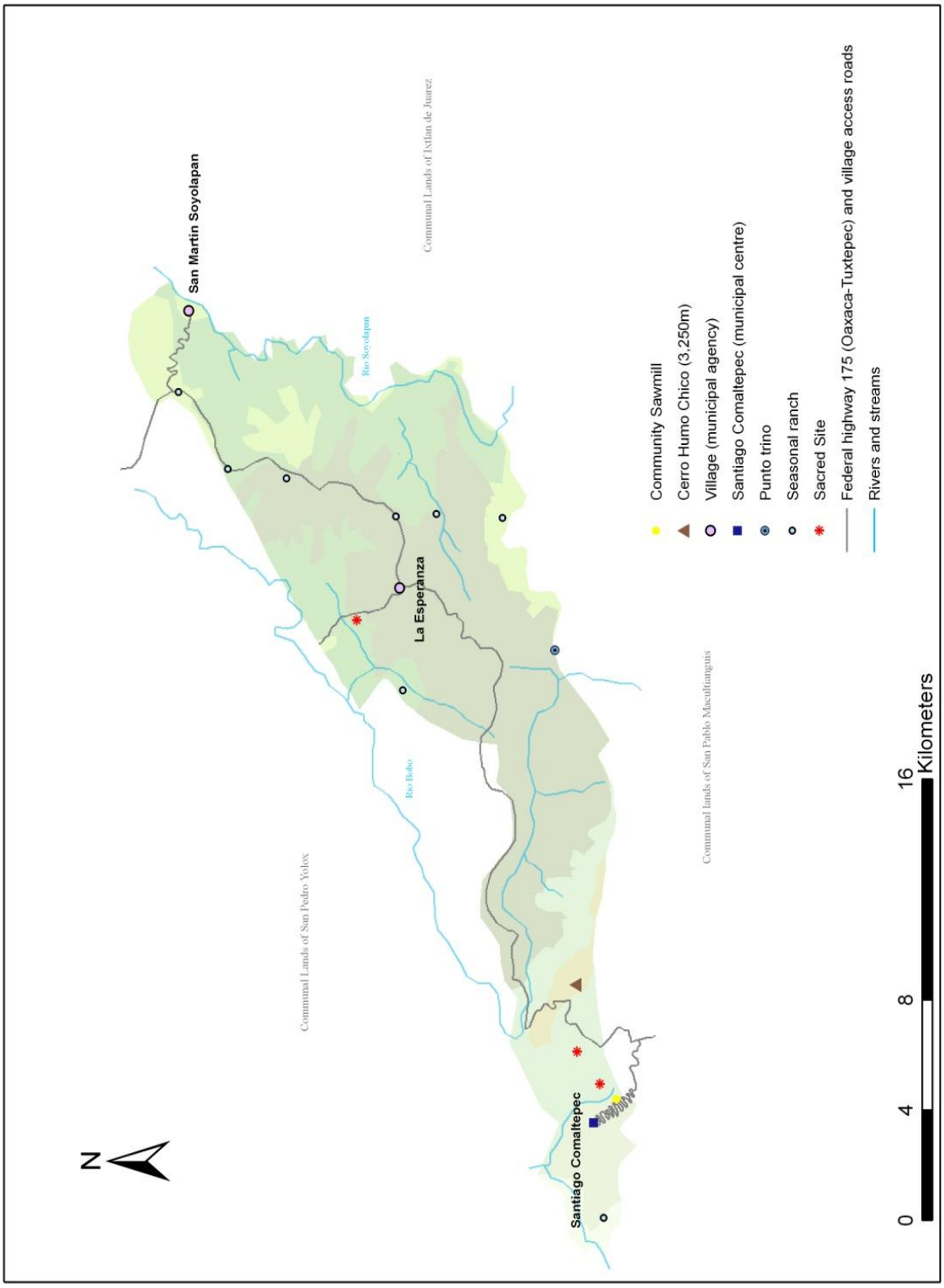
communal properties. Some of these communal territories are small (1,500 hectares), whilst others are much larger (over 25,000 hectares). Administratively, they pertain to the following districts: Ixtlan (26 municipalities), Villa Alta (25 municipalities) and Mixe (17 municipalities). This study features two communities located in the first of these three districts. Such is the mosaic of microenvironments found in Ixtlan's mountains and valleys, that the territory of many communities contains two, three, or even four principal climatic zones. This makes it possible to grow a wide array of crops, which has led to impressive levels of agro-biodiversity. The vast majority of agricultural land here is *temporal* (seasonal), which is to say that it is rain-fed. Traditionally, local farmers have used neither pesticides nor hybrid seed, enabling the survival of a genetically rich variety of native domesticated and wild plants. Main cultivars are maize, bean, squash, coffee and a mix of temperate and tropical fruits. Livestock ranching is also practiced, particularly in lowland, humid areas, with their more favourable topography. Since the mid-1980s, after regaining control of their communal forests, a number of highland communities have embarked on the commercialisation of raw and processed timber products.

Having provided background on the wider region, the remainder of this chapter is dedicated to a thorough description of the two study communities.

4.4 The Study Communities - Historical and Contemporary Setting

4.4.1 The Chinantec community of Santiago Comaltepec

Map 4.1 provides the layout of the communal territory of the Chinantec community and municipality of Santiago Comaltepec (hereafter referred to as **Comaltepec**). The community was founded in 1603, with the original inhabitants having previously resided in the Rio Soyolapam area to the east. The name Santiago Comaltepec originates from the Chinantec words *comalli* (or 'Comal', which refers to the ridge that surrounds the main village), *tepelt* (which signifies 'hill') and *Santiago* (the name of the community's patron saint, the Apostle James). The community's territory is split into two main zones: the more extensive wet, humid zone that lies to the east of the main *cerros* (mountain peaks), and which spans both tropical and humid-temperate climes, and a less extensive dry zone to the west. Comaltepec is bordered to the north by the communal lands of San Pedro Yolox, San Juan Quiotepec, San Pedro Yolox and San Juan Bautista Valle Nacional, to the south by San Pablo Macuiltianguis and Ixtlan de Juárez, to the west by San Pedro Yolox and San Pablo Macuiltianguis and to the east by Ayotzintepec.



Map 4.1: Territorial layout of Comaltepec

The head village of Santiago Comaltepec (Plate 4.3) is located in the west (17º 33' 54" Latitude North and 96º 32' 54" Longitude West), at an altitude of 2,005 metres above sea level. It is an approximate three hour drive north of the state capital of Oaxaca City, reached via Federal Highway 175 (Oaxaca-Tuxtepec) and a 10km unpaved forest road accessed at Cerro Machin (Km. marker 115).

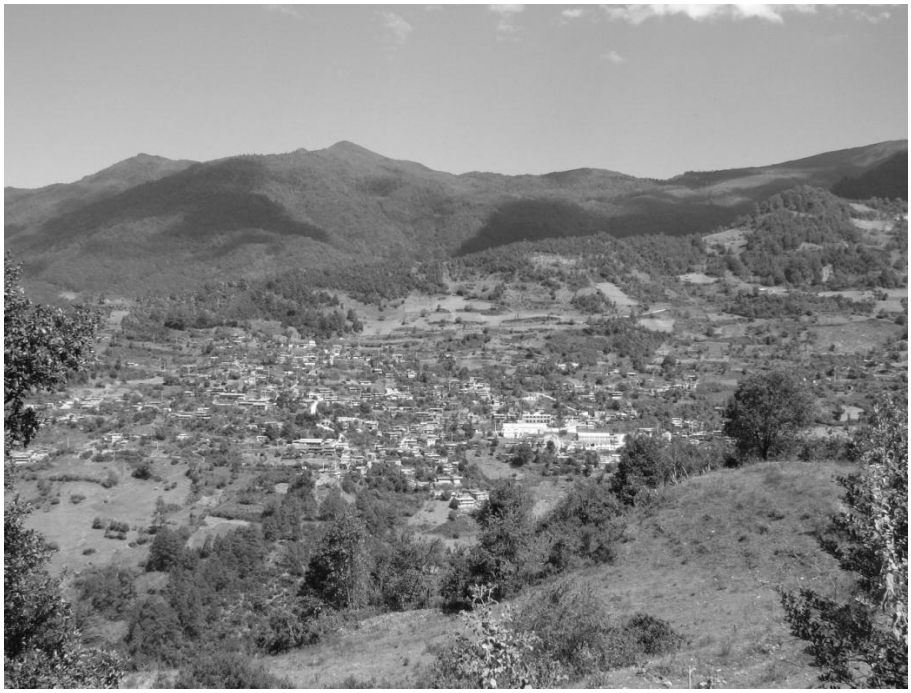


Plate 4.3: Head village of Santiago Comaltepec
Photo: Jim Robson

When Federal Highway 175 was built in 1958-1959, this helped to facilitate the establishment of two more permanent settlements: La Esperanza and San Martin Soyolapam, located on the windward (eastern) side of the Sierra (Plates 4.4 and 4.5)[29]. While Santiago Comaltepec is the municipal centre, these two villages act as police agencies and help to maintain a presence throughout the community's large and diverse territory. La Esperanza is located at kilometre marker 80 of Federal Highway 175 (45km from Santiago Comaltepec) and at an altitude of 1,600 metres above sea level. San Martin Soyolapam is located a further 25km

[29] Undoubtedly, one of the major improvements initiated by the Federal government has been the extension of the network of paved and unsurfaced roads. The crucial period in infrastructural development began during the 1940s, when Oaxaca was connected to the Pan-American Highway (Clarke 2000).

east, at the foothills of the Sierra, at an altitude of 168 metres above sea level. It is reached by an 8km unpaved forest road, which is accessed at kilometre marker 62 of Highway 175.

Plates 4.4 and 4.5: La Esperanza (left) and San Martin Soyolapam (right)
Photo: Jim Robson

The municipality of Comaltepec contains of a total of 13 localities (INEGI 2005). Only Santiago Comaltepec (municipal centre), Soledad Tectitlan[30] (municipal agency) and La Esperanza and San Martin Soyolapam (police agencies) are recognised as administrative localities by the Government of the State of Oaxaca. Comaltepec's remaining nine localities - Puerto Eligio, Metates, Puerto Antonio, El Mameyal, Cerro Redondo, Rancho Trucha, Tarabundi, San Bernardo, and La Chuparosa - are *rancherías*[31], seasonal or semi-permanent ranches that were traditionally used by local families from the main village of Santiago Comaltepec to plant and harvest a range of crops (coffee, banana, corn, wheat) for domestic consumption or to sell at nearby markets. While one (La Chuparosa)[32] is located in the west, the

[30] Soledad Tectitlan is not part of the indigenous community of Santiago Comaltepec. However, since it is considered too small to be its own municipality, it falls under the administrative jurisdiction of Comaltepec.

[31] The name *ranchería* is used in the Sierra Norte in reference to single or multiple homesteads in isolated agricultural areas, away from larger, permanent villages. They have no specific connection to livestock ranching.

[32] Soon after receiving title to their communal lands in 1953, the community of Santiago Comaltepec, under force of arms, took possession of lands belonging to the neighbouring Zapotec community of San Juan Luvina. The area was known locally as 'La Chuparosa' (named after a nearby rock outcrop that resembles a humming bird) and provided good land for growing maize, beans and wheat. In the late 1990s, the community applied for *ejido* status for this land, in order to safeguard it from Luvina's growing territorial claims. It was granted *ejido* status on November 13, 2001, covering a total of 893.54 hectares. In contrast to areas of communal territory, to which all of Comaltepec's *comuneros* (village rights-holders) have access, rights to the *ejidal* lands of Rancho Chuparrosa are limited to a small number of *ejidatarios*. These are the heads of the original families from Santiago Comaltepec who traditionally worked plots in this area. Rights are hereditary, passed down from *ejidatario* to son.

remainder are found to the east of community's highest peaks. Some *rancherías* are tiny settlements (just two or three homesteads), while others are much larger, and have been home to as many as fifteen or twenty resident families (Metates, Rancho Trucha).

Electricity reached Santiago Comaltepec in 1964. This and other forms of 'development' followed construction of (then unpaved) Federal Highway 175 in the late 1950s, which passes through the heart of the community's territory. Telephone arrived in the 1980s, although only a handful of households today have private lines, with the vast majority dependent on the telephone kiosk in the village centre. This is a crucial service for families who want to stay in touch with relatives living in Mexican cities or the U.S. Public buildings include a Municipal Palace in Santiago Comaltepec, which houses the municipal and communal authorities, as well as the community's forest enterprise (known locally as the '*Unidad Forestal'*). There is also a municipal palace in the agencies of La Esperanza and San Martin Soyolapam. Nearly all families consider themselves Catholic, and all three permanent villages have a church in which to practice their faith. Santiago Comaltepec and La Esperanza both have a community food store (CONASUPO[33]), which provides (imported) subsidised maize, basic foodstuffs (oil, sugar, salt etc.), and other amenities.

In terms of medical services, Santiago Comaltepec has a full-time rural health centre, with resident doctor, nurse and dentist. The village also has a community ambulance for taking patients to the regional hospital in Ixtlan or to specialist units in Oaxaca City. There is also a community pharmacy that has been running since 1999. La Esperanza and Soyolapam both have health clinics, but they are only open on a bi-monthly basis. If more urgent medical attention is required then villagers are dependent on getting a ride to Valle Nacional (as the closest regional centre). There is one certified traditional medicine practitioner in the community, although she stopped being active in 2004. The head village has a nursery school, primary school, secondary school and technical college. La Esperanza has a primary and tele-secondary school[34], while Soyolapam has a primary school only. There is a community-run Internet service in Santiago

[33] *Compañía Nacional de Subsistencias Populares* (CONASUPO) ran the state-owned food distribution network and grocery stores that provided basic foodstuffs (corn, beans, sugar, dried milk etc.) to the rural and urban poor in Mexico. Discontinued by the Zedillo government at the turn of the century, to be replaced by DICONSA, the name is still used in Comaltepec to refer to the government-subsidised store that provides basic food items to villagers.

[34] To provide isolated rural communities with access to education, the Mexican government uses television to provide secondary schooling. Lessons are broadcast daily by satellite to televisions in the local schools. Most classes have a teacher to give further explanations and to distribute textbooks. There are about 16000 tele-secondary schools in Mexico.

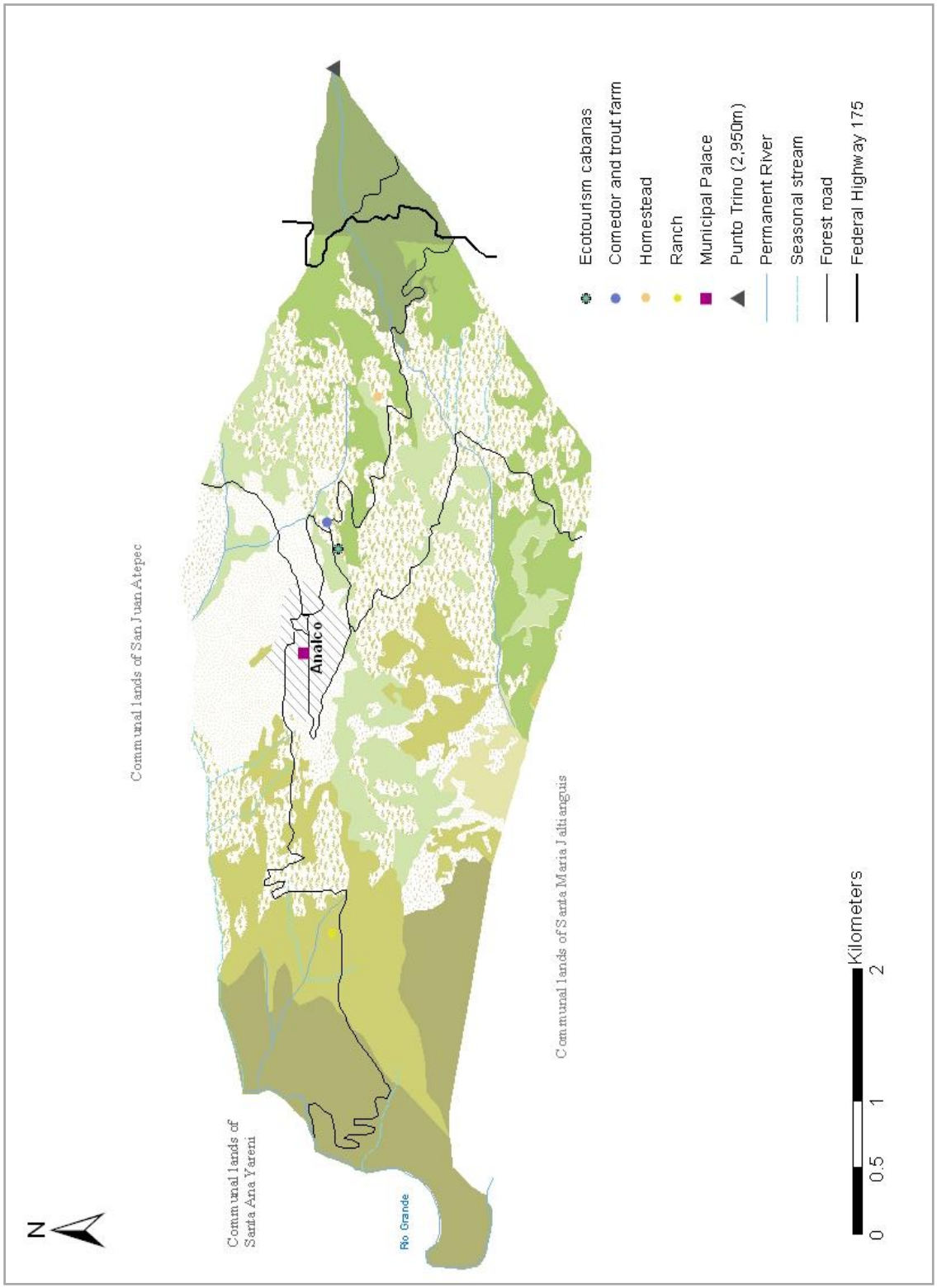
Comaltepec, which is open in the afternoons (Mon-Fri). The head village also has a public bus service that runs to and from Ixtlan (1.5 hours each way) on Mondays (for the weekly market) and to Oaxaca City on Tuesdays, Fridays and Sundays.

4.4.2 The Zapotec community of San Juan Evangelista Analco

Map 4.2 shows the layout of the communal territory of the Zapotec community and municipality of San Juan Evangelista Analco (hereafter referred to as **Analco**). The village of Analco is located at an altitude of 2,120 metres above sea level (Plate 4.6).

Plates 4.6: Village of Analco
Photos: Jim Robson

It is a 2 hour drive or 87km north of Oaxaca City and is reached via Federal Highway 175 (Oaxaca-Tuxtepec) and an 8km unpaved forest road heading west of the highway. Analco's communal territory is located within the coordinates: 17° 23' 00" Latitude North and 17° 25' 00" Longitude West; 96° 30' 00" Latitude North and 96° 35' 00" Longitude West. To the north it borders the community of San Juan Atepec, to the south are the community lands of Santa Maria Jaltianguis, to the west those of San Miguel Abejones, with Ixtlan de Juárez to the east.



Map 4.2: Territorial layout of Analco (adapted from Lara 2007)

Analco is one of the oldest communities in the Sierra Norte. According to village records, the area was first settled by a group of Zapotecs in 1450, and given the name *Lachi-aduni*. In the local Zapotec dialect, 'Lachi' means *llano* or 'hill', while 'aduni' means *parado* or 'standing'. In 1486, members of the *mexica* ethnic group invaded the village and gave it the new name of 'Analco', which in the *náhuatl* language means: 'to the side of water' or 'by water'. This placename, which remained even after the *mexica* left, alludes to the lagoon that is located to the southeast of the village. In 1825, Analco became a municipality. In 1910 and 1911, many men from the village left to fight in the Mexican Revolution, encouraging armed groups from the neighbouring communities of Atepec and Jaltianguis to make repeated excursions into the community's territory, taking over areas of Analco's customary forestlands and forcing many families to abandon their homes. When the Revolution ended eight years later, the men who survived returned to fight the occupiers and successfully recover a proportion of Analco's lands. However, territorial conflicts with Atepec continued until the 1950s, with a number left dead and injured on both sides. Litigation between the two communities finally ended in 2004 under a ruling by PROCEDE (Communal Land Titling Certification Program).

'Modernity' also reached Analco following construction of Federal Highway 175. A potable water system was installed in 1964, while electricity arrived in 1968. In 1965, a primary school was opened, with a tele-secondary school established in 1982. In 1990, the first health post was opened (with attendant nurse), upgraded in 2002 to a Community Health Centre with resident doctor, nurse and ambulance. In 1994, the first village-wide drainage and sanitation system was installed, in addition to a public telephone line. In 2001, a community library was opened, and four years later a Community Training Centre was set up next door. This Centre provides computer-based training to young people (using satellite Internet access) and was part funded by the federal government's 'e-Mexico' program and the Monterrey Institute of Technology and Higher Education. It acts as the village's only public Internet provider. Public buildings include a Municipal Palace (Plate 4.7) that houses the offices of the Municipal Presidency and the communal authorities of the *Comisariado de Bienes Comunales* (CBC). This building and adjacent plaza forms a central focus for community life and activity. Across from the Palace is a community store (CONASUPO) selling basic supplies and foodstuffs (fruit, vegetables, cheese, meats and packed goods), and a small music hall where the village bands practice at weekends and on weekday evenings. Behind the Palace is the communal mill

(*molino*), run by incumbents of the CBC and used by families to grind corn kernels into dough. Public transport is virtually non-existent; while there is a community bus, it has no fixed or regular schedule.

Plate 4.7: Municipal Palace and Offices of the CBC, Analco
Photo: Jim Robson

In the early 1980s, after a group of evangelical missionaries arrived and resided in the village, evangelicalism established itself in a community previously dominated by Catholicism. Currently, an estimated 25% of the population is Protestant, with the remaining 75% Catholic. The success of evangelical Protestantism in Latin America over the past few decades is well documented[35], with often radical consequences that divide communities into religious factions. In Analco, local people appear to have struck a balance, generally upholding the interests of the community above their religious loyalties. There are still tensions and differences, however, and these can be seen during celebratory moments in traditional religious and civic life. When the community authorities assigned land on the edge of the village for an evangelical church to be built, many followers began to move homes to this part of the village, creating an urban zone divided along denominational lines.

[35] Although missionaries played a key role, in Analco it appears that indigenous Protestantism offered a meaningful alternative to individuals who had suffered from alcoholism or economic and political marginalization in the village.

4.4.3 Comparative village demographics and household structure

In 2008, Analco was home to 405 inhabitants, living in a total of 126 households (Table 4.1). The village of Analco is the only locality to have been settled within the community's territory. A quarter of the population is over the age of 65, with less than a quarter of residents between 20 and 44 years of age. Although the community's census does not capture information on the number of indigenous speakers, during conversations in the field it was very rare to find anyone below the age of sixty with a working knowledge of Zapotec. My best estimate is that no more than a fifth of the resident population could be considered proficient in Zapotec, with few individuals speaking it on a regular basis.

Table 4.1: Villages with a permanent resident population, Analco
(*Source*: Village and Community Census, 2008)

Village	Number of inhabitants	Number of households
Analco	405	126

Comaltepec's resident population is considerably larger than Analco's and far more dispersed due to the size of the community's territory and the existence of multiple localities. Table 4.2 shows that the head village (and municipal centre) of Santiago Comaltepec was home to 823 inhabitants in 2008, residing in 207 households. The age-sex structure of the local population is less top-heavy than Analco's, with a much greater proportion of children and adolescents. There are, however, few residents among the most productive age groups (20-45). On the humid side of the mountains, La Esperanza was the next largest settlement with 154 inhabitants (45 households), and a couple still living in nearby Vista Hermosa. Although the village census for La Esperanza collected less detailed demographic data, it still showed that the majority of residents are over 60 or under 15 years of age.

According to a 2008 Oaxacan Ministry of Health census, there is still a family residing in Puerto Eligio and also in Puerto Antonio, although it was unclear whether these were permanent residents or seasonal agricultural workers[36]. In the tropical lowlands, San Martin Soyolapam was home to 83 inhabitants (24 households), while 16 people (4 households) lived in the tiny roadside hamlet of Metates. From a total of 1087 residing in the community, more than 80%

[36] Data on the settlements found on the humid side of the community's territory comes from a January 2008 census carried out by a team (Sobec Santos Garcia and Oscar Amox Hernandez Ignacio) from the Ministry of Health based in Oaxaca City.

speak Chinantec (INEGI 2005). De la Mora (2003) believes the number to be much higher, estimating that 98% of the local population are Chinantec speakers, and almost 92% of residents are bilingual (Chinantec and Spanish). Most of the monolingual families live in La Esperanza, San Martin Soyolapam and other settlements on the humid side of the community's lands. Chinantec is spoken with family, friends and *paisanos* (fellow citizens), while Spanish is used to communicate with neighbouring Zapotec communities, NGOs, researchers and government officials.

Table 4.2: Villages and settlements with a permanent resident population, Comaltepec (*Source*: Village and Community Census, 2008)

Village / ranch	No. of inhabitants	No. of households
Santiago Comaltepec	823	207
La Esperanza	154	45
San Martin Soyolapam	83	24
Metates	16	4
Puerto Eligio	5	1
Puerto Antonio	4	1
Vista Hermosa	2	1
TOTAL	1087	283

In both communities, household and family structure[37] is similar (Table 4.3). The nuclear family is traditionally the main unit of production and reproduction, with most comprising between four and six children. Although this may seem quite high, the trend over the past 15-20 years has been towards smaller family size, a finding supported by analysis of family size in households where the head is 35-45 years of age. It is also consistent with the introduction of family planning programs in rural Oaxaca in the late 1970s. The average age of heads of household is 53 yrs in Analco and 55 yrs in Comaltepec. Consistent across the two communities, over 90% of *comuneros* (common property rights-holders) have completed or attended primary

[37] For the purposes of this study, households – defined as the basic residential unit in which economic production, consumption, inheritance, child rearing and shelter are organised or carried out (Haviland 2003) - are considered synonymous with the family. Unless stated otherwise, 'family' refers to the nuclear family consisting of a parent or parents, and their children (who can be married or unmarried). In both cases, not all members need be resident, but can include non-resident (migrant) members who continue to contribute in some way to household (and family) economic productivity and wellbeing. Such a definition has been wildely accepted and cited for the Mexican context (Wiest 1973).

school but fewer than 40% have completed secondary school. Less than 10% have gone to technical college or attained a professional qualification, while fewer than 2% possess a university education. However, the numbers in each category will continue to shift over time, now that young people have much improved access to secondary-level (in Analco, Santiago Comaltepec, La Esperanza) and preparatory-level schooling (in Santiago Comaltepec, with colleges in nearby Ixtlan, Capulalpam de Mendez and Xaicui an option for students from Analco).

Table 4.3: Average age and level of schooling for parents and children (*Source*: Household survey)

Village	Average age of head of Hh	Average no. of children per Hh	Level of schooling (parents)	Level of schooling (children)
Santiago Comaltepec	56	4.5	Primary level (fifth grade)	Secondary/Preparatory
La Esperanza	54	5.5	Primary level (fifth grade)	Secondary
San Martin Soyolapam	52	5	Primary level (fourth grade)	Secondary/Preparatory
ANALCO	53	5	Primary level (fifth grade)	Secondary/Preparatory

In terms of productive occupations, Comaltepec and Analco are best described as *campesino* communities, with **farming** and the **home** accounting for more than four-fifths of resident adult citizens (Table 4.4). However, while agriculture constitutes the principal activity, it may not be a full year occupation. For example, in the head village of Santiago Comaltepec and the community of Analco, only one harvest is possible per year, so from December to March or April, farmers are free to look for off-farm work. In both communities, women categorise themselves as housewives (*amas de casa*), although their daily duties will often include the collection of firewood and other activities *en campo* (in the countryside).

In both communities, active *comuneros* who are not farmers earn an income locally as builders, labourers, teachers, with just a handful working as professionals in regional urban centres (Oaxaca City, in particular). In Analco, 17 families were (in 2008) running some kind of small business in the village. There are numerous general stores, three bakeries, two carpentry workshops, and a host of food vendors (selling either tortillas or tacos two or three days a week).

Table 4.4: Principal occupations among adult residents of Comaltepec and Analco (*Source*: Village and Community Census, 2008)

Occupation	No. of adult residents COMALTEPEC	%	No. of adult residents ANALCO	%
Home	302	48.6	113	41.4
Farmer	210	33.8	113	41.4
Employed (off-farm)	26	4.2	18	6.6
Professional	8	1.3	5	1.8
Builders	10	1.6	2	0.7
Handicrafts	0	0.0	3	1.1
Store Owner	20	3.2	12	4.4
Unemployed	14	2.3	5	1.8
Other	31	5.0	2	0.7
TOTAL	621	100	273	100

Table 4.5: Household income in Comaltepec and Analco (*Source*: Village and Community Census, 2008)

Household Income	No. of households COMALTEPEC	%	No. of households ANALCO	%
One minimum wage	189	89.4	120	92.3
Two minimum wages	22	10.1	10	7.7
More than two minimum wages	1	0.5	0	0
TOTAL	277	100	130	100

Household income is low, with the vast majority of families in both Comaltepec (89%) and Analco (92%) receiving the equivalent of one minimum salary or less from their productive activities (Table 4.5). Of the remainder, only one or two families make more than two minimum salaries. This is indicative of low wages prevalent in the region and the limited opportunities for commercial agriculture available locally. While a few men in each community are able to secure paid work in local construction or forestry activities, employment opportunities are generally few and far between. Small businesses require start-up capital, such that many store and restaurant owners are returned migrants from the U.S. In both communities, a small number of *comuneros* have *yuntas* (teams of oxen) that are rented out to help families plough their fields ready for seeding (at a cost of approximately US$15-20 pesos per day). Additional sources of household income are migrant remittances, government social welfare programs such as *Oportunidades*, *Procampo* and *70 y más*, or a combination of the three. In Analco, *Procampo* provided for approximately 50 beneficiaries, *Oportunidades* for 80 beneficiaries, while *70 y más* provided

support to 85 individuals as of September 2008. Although up-to-date information was not obtainable for Comaltepec, similar findings would be expected.

4.5 The Study Communities - Natural Capital

4.5.1 Forest ecosystems

Set within a region renowned for high biological diversity, between them Comaltepec and Analco are home to all four principal forest types found in the northern highlands: tropical dry forest; mixed pine-oak forest[38]; montane cloud forest; and, tropical evergreen forest (Rzedowski 1979). However, before looking at each forest type in greater detail, it is worth noting some important differences between the number and size of the forests held by these two communities (Figures 4.1 and 4.2[39]).

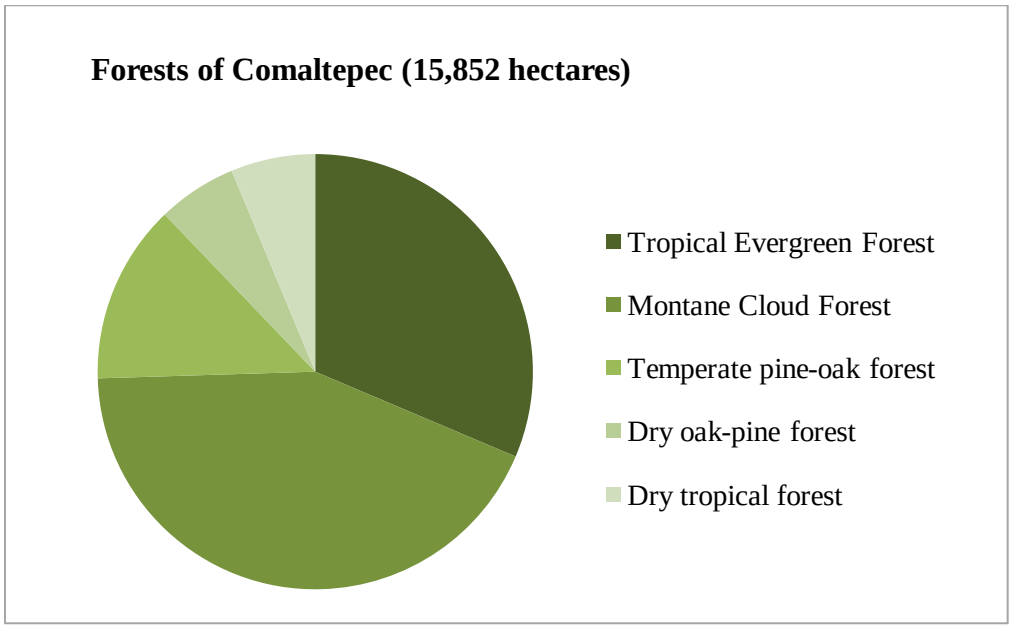


Figure 4.1: Distribution of forest types in Comaltepec (*Source*: UZACHI 2005)

Comaltepec possesses by far the larger territory of the two (just over 18,300 hectares), of which almost 16,000 hectares (or approximately 85%) consists of primary and secondary forest. In contrast, the communal territory of Analco is much smaller (1,658 hectares), of which 952

[38] Dry oak-pine forest and temperate pine-oak forest are included as the two sub-types of mixed pine-oak forest found locally.
[39] While lacking precision, the circles in these figures vary in size in order to provide a rough visual representation of the disparity between the two study communities' forest extensions.

hectares (or 57%) are forested.

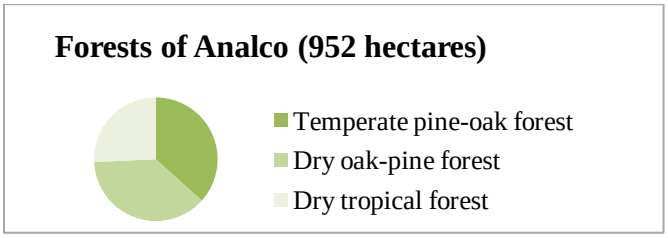


Figure 4.2: Distribution of forest types in Analco
(*Source*: Lara and Manzano 2005)

The configuration of Comaltepec's territory is such that its forests extend across both leeward (dry) and windward (humid) sides of the *Sierra Madre de Oaxaca*. This has endowed it with medium to large extensions of all four forest-types, including more than 5000 hectares of mainly unbroken cloud forest and significant areas of primary and secondary tropical evergreen forest. Analco's territory, meanwhile, is located wholly on the leeward side of the range, and home to restricted tracts of tropical dry forest and mixed pine-oak forest.

4.5.1.1 Dry tropical forest

On the leeward (western) side of the range, between 1250 and 1700 metres above sea level (m.a.s.l.), the dominant vegetation type is deciduous dry tropical forest (Plate 4.8). This area is characterised by a warm and dry climate. Annual precipitation is low (800 – 1400mm) due to its lower elevation and location within the rain shadow of the community's highest peaks. This zone is characterised by steep, mountainous terrain, with rocky soils poor in organic matter. Trees tend to be short and stubby (4-8 metres in height) with *Bursera simaruba, B. fagaroides, Conzattia multiflora, Lonchocarpus emarginatus, Ceiba aesculifolia* and *Cordia elaegnoides* among the most common species. The middle strata consists of an array of spiny shrubs, bushes and cacti, with *Agave, Cephalocereus, Escontria, Myrtillocactus, Neobuxbaumia, Pereskiopsis* and *Stenocereus* all present.

In Comaltepec, this forest type covers less than 800 hectares of communal territory, while in Analco it covers approximately 245 hectares. In neither community is this forest zone used or frequented much by villagers. Only occasionally will individuals venture down here to harvest *pitahaya*, the fruit of columnar and prickly pear cacti, sometimes on their way to or from Rio Grande or, in the case of Comaltepec, heading to the *ejido* of 'La Chuparosa'. Although

officially prohibited in both communities, this is also a good spot to hunt forest mammals such as wild boar and white-tailed deer because of the relatively sparse tree cover. There are a number of species of copal tree (of the genus *Copaifera*) found locally. Although the sap is collected widely (to make incense) by indigenous groups in other parts of Mesoamerica, *Comaltepecanos* and *Analqueños* have no tradition of harvesting copal resin.

Plate 4.8: Deciduous dry tropical forest in September (after summer rains)
Photo: Jim Robson

4.5.1.2 Dry oak-pine forest

As one gains altitude, the vegetation changes to an oak-dominated dry, temperate forest. These oak forests better tolerate the more clay-based soils (rich in organic matter and moderately acidic) typical of this zone. In both cases, they are found between 1700 and 2100 m.a.s.l. Forest structure consists of trees 4-20 metres in height, with several species of oak dominating. The most common are white oak (*Quercus sp*.) with fewer red oaks (*Rubrae sp*.) (*Encino negro, encino chaparro, encino amarillo*). These oaks associate with small numbers of pine; *Pinus ayacahuite, P. patula, P. michoacana* and *P. oaxacana* – the last two of which are well adapted to the dry conditions (especially at the lowest reaches of its range). Madroño (*Arbutus xalapensis*), a species favoured for firewood, is also widely distributed. Shrubs and bushes form an intermediate strata 2 to 5 metres in height with common species including *Bejaria aestuans, Comarostaphylis discolor, Lyonia squamulosa, Litsea glaucescens* and *Myrica cerifera*, while

among the herbaceous plants one finds *Salvia gracilis, Arenaria megalantha, Lobelia* sp. and *Lupinas* sp. Older oak stands within this forest provide excellent habitat for epiphytes, especially bromeliads, including several species of *Tillandsia* (locally referred to as *'maguey de encino'*).

In Comaltepec, this forest zone covers approximately 700 hectares, and is accessed by local residents for firewood, timber for fence posts, and a range of NTFPs. In Analco, this forest covers 364 hectares and is also used as a domestic forest zone. In both cases, those areas of forest closest to access roads have been subject to intense timber extraction over the years and are notable for their absence of mature oak stands (given that oak is the principal species collected for firewood), with a transition to secondary pine-dominated forest in some areas. In the least accessible areas (far from forest roads and pathways), patches of primary oak forest can be found with abundant epiphytes. The wetter, more humid conditions found along the edge of some local streams provide ideal conditions for stands of 'Palo de Aguila' (*Alnus spp.*) and other familiar riparian trees representing Mexican species of widespread North American genera, such as alder, willow, and dogwood.

4.5.1.3 Temperate pine-oak forest

In higher areas (from 2100 to 3000 m.a.s.l.), the dominant climate is sub-humid temperate with an average annual temperature that ranges from 12 to 18 degrees Celsius. Temperatures can drop to single figures Celsius between November and February. Annual precipitation ranges from 1800 to 2200 mm, although the majority falls during the summer rainy season (June to October). Pines (*Pinus)* dominate in this region. The main strata consist of trees 15-25 metres tall, with *P. ayacahuite, P. hartwegii, P. leiphylla, P. patula,* and *P. psuedostrobus* present. A number provide commercially valuable timber, with Mexican white pine (*P. ayacahuite*) prized locally for house beams and *P. psuedostrobus* and *P. patula* preferred species for harvest by forestry enterprises. These pines share habitats in a number of areas with other genera such as *Quercus*, *Liquidambar* and *Alnus*. *Q. crassifolia* dominates the understory at lower altitudes, before giving way to *Q. laurina* and other oaks as the pine canopy closes in. The intermediate strata measures 2 to 6 metres in height, with the most commonly found species being: *Arctostaphylos pungens, Gaultheria acuminata, Alnus jorullensis, Bejaria aestuans, Baccharis heterophylla, Amelanchier denticulate, Litsea glaucescens, Rhus virens, Calliandra grandiflora* and *Miconia hemenostigma*. The herbaceous layer typically includes *Alchemilla pectinata, Arenaria megalantha, Lamourouxia tenuifolia, Stevia lucida* and *Dryopteris* spp.

In Comaltepec, notable characteristics of this forest include the presence of a small number of Oyamel firs (*Abies hiekelii*) above the area known locally as 'Las Cascadas', in addition to stands of *Pinus leiophylla* and *P. rudis* close to 'El Mirador' and the higher parts of the community's territory (above 3000 m.a.s.l.). These high elevation forests also include stands of *P. hartwegii*; tough, fire-resistant pines. Periodic fires have raged along these ridges (1988, 2007), creating a habitat mosaic that supports a rich mountain flora. In the very highest areas, such as those surrounding Cerro Humo Chico (3250 m.a.s.l.), trees are far scarcer with alpine shrubs such as Jarilla (*Senecio sp.*) dominating. In the western part of this zone, below the federal highway, there are restricted stands of *Laureceae spp.*, which are used by the community on an occasional basis for ornamental and religious purposes. Over the past 40 years, some sections of this forest (especially in and around *Agua Fria*) have been severely affected by a combination of forest fires (1982 and 1998), mountain pine beetle (2006 and 2007), heavy snowfalls (2008), intermittent foraging (ongoing), and the impact of high-intensity selective logging in the 1960s and 1970s.

In Analco, notable features include highly restricted stands of *Litsea glaucescens*, an endangered species given special status under Mexican environmental regulation (NOM-059). Another important species found here – and normally associated with montane cloud forest – is *Tilia mexicana*, a rare and endangered species that is endemic to Mexico. The forest is also home to several species of Dahlia – a genus of bushy, tuberous, perennial plants native to Mexico, Central America, and Colombia. Dahlia was gathered by the Aztecs and cultivated for food, ceremonial uses, as well as decorative purposes. Today, they are considered the national flowers of Mexico, and are picked locally for ornamental purposes in village homes and religious ceremonies. This pine forest is a domestic use zone with no commercial exploitation permitted to date. In recent years, some small sections of pine have been affected by mountain pine beetle, which some locals believe is a result of the absence of forest management and use. The selective extraction of large pines, for example, is now considered problematic because it fails to produce the larger openings that encourage new growth.

4.5.1.4 Montane cloud forest

Heading east from the high *cerros* (mountain peaks), Comaltepec's territory drops towards the Gulf of Mexico, and as it does so the climate gradually becomes warmer and more humid. Above 2400 m.s.a.l. mixed pine-oak forest still dominates, but from about 2400 down to

1300 m.s.a.l., the climate varies between temperate-humid and warm-humid. Precipitation is extremely high with annual rates ranging between 3000 and 4500mm. Indeed, up to 6000mm of rainfall has been recorded at Vista Hermosa, although this is considered unusual.

Relatively cool temperatures combined with high humidity and almost constant cloud (and precipitation) has led to the establishment of extensive areas of montane cloud forest (Plate 4.9). The vegetation in this forest is dense, richly floristic, and grows in deep soils with a thick layer of organic material. The principal strata is formed by trees up to 25 metres in height and dominated by, among others: *Quercus candicans, Q. corrugate, Q. eugennifolia, Pinus patula, Liquidambar styraciflua, Weinmannia pinnata, Dendropanax populifolius, Cyathea sp., Clethra sp.,* and *Sauraucia sp.* However, in areas such as '*El Relámpago'*, the dominant stratum reaches 30 to 50 metres in height. The most abundant group of trees found in this forest belong to the *Lauraceae* or laurel family of flowering plants. IFRI sampling work in 35 forest sites identified over thirty species of laurel, with the true figure most probably higher. For example, the cloud forests belonging to the neighbouring CORENCHI communities are home to as many as seventy species (Armando Rincon, pers. comm.). Other notable tree species include small stands of *Pinus chiapensis*, which are found below 2000 m.a.s.l. in more tropical and sub-tropical zones. The areas of cloud forest running down from the federal highway towards San Bernardo are also home to a significant population of Caudillo (*Oreomunnea mexicana*) – a tree species from the Jurassic period now found only in this part of Mexico.

A characteristic of these forests is the presence of giant ferns (Plate 4.10), including *Sphaeropteris horrida* and *Cyathea divergens* (Cyatheaceae) and *Diplopterygium bancroftii* (Gleicheniaceae), which can grow as tall as 15 metres. In addition to tree ferns, the intermediate strata consists of bushes, shrubs and small trees reaching 1.5 to 6 metres in height, and dominated by *Miconia lonchophylla* (Melastomataceae) and *Calyptranthes schiedeana* (Myrtaceae), among others. The epiphytes are a particularly diverse group found within these forests. The most important families are Orchidaceae, Bromeliaceae and Piperaceae. More than 40 species of orchid have been identified in the forests around La Esperanza alone. The most commonly found in the IFRI sample sites were *Maxillaria tonsoniae, Prosthechea varicosa* and *Rhynchostele rossil*. At least five species of *Chameadorea* palm are also commonly found in these forests.

Plate 4.9 (left): View of the cloud forest from El Relampago, south-west of La Esperanza
Plate 4.10 (right): Giant ferns, cloud forest of Comaltepec
Photos: Jim Robson

4.5.1.5 Tropical evergreen forest

Dropping below 1300 m.a.s.l., the climate becomes noticeably more humid and the principal vegetation type changes once again. The cloud forest gives way first to a transition zone of pre-montane tropical forest before turning into extensive areas of tropical evergreen forest (Pennington and Sarukhan 2005). The climate is classified as Am e (g) w", hot humid with rains in the summer, an annual mean temperature of 24 degrees Celsius and up to 3500mm of rainfall per year. It is a zone characterised by young soils of little or medium development. The highest strata consists of individuals 30 to 40 metres tall, and include *Terminalia amazonia, Cordia allidora, C. megalantha, Calophyllum brasiliense, Dalium guianense, Tapirira mexicana,* among other species. Trees in the intermediate strata reach 15 to 25 metres in height and are dominated by *Spondias radkolferi, Cymbopetalum penduliflorum,* and *Sloanea tuerckheimii*. The lowest strata (between 3 and 10 metres) include *Pleuranthodendron lindenii, Ficus obtusifolia* and *Miconia* sp. Another important element of these forests is the presence of palms such as *Astrocaryum mexicanum, Desmoncus chinantlensis, Bactris mexicana,* and a number from the family *Chamaedorea*, including the edible and highly prized 'tepejilote' (*Chamaedora tepejilote*). In addition, these forests are home to an abundant and impressive diversity of epiphytes from the families Bromeliaceae and Orchidaceae.

These tropical forests form part of a region called the La Chinantla Baja (Lower Chinantla), known to contain some of the most diverse and best conserved extensions of

rainforest in the country. In the case of Santiago Comaltepec, while some areas (the most inaccessible) comprise largely untouched, primary forest, others are characterised by patches of primary and secondary forest mixed with cultivated zones (coffee) and pasture for livestock.

4.5.2 Notable fauna and floristic diversity

Over 1000 plant species have been identified in the District of Ixtlan (to which both Comaltepec and Analco belong), while more than 75 species of fungi have been collected within the two communities (Lara and Manzano 2005; FLACSO 2007). I was unable to undertake sampling work in all forest types represented locally, but floristic lists for Analco's pine-oak forest and Comaltepec's cloud forest and tropical evergreen forest can be found in Appendices VIII and IX.

The forests of Comaltepec, and to a lesser degree those of Analco, are home to an impressive diversity of fauna. On the humid side of Comaltepec's territory, notable mammals include 'tigrillo' or ocelot (*Leopardus pardalis*), jaguar (*Pantera onca*), puma (*Puma concolor*), margay (*Leopardus weidii*), Mexican tree porcupine (*Sphiggurus mexicanus*), armadillo (*Dasypodidae spp.*), Gray Brocket deer (*Mazama gouazoubira*), cacomixtle (*Bassariscus sumichrasti*), Baird's tapir (*Tapirus bairdi*), 'perro del agua' or Neotropical otter (*Lontra longicaudis*), Mexican Spider Monkey (*Ateles geoffroyi vellerosus*), and 'tepezcuintle' or Spotted Paca (*Cuniculus paca*) – although this last species is rarely seen now because of over-hunting. Mammals on the leeward (dry) side of the mountains include puma (*Puma concolor*), 'tejon' or Greater Grison (*Galictis cf. vittata*), white-tailed deer (*Odocoileus virginianus*), 'zorrillo' or skunk (*Mephitidae*), 'jabali' or Wild Boar (*Sus scrofa*), wild pig or peccary (*Tayassu tajacu*) and racoon (*Procyon lotor*) (Lara and Manzano 2005; FLACSO 2007; Lara 2007; Robson 2008; López López 2005; interviews with local land users).

Resident birds include several species of eagle, emerald toucanet (*Aulacorhynchus prasinus),* Keel-billed Toucan *(Ramphastos sulfuratus),* Ringed kingfisher (*Ceryle torquatus),* the locally named 'faisan', or Crested Guan (*Penelope purpurascens*), vultures, chachalaca (*Ortalis* spp.), quail, woodpecker, Central American Great Horned Owl (*B. v. mesembrinus),* wood pigeon, and several species of parrot. Reptiles include rattlesnake (*Crotalus* spp.), Central American Coral Snake (*Micrurus nigrocinctus*), 'vibora sorda' (*Bothriechis* sp), and the Oaxacan dwarf boa (*Exiliboa plicata*) (IUCN Vulnerable). Amphibians include several species of salamander of the genus *Pseudoeurycea,* including a newly discovered species, *P. papenfussi*

(Parra-Olea et al. 2009). Freshwater species include shrimp, freshwater crab, croaker (Family *Sciaenidae*), charales, and native and non-native species of trout (*Salmoninae*) (Lara and Manzano 2005; FLACSO 2007; Lara 2007; Robson 2008; López López 2005; interviews with local land users).

4.5.3 Hydrological resources

The communities' forests are home to many mountain springs, rivers and waterfalls, and provide a range of vital hydrological services – not only to the local populace but to downstream users living in the cities of Valle Nacional and Tuxtepec. At a regional scale, the territories of both communities form part of the River Papaloapan watershed, one of the most important in the south of Mexico. More locally, the areas around Cerro Humo Chico (the highest point of the Comaltepec's territory) act as part of the headwaters of the *Rio Soyolapam*, a major river in the area and a main tributary of the Papaloapan.

In terms of drinking water, Santiago Comaltepec obtains the majority of its potable water from the Rio Verde. In La Esperanza, drinking water comes from a nearby natural spring called 'el Chorro', while the residents of San Martin Soyolapam get their water from a natural spring known as 'el Chinene'. In Analco, both permanent and seasonal rivers and smaller streams criss-cross the community's lands. The community obtains most of its drinking water from three natural springs that are located approximately halfway between the village and the federal highway. The high catchment area that provides Analco with most of its water is located in the communal territory of Jaltianguis, such that Analqueños find themselves partly dependent on the forest management practices of their neighbours to the south. Where streams and springs emerge in open areas of pasture, they provide conditions for *berro* or watercress (*Rorippa nasturtium-aquaticum*) – harvested by local people as an important food supplement.

4.6 The Study Communities - Territorial Land Use and Practices

4.6.1 Cropping zones

On the leeward (dry) side of the range, both communities refer to a system of three climatic and cropping zones commonly recognised by *campesinos* across Mexico. These are known as *tierra fría* (cold country), *tierra templada* (temperate country) and *tierra caliente* (hot country), although between each category there are transition zones where species typical of both

zones can be found[40]. These vertical belts are characterised by changes in elevation and temperature, and secondarily by rainfall. Figure 4.3 shows these zones as they apply to Analco's communal territory, the entirety of which encapsulates these three categories.

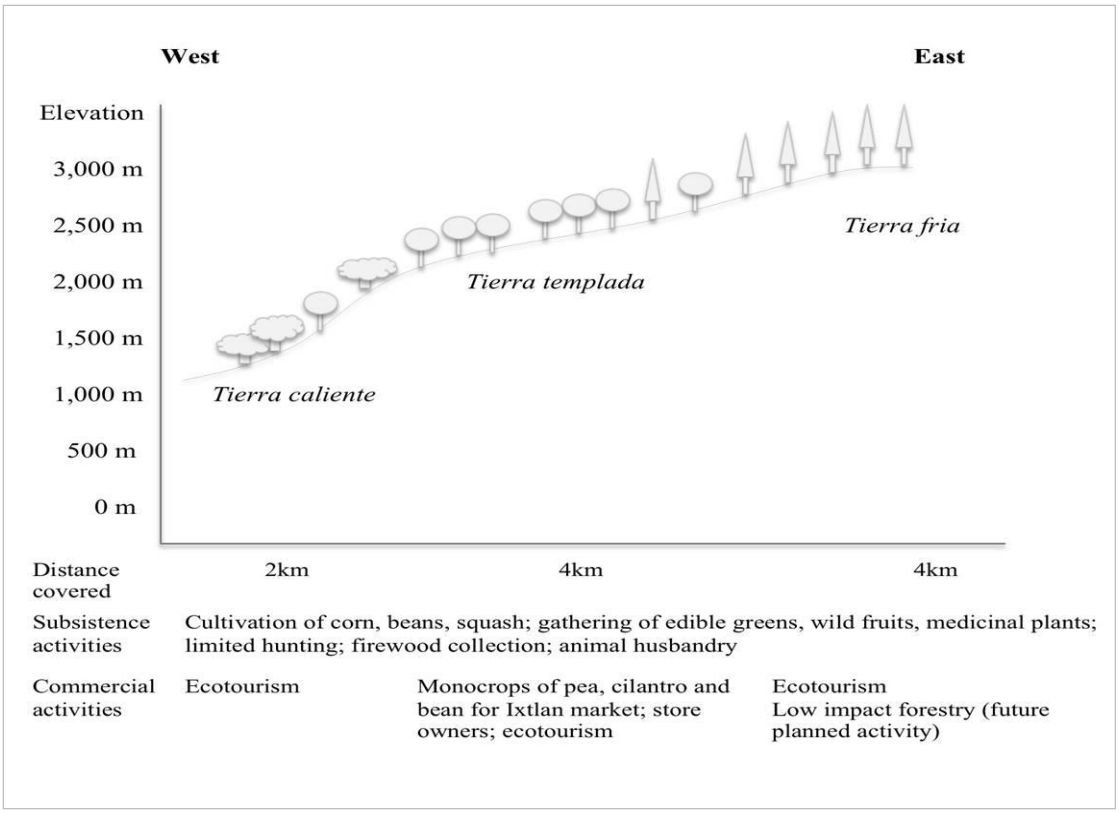
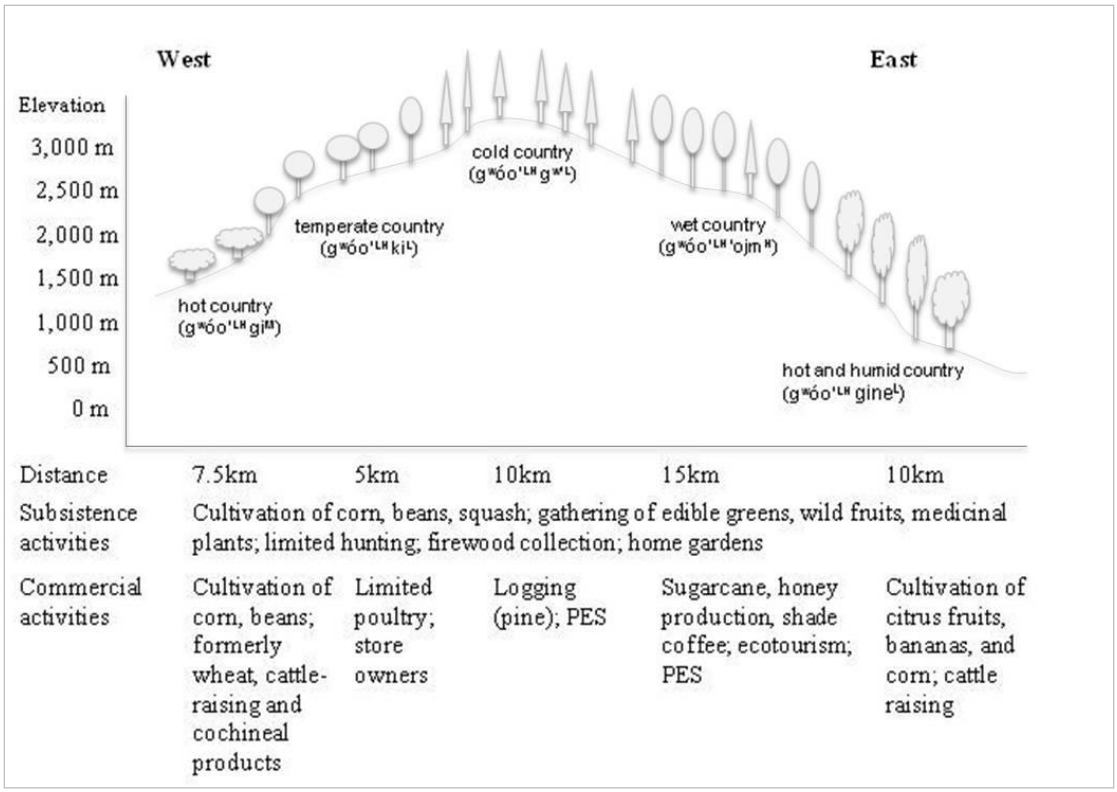


Figure 4.3: Main subsistence and commercial activities in Analco as they correlate to climatic and cropping zones (Adapted from Martin 1993)

The westernmost portions of the two communities' territories are located in *tierra caliente*, which rises from the Rio Grande at 1250 m.a.s.l to around 1600 m.a.s.l. In this zone, wheat has traditionally been planted in the autumn months, and the rainy summertime often yields a good harvest of beans and corn. This was formerly an area of cochineal production and cattle-raising in Comaltepec (Martin 1993). *Tierra templada* lies above hot country between 1700 m.a.s.l. and 2300 m.a.s.l. This provides a healthy climate in which to reside, and one suited to *milpa* agriculture (see Appendix X for details of this age-old cropping system) and the cultivation of other subsistence crops and fruit trees. This is the zone where the head villages of

[40] In Analco, for example, the zone between *tierra templada* and *tierra caliente* is recognised for a different planting season for staple crops such as corn and beans.

both communities are located, although in the case of Comaltepec it covers a much smaller proportion of the communal territory, while in Analco it occupies a much larger proportion of their community lands. This is the zone most heavily used for agriculture on the dry side of the range, and where adjacent forests are most heavily exploited for edible plants, mushrooms and firewood, among other products. The heaviest rain falls over a period of 5-6 months, guaranteeing one annual corn crop in the fields around Santiago Comaltepec and Analco and, if rains start by June, in the dry, hot ranches also. *Tierra fría* begins at roughly 2300 m.a.s.l. and extends to 2900 m.a.s.l. (at 'Punto Truino') in Analco, and to the peak of Cerro Humo Chico (3250 m.a.s.l.) in Comaltepec. The cold zone divides the humid and dry sides of Sierra Madre range, and holds reserves of extensive pine forests that, in the case of Comaltepec, yield large quantities of commercial timber. In addition to the system described above, the Chinantecs of Comaltepec have developed their own classification of cropping and climatic zones that span a 45-kilometre altitudinal and ecological gradient (Figure 4.4).



Distance	7.5km	5km	10km	15km	10km
Subsistence activities	Cultivation of corn, beans, squash; gathering of edible greens, wild fruits, medicinal plants; limited hunting; firewood collection; home gardens				
Commercial activities	Cultivation of corn, beans; formerly wheat, cattle-raising and cochineal products	Limited poultry; store owners	Logging (pine); PES	Sugarcane, honey production, shade coffee; ecotourism; PES	Cultivation of citrus fruits, bananas, and corn; cattle raising

Figure 4.4: Main subsistence and commercial activities in Comaltepec as they correlate to climatic and cropping zones (Adapted from Martin 1993)

San Martin Soyolapam is found at 168 metres above sea level (m.a.s.l.), and other humid zone settlements are stepping stones to increasingly higher elevations (Martin 1993): Puerto Eligio at 700 m.a.s.l.; Metates at 800 m.a.s.l.; Vista Hermosa at 1500 m.a.s.l.; and, La Esperanza at 1600 m.a.s.l. Settlements and ranches in the dry zone begin with the head village at 2000 m.a.s.l., before heading down to Rancho San Pedro at 1800 m.a.s.l. and Rancho Chuparrosa at 1600 m.a.s.l. (Table 4.6).

Table 4.6: Correlation of Comaltepec settlements and ranches to climate/cropping zones

Climate Zone	**Settlement / ranch**
hot and humid (g^{w}óo$'^{LH}$ gine^{L})	San Martin Soyolapam, Metates, Puerto Eligio, Puerto Antonio, Rancho San Bernardo
temperate humid (g^{w}óo$'^{LH}$ 'ojm^{H})	La Esperanza, Vista Hermosa, Rancho Trucha
cold (g^{w}óo$'^{LH}$ $g^{w,L}$)	Santiago Comaltepec
temperate and dry (g^{w}óo$'^{LH}$ ki^{L})	Rancho San Pedro
hot and dry (g^{w}óo$'^{LH}$ gi^{M})	La Chuparosa

This system takes into account varying precipitation, temperature, elevation and suitability for different types of agricultural production (Martin 1993). Five main zones are recognised, and roughly overlap the distribution of forest types (Table 4.7).

Table 4.7: Chinantec climate/cropping zones and correlation to rainfall, temperature, elevation and vegetation type (adapted from Martin 1993)

Climate Zone	**Precipitation (mm/yr)**	**Temperature Range (C)**	**Elevation Range (m)**	**Forest Type**
hot and humid (g^{w}óo$'^{LH}$ gine^{L})	3,200-3,700	21-25	100-1,000	Tropical Evergreen
temperate humid (g^{w}óo$'^{LH}$ 'ojm^{H})	2,700-3,200	16-20	1,000-2,200	Montane Cloud
cold (g^{w}óo$'^{LH}$ $g^{w,L}$)	2,000-2,700	9-14	2,200-3,200	Pine-oak
temperate and dry (g^{w}óo$'^{LH}$ ki^{L})	1,300-2,000	15-18	1,600-2,200	Oak-pine
hot and dry (g^{w}óo$'^{LH}$ gi^{M})	800-1,300	16-21	1,000-1,600	Tropical dry

The temperature is hottest at low elevations in dry and wet zones, moderate in the wet, humid country, cold on high mountain peaks, and cool around the head village of Santiago Comaltepec. This variation in precipitation, temperature and vegetation along altitudinal gradients, have resulted in an impressive range of subsistence and commercial resource practices. While resource practice on the leeward (western) side of the range largely mirrors that found in

Analco, the inhabitants of humid wet country dedicate themselves to the cultivation of *milpa* and coffee, while in the lowlands, the hot and humid climate is also appropriate for citrus crops, bananas, chillies and cattle-raising. Different varieties of corn are available for cultivation in these humid areas, making subsistence cropping a common element across all territorial zones. Heavy rainfall on the humid side of the Sierra, spread over an 8-10 month period, allows for up to two corn crops per year.

For more detailed information on resource practices as they pertain to both communities, please see Appendix XI.

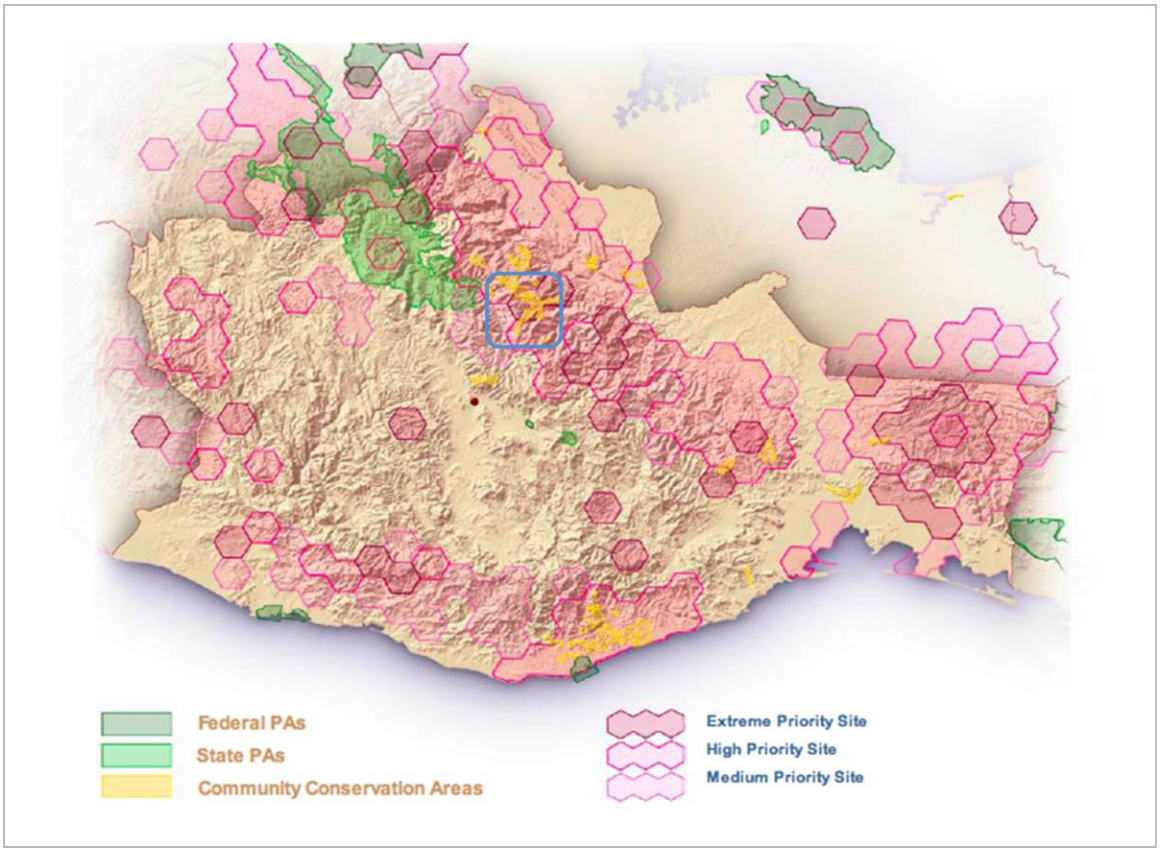
4.6.2 Interconnected knowledge domains

As a consequence of such high variability, traditional lifestyles in both communities have been based on local peoples' access to a diversity of ecological zones, and their adaptation to environmental extremes. Here, as in most parts of the northern Sierra, traditional environmental knowledge (TEK) (after Heckler 2009) is interrelated with perception of multiple aspects of the natural environment. For example, Martin's (1993, 1995) work on Chinantec and Mixe communities found that each useful local plant collected could be located by its ecological parameters: the soil in which it grew; the climate in which it flourished; as well as its abundance in different types of vegetation, under various schemes of land use and in diverse stages of ecological succession. It is this distribution of vegetation types, climates and soils that have determined local people's choice of where to settle, farm, and gather wild plants. While subsistence production begins in cultivated fields, it can extend deep into local forests where users find plants and animals that enrich their diet, health care and rituals. In this way, various threads weave together to form a complex tapestry of environmental knowledge (Martin 1993, 1995). This knowledge is codified by both Zapotecs and Chinantecs in systems of classification that recognize different soils, climatic zones, successional stages, and seasons (Martin 1993; Chapela 2005; González 2004; Hunn 2008; Robson 2007) – systems that guide decisions about where and when to cut and burn forest cover, how many years to cultivate a specific plot of land, where to gather NTFPs and uncultivated plants, or where to look for game animals. Some observers believe it is this mix of knowledge systems and productive zones (according to ecological niche) that have traditionally helped local communities to develop a flexible economic scheme by which to adapt to variable market conditions (Martin 1993, Chapela 2005, Robson

2007) – a strategy based on the oscillation between subsistence and commercial production, and the back-and-forth movement between the different climatic zones found in this highland region.

4.6.3 Resource conservation

The communal territories of Comaltepec and Analco lie at the heart of a region identified by Mexico's planners as a priority site for biodiversity conservation (Map 4.3) (Conanp-Conabio 2007).



Map 4.3: State of Oaxaca showing high biodiversity areas and location of state and federal Protected Areas (PAs) and autonomously-governed Community Conservation Areas (CCAs). The study communities are located in the area encircled in blue.
(*Source*: Conanp-Conabio 2007)

As Chapter 2 explained, the high levels of biological diversity found across the Sierra Norte are associated with a complex landscape dynamic, where an abrupt topography and marked climatic variations combine with cultural patterns of production and land use to create the necessary conditions for conservation along ecological and altitudinal gradients. Both study

communities, for example, meet the criteria set by the Forest Stewardship Council (FSC) for High Conservation Value Forests (HCVF)[41], incorporating: (i) areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species); (ii) areas that are in or contain rare, threatened or endangered ecosystems; (iii) areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control); and, (iv) areas fundamental to meeting basic needs of local communities (e.g. subsistence, health) and/or critical to traditional cultural identity (areas of cultural, ecological, economic or religious significance). Comaltepec (since 1993) and Analco (since 2005) have developed Community Land Planning (CLP) to reflect the multifunctionality of local landscapes and improve management of their territorial resources. These land use plans very much reflect the presence of mixed systems that respond to contemporary issues and livelihood needs, while retaining historic sacred relations and traditional practices (Robson and Berkes 2010). Communal territories are divided into four land use categories (Table 4.8).

Table 4.8: Community land planning in Comaltepec and Analco

Land Use Zone	Area (ha) COMALTEPEC	Area (ha) ANALCO
I. FOREST PRODUCTION AREAS		
- Intensive logging	452.57	0.00
- Low intensity logging	291.60	60.05
- Seed areas (Germoplasm)	4.97	0.00
- Domestic use	687.20	304.50
- Mixed pasture / forest with resin production	-	413.50
Subtotal	1,436.34	778.05
II. PROTECTED AREAS		
- Watershed protection	522.82	130.90
- Wildlife protection	4,420.85	0.00
- Forest reserve	5,067.85	0.00
Subtotal	10,011.52	130.90
III. FOREST RESTORATION AREAS	416.03	54.40
IV. AGRICULTURE / LIVESTOCK / URBAN USE	6,206.28	695.70
TOTAL	18,070.17[42]	1,698.65

[41] The concept of High Conservation Value Forests (HCVF) was first developed by the Forest Stewardship Council (FSC) in 1999 as their Ninth Principle. The FSC defined HCVF as forests of outstanding and critical importance due to their environmental, socio-economic, cultural, biodiversity and landscape value.

[42] The shortfall of 295 hectares corresponds to an area of Comaltepec's territory that was under legal dispute with the neighbouring community of San Pedro Yolox. While this conflict has been resolved, no form of land use is currently permitted in this area.

The CLP is approved by all community members (via the General Assembly of *Comuneros*), while in operational terms the plans are implemented by the *Comisariado de Bienes Comunales*, with technical support provided by UZACHI (in Comaltepec) and a local Oaxacan NGO (Estudios Rurales y Asesoria, A.C.) in Analco. Under the current (2003-2013) management plan, over half of Comaltepec's territory (10011 hectares) is designated for forest and ecosystem protection: with over 500 hectares set aside for watershed protection; almost 4500 hectares for 'wildlife protection'; and, over 5000 hectares as a 'forest reserve'. In all such areas, extractive activities are officially restricted, with sets of rules clearly defining (and limiting) who has access to, and use of, forest resources. The communal authorities are charged with supervising and monitoring these protected zones. This high level of protection is indicative of the important multiple values – both intrinsic and extrinsic – that the community affords its forests. In addition to the establishment of several protected areas, the community has established a plant nursery for reforestation purposes. When I visited in November 2008, it housed approximately 80000 pine saplings ready to be planted in degraded forest areas around Agua Fria (Plate 4.11).

Plate 4.11: Tree nursery, Santiago Comaltepec
Photo: Jim Robson

In contrast, Analco has a far smaller area of forest (under 1000 hectares) and is thus less able to set aside community conservation areas (CCAs). In contrast to Comaltepec, this community is not home to large areas of forest that are both uninhabited and blessed with species

of high conservation / low commercial value. However, despite this limitation, Analco has established a 130-hectare area of forest for watershed protection, and established sets of rules that currently prohibit extractive practices such as hunting and logging for commercial ends. The small PA covers the forest that sits above the highway, which is referred to locally as '*puro monte*' or '*bosque de conservación*' (conservation forest). Unlike the pine-oak forests of neighbouring communities, this forest was not affected by the FAPATUX concession period. The community has undertaken several reforestations over the past three decades. One of the first occurred 25 years ago, when *comuneros* and schoolchildren planted pine saplings in clearings adjacent to the village access road. More recently, in 2007, a small area of pine forest infested with mountain pine beetle was cleared, with these areas due to be reforested with 11,000 new saplings provided by CONAFOR. In 2009, a further three and a half hectares of forest received *saneamiento* (cleaning), and reforested with 3,400 pine saplings (*P. patula*).

4.6.4 Local conservation values and ethics

The following quote is taken from *Requiem for Nature*, a book written by the renowned tropical ecologist John Terborgh:

> The well-organized societies of the industrialized world are the ones most concerned about biological diversity and most capable of providing the stable, long-term institutional support needed to preserve it. But much of the earth's biological wealth is confined to the tropics, especially tropical forests, nearly all of which are located in developing countries where appreciation of wild nature is minimal and public institutions are notoriously frail. For many residents of the tropics, nature has only utilitarian value, as an immediate source of wealth or a livelihood. The thought that there might be more exalted reasons for nature to exist has not entered the consciousness of many people who live in and around tropical forests
>
> John Terborgh (1999:12)

I am still shocked each time I read this; incredulous as to how a man who has spent the past forty years working on forest biodiversity and conservation in tropical countries can draw such a stark conclusion. Clearly, he has not been to northern Oaxaca.

At the local level, and as household survey analysis highlights, villagers in Comaltepec and Analco attach a range of values, both intrinsic and extrinsic, to their forestlands (Table 4.9).

Views from the two communities are remarkably consistent. The most common responses point to one or more of the environmental services provided by local forests, typically the provision of clean air or water. Indeed, the regulation of hydrological resources was the most-cited environmental service associated with local forests. Fewer households referred to the more tangible products and benefits obtained from local forests, which form part of the local subsistence economy, such as firewood, edible plants and timber. However, this was more evident in Analco than in Comaltepec, and is perhaps attributable to differences in territorial size and the proportion of households in each community that continue to maintain strong ties to the land in terms of harvesting practises. A number of households in both communities highlighted the importance of forests for biodiversity conservation by providing habitat for plants and animals.

Table 4.9: Local conservation values (*Source*: General household survey)

Community	**Household responses to the question:** *"Why are the community's forests important to you and your family"*
Comaltepec	"they are the reason for the clean air that we breathe", "they provide habitat for many animals", "the forests provide our oxygen", "the forests are the reason we have clean water", "the forest is very important for protecting the soil", "the forest protects us from the wind while in the city it is hot and dusty... everything gets in", "the forests protect the animals", "it reduces soil erosion in the fields", "we have to protect the forest so that our lands don't dry out", "it is important to conserve the forest because it keeps everything cool and our water clean", "we have less contamination here because of the forests... while it is very hot in Oaxaca (valley) since there are no trees there", "they are important because they are the source of firewood for cooking and timber for building the house".
Analco	"the forests are the reason we have water in the mountain streams", "the forest is important because that is where the water is born [from springs], which we use to drink and to irrigate our fields", "the forests ensure that the springs don't run dry", "thanks to the forest we always have water", "it provides the timber that we use and some plants that we eat", "it is important for the fauna... which we are careful to protect", "from the forest comes the air that we breathe and the water that we drink", "it is important for the trees (timber) and the water that it provides", "because it has not been heavily exploited the springs are not dry", "if we didn't have any forest then we would have to buy our timber and firewood", "it is the source of our firewood", "the forest provided the beams over our head"

A local conservation ethic is thus linked to the range of services that forests provide. Building upon these findings, households were asked: "*How do you rate the importance of the*

community's forests with respect to the different uses and services they provide to your family?" The results are provided in Table 4.10, with ratings given as a modal score, with 1 signifying 'not important', 2 'important', and 3 'very important'. In both communities, local forests were considered 'very important' for meeting subsistence needs, for their contribution to soil fertility, for the role they play in reducing soil erosion, and for their cultural/spiritual significance[43]. In terms of income, however, only a minority of households in either community stated that forest resources were 'important' or even 'very important' – a reflection, no doubt, that commercial logging has yet to take off.

Table 4.10: Importance of forests rated for uses and services provided to local families (*Source*: General household survey)

Community	Subsistence	Financial income	Contribution to soil fertility	Control of soil erosion and retention of water	Cultural / Spiritual significance
Analco	3	1	3	3	3
Comaltepec	3	1	3	3	3

Given how important local forests are to households in both communities, and how they are valued for the services and benefits they provide, the household survey attempted to gauge local interest in the need for forest conservation efforts. When asked if *"the community's forests should be protected?"* 88% of households in Comaltepec were in agreement, with only 12% not in agreement. Likewise, in Analco, a similar number (85%) were in agreement, with the remaining households split between those not in agreement (7.5%) and those undecided (7.5%). These findings highlight just how strong the conservation ethic is among families in both communities. Despite the fact that many households still depend upon territorial resources for at least part of their subsistence needs, the data shows that a clear majority are willing to reduce consumption, or would at least consider doing so if the condition of local forests needed to be

[43] Local forests hold an important spiritual significance. In Comaltepec, this is reflected in the existence of numerous sacred sites in areas close to Santiago Comaltepec and La Esperanza, above all the pine-oak forests of *Agua Fría* and the cloud forest at *Cerro Hormiga*. These sites play a key role in the community's agricultural calendar. Every January, a select group of *comuneros* from La Esperanza visit the *Cerro Hormiga* site located 40 minute's walk from the village. They provide offerings, hold prayers and ask the forest spirits to provide good fortune for the forthcoming year, success for the village and a bountiful harvest. At *Agua Fría*, in addition to the typical offerings, representatives from the head village traditionally sacrifice a turkey and let its blood soak into the earth. This is done to bestow good fortune on the upcoming harvests. In addition to the presence of sacred sites, there are certain plant and animal species that hold special spiritual significance. Laurel trees in particular are important and used on a weekly basis to adorn churches in both Analco and Santiago Comaltepec, as well as during religious festivals such as Semana Santa (Easter).

improved. Indeed, conservation forests have been established in both communities for family and community wellbeing, such as the provision of clean water, in addition to strict conservation reasoning. In this way, the protection of biological and cultural diversity is centred on the premise of landscapes where territorial use and protection are informed by values that combine conservation ethics, livelihood needs and long-standing beliefs and customs (Robson and Berkes 2010).

4.7 Tenure, Governance and Rules of Resource Use

4.7.1 The common property regime

Across the Sierra Norte, indigenous groups have organised themselves to hold land in common since time immemorial. However, the ancestral lands of Comaltepec were not formally recognised by the state as common property until 1953, when the community was given title to 18,366.37 hectares or approximately two hundred square kilometres of forestlands. In the case of Analco, it was not until 1966 that the community was granted title to 2111.20 hectares of its ancestral lands. This was later adjusted to the current 1658.53 Ha[44]. In both communities, resource rights are traditionally granted to resident men over the age of eighteen (known as *comuneros* or commoners), while communal land management and resource use are mediated through the *usos y costumbres* customary governance system – providing local people with an important degree of autonomy to govern their affairs. The principal space for communal decision-making is the *Asemblea General de Comuneros* (General Assembly of Comuneros).

4.7.2 The communal authorities

In both communities, *comuneros* are represented by two communal authorities: the *Comisariado de Bienes Comunales* (Commissioner of Communal Resources) and the *Consejo de Vigilancia* (Surveillance or Oversight Council)[45]. The *Comisariado de Bienes Comunales* (CBC)

[44] In 2003, the Certification Program of the National Agrarian Register (PROCEDE) undertook a new measurement and found that the actual area was 1658.53 hectares. The difference was explained by errors in the original method used for measurement. While the official area in hectares has changed, the polygon itself has not.

[45] In both communities, there are additional committees that meet periodically and are sometimes called upon to resolve issues that are beyond the remit of the CBC. In Comaltepec, for example, there is a *Consejo de Ancianos* (Council of Elders). This body is comprised of older *comuneros* who have occupied important positions within the community and completed their communal obligations or 'service' with distinction. Members have: (i) to be born in the community; (ii) to be honest; (iii) to have completed six years of service (*cargos*); and, (iv) to have attended 95% of communal assemblies. Currently, this committee consists of 12 members and convenes when there are problems that require the experience and knowledge of the elders. It normally meets behind closed doors.

consists of a President, a Secretary and a Treasurer, with the *Consejo de Vigilancia* (CV) made up of a President, a first officer and a second officer. New sets of incumbents are voted in at annual communal elections, with three candidates put forward for each position. As with the majority of *cargos*, incumbents of the CBC and CV do not receive any form of payment or material compensation. Neither are they supposed to have capital or property that depends on forest use or extraction. The CBC is responsible for executing any agreements established in the Assembly, in addition to maintaining registers of *comunero* participation, recording the Acts of the Assembly, maintaining a register of *tequios*, and accessing technical and financial support for community-level (mainly forest-based) initiatives. The principal responsibilities of the CV are to monitor the activities of the CBC and report discrepancies to the Assembly.

In Comaltepec, both the CBC and CV meet on a daily basis (normally in the early morning and early evening), and most *cargo*-holders remain busy with communal commitments and activities throughout the day. As such, incumbents' posts are largely full-time occupations for the period of time that they hold office. It is estimated that 16,200 workdays were invested in the CBC and communal *tequios* during the period 2003-2008. In contrast, the communal authorities in Analco meet 3 times a week on Monday, Wednesday and Friday evenings (after 7pm). Their other *cargo*-related commitments make take up 2-3 days a week, and are thus best described as part-time occupations; allowing most incumbents to cover some if not all of their agricultural chores. An estimated 11,700 workdays were invested in the CBC and *tequios* during 2003-2008.

The CBC operating budget for 2008 was $6,000 pesos (US$550) for Analco and $35,000 pesos (US$3,400) for Comaltepec. In Analco, the CBC's principal income is generated by the mill (*molino*) and from the fees established by the 1997 *Communal Statute* for logging and firewood collection. The authorities themselves manage the mill, working Monday to Friday in pairs on a rotational (weekly) basis. The mill generated $5,475 pesos in 2008. In Comaltepec, income is generated from a number of sources: migrant contributions (*tequios*), the sale of timber products, local logging and firewood fees, and more recently payment for environmental services from CONAFOR. Data on total income for 2007 or 2008 were not available but would have been well over US$10,000, given that participation in the federal government PES scheme for hydrological resources was worth $85,000 pesos per year for the period 2004-2008.

4.7.3 Individual and collective property rights

In both communities, forests, grazing lands and watercourses remain common property resources and are administered by the *Comisariado de Bienes Comunales* (CBC), under the mandate of the General Assembly. The communal authorities are responsible for supervising and monitoring all productive activities carried out by *comuneros* that involve the use and exploitation of community resources. All trees are common property; including those growing in and around agricultural plots. In such areas, forest resources are only permitted for domestic purposes (firewood, fence posts etc.). *Comuneros* (rights-holders) have the right to enter local forests. They can collect products from those forests, contribute to the management of those forests, and take decisions regarding the management of forests and determine who can and cannot access them. Although communal lands in Comaltepec and Analco are not subject to purchase or sale, in the case of urban lots and small agricultural areas ('*solares*' or home gardens) within or surrounding each village, agrarian rights can be transferred to other family members or neighbours. However, these individual plots are '*prestados*' (lent), so while the *comunero* may have a '*derecho de posesión*' (possession right) they do not hold '*derechos de propiedad*' (property or ownership rights), which remain with the community. In neither community does the General Assembly of *Comuneros* allow lands or agrarian rights to be ceded to people from outside the community (unless they have spent a determined amount of time residing locally and have fully complied with set communal obligations).

In relation to land tenure, the above rights allocations have helped to maintain a functional organisational structure and internal community cohesion - in conjunction with the establishment and enforcement of specific resource institutions (rules-in-use). This supports the findings of others (Chapela 2005; Merino 2004) who have conducted social-ecological research in the region.

4.7.4 Local rules of resource use

The *estatuto* (communal statute) of both communities establishes and regulates the written rules, rights and obligations of *comuneros* with regards to territorial access and use. Any changes to the statute have to be approved by the General Assembly of *Comuneros*. The statute also includes mechanisms for resolving internal conflicts. Those found guilty of breaking set rules are obligated to pay a fine fixed by the Assembly. In addition, before granting authorisation to a *comunero* to carry out a certain activity, the communal authority must ensure that the

individual in question has complied to date with all his obligations to the community. In the case of Analco, the communal statute has just been updated at the behest of recent municipal and communal office-holders, who felt that many of its rules were no longer relevant. The new statute came into force in mid-2010.

The success of rule making in commons regimes depends, in large part, on how users respond to such regulations. Household surveys were used to identify how families in both communities viewed the institutional arrangements that regulated their access to, and use of, forest and other communal resources. In response to the question, "Do you feel that the rules on forest use are completely fair, reasonably fair, or not fair?" just under half of households (48%) surveyed in Comaltepec stated that forest use rules were completely fair, with the same number (48%) saying they were reasonably fair. Just 4% of households believed them to be unfair. In Analco, in contrast, a much higher percentage (88%) of surveyed households felt that forest use rules were completely fair, with the remainder of the opinion that these rules were reasonably fair. With regards the penalties set for non-compliance with resource rules, 58% of surveyed households in Comaltepec responded that the sanctions for breaking resource use rules were completely fair, 38% said that they were reasonably fair, and 4% said that they were unfair. In Analco, 77% of households felt that the sanctions in place were completely fair, 19% felt they were reasonably fair and just 4% felt that they were unfair.

The survey results show that the majority of *comuneros* and their families understand and respect the rules pertaining to the use and management of communal resources, in addition to the institutional structure set in place to monitor compliance, sanction, and resolve conflicts as and when they arise. The fact that most rules are considered fair and legitimate is a reflection of the transparent process involved in creating these specific resource institutions, in which users, as voting members of the General Assembly of *Comuneros*, participate fully. Respondents agreed that the regulation of different resource uses and the existence of specific institutional arrangements help to control the level and type of extractive activities taking place within each of the community's forests.

4.8 Summary

This chapter began by providing background information on Oaxaca and the Sierra Norte, before a brief history and current socio-economic profile of Analco and Comaltepec were

given. The chapter then described the impressive natural capital found within the communities' territories, and how resource practice and knowledge have evolved in response to the topographical, climatic and vegetative diversity found locally. The final section attested to the richness of values, norms and rules held and adopted by villagers that have proven instrumental in securing the environmental sustainability of local commons regimes. Such context is important because the thesis now moves on to explore how demographic and cultural changes are impacting life in a region where the use and management of communal resources continue to form key components of village tradition and identity. In this regard, a key lesson to take forward is that the household economy in Analco and Comaltepec is still dependent upon agriculture as the main local production system, with neither community yet reliant upon forestry or another commercial venture (besides migration) for a significant source of their income.

CHAPTER 5 – OUT-MIGRATION AND COMMONS INSTITUTIONS

Plates 5.1 and 5.2: California vehicle licenses bearing the names of Comaltepec and Analco (in Zapotec) respectively. *Photo*: Jim Robson

PART I – Historical Migration Flows, Contemporary Dynamics and Local Perceptions

5.1 Introduction to Chapter 5 / Part I

> Los Angeles is where most of the work and where most of our people leave to … my husband went there because there is no money here … it is not enough [to live on] and so he left to earn a better wage... my eldest daughter also went, got married over there and now lives with her family in Texas, while my other two daughters are in Los Angeles. They left to work and experience a new way of life. He [the husband] sends me about US$300 a month but my daughters don't send money … they have their own families to support and do not have anything spare to send. They tell me that life is more difficult over there, they have to pay for everything and there are a lot of expenses … here it is easier because we have our own home. My daughters cannot visit us because they do not have papers and they cannot risk leaving their children.
>
> Lilia Enriqueta López García, 48, resident of La Esperanza

In a single quote, Lilia encapsulates many of the dynamics that characterise out-migration from highland villages in northern Oaxaca: the importance of social networks; the main push and pull factors driving migration; the role of remittances; what life in the U.S. is like for undocumented workers; and, the impact of out-migration on family unity. The first part of Chapter 5 describes these dynamics, along with other aspects of historical and contemporary

migration flows from the two study communities to multiple destinations in Mexico and the U.S. In doing so, it provides the basic data that underpins subsequent analyses presented in this thesis.

5.2 Historical and Contemporary Migration Flows

5.2.1 From 1910 -1960

Out-migration from Oaxaca is deeply rooted as a survival strategy (Bezaury 2007). Although this thesis focuses on the impacts of out-migration since the 1970s, it is important to briefly describe prior migration experiences among the two study communities, since past experiences (both individual and collective) can and do inform present and future decision-making.

In Analco, the first major wave of migrants left during the early part of the twentieth century, when the Mexican Revolution (1910-1917) saw many families leave their homes for Oaxaca City, or head north to Tuxtepec and Valle Nacional (close to the border with Veracruz state). Many *Analqueño* males, proud of their leftist political beliefs and 'warrior' mentality, actively participated in the struggles. Indeed, so many men left that the community subsequently suffered incursions from the neighbouring communities of San Juan Atepec and Santa Maria Jaltianguis, forcing resident families to flee their customary lands. It was only once the conflicts had actually ended, around 1920, and men started to return, that Analco was able to reclaim a portion of its former territory.

For the next twenty years, there was little out-migration of note. Then, during the 1940s and 1950s, both Comaltepec and Analco experienced their first taste as a source of migrant wage-labour, when adult men left to work in the fields of North America as part of the *Bracero* Program[46]; established to provide a cheap supply of foreign labourers to the U.S agricultural sector. These were six-month to one-year contracts, with migrants obligated to return home after terms had been fulfilled. Despite being temporary arrangements, these experiences were highly significant – exposing many community members to the outside world, a cash economy, and, in some cases, a more urbanised setting and way of life.

[46] Initiated in 1942, the program constituted a series of laws and diplomatic agreements to bring temporary contract labourers from Mexico to the United States to work in the agricultural sector. After the expiration of the initial agreement in 1947, the program continued under a variety of administrative agreements until its formal end in 1964.

5.2.2 From 1960-2008

Following these earlier migratory experiences, which were still fresh in the collective memory, the 1960s saw the first community members leave of their own accord to earn a regular wage in regional and national urban centres. As evidence of this, Figure 5.1 highlights the rapid growth of Oaxaca's cities from 1930-2000 (note that none of these cities had a population exceeding 40,000 prior to 1950).

While some *Analqueños* headed north to Tuxtepec and Loma Bonita on the Oaxaca-Veracruz border, to work on recently established pineapple and sugarcane plantations, the majority left during the 1960s and early 1970s for larger urban centres. While some resided in nearby Oaxaca City, it was the country's capital, Mexico City, which quickly became the most favoured migrant destination. Many families settled permanently in the capital, or used it as a staging post before they moved further north. A smaller number stayed in Mexico City for an extended period of time (15-25 years) before returning to Analco in the 1990s and early 2000s.

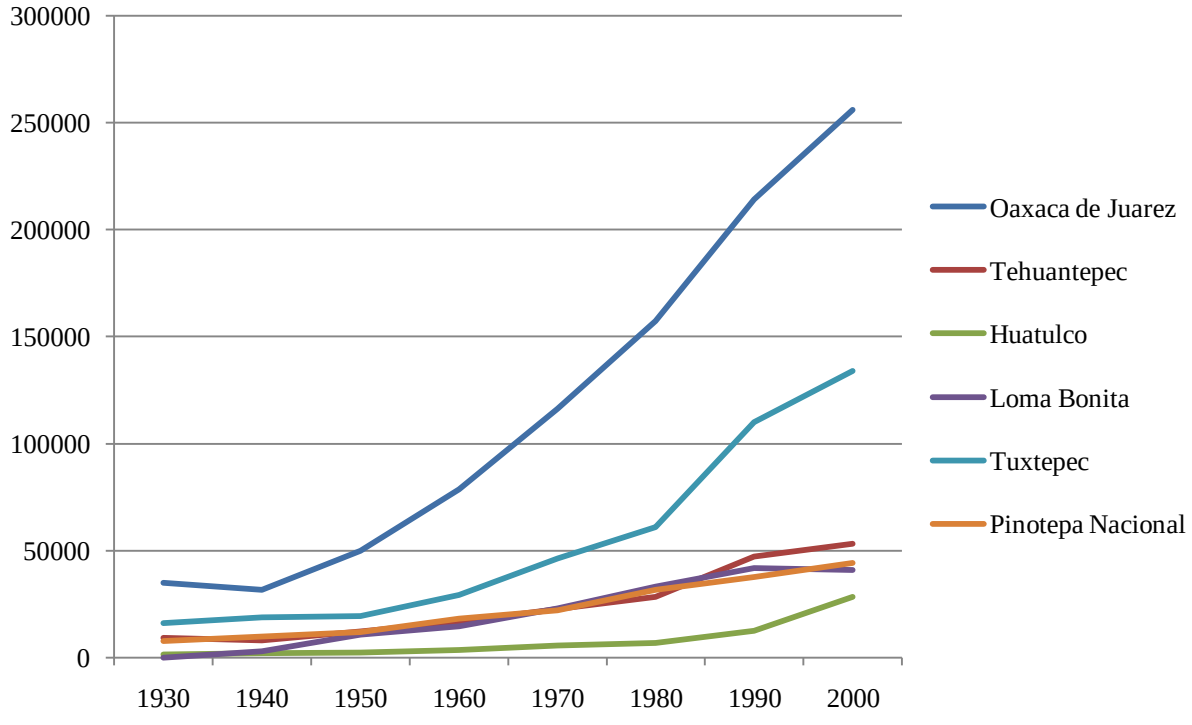


Figure 5.1: Growth of urban centres in the State of Oaxaca (1930-2000) (*Source*: INEGI 2005)

In Comaltepec, in contrast, internal (national) migration rates were less intense and began a decade later. The reason for this is not immediately clear. On the one hand, the forest concession period (which began in 1958 and affected the forests of Comaltepec but not those of Analco) certainly provided a source of employment to community members, and may have encouraged many families to stay. On the other hand, de la Mora (2003) argues that the poor deal the community received from private logging operations acted as a specific driver behind some migrants' decision to leave. Either way, high birth rates throughout the 1960s and 1970s cancelled out the effect of low to moderate out-migration rates, allowing Comaltepec's resident population to continue to grow throughout the period.

At the end of the 1970s there was an important shift in the migratory pattern as the first *Comaltepecanos* left for the U.S. Two young men left in 1978 for Los Angeles, with friends from the neighbouring community of San Pablo Macuiltianguis (which had established ties in southern California since the mid-1970s). Very quickly, the U.S. overtook Mexico City as the prime destination for migrants from the community. Indeed, many who had earlier left for Mexico City moved onto the U.S. upon hearing that work was plentiful there. The vast majority of migrant *Comaltepecanos* headed to the Los Angeles Metropolitan Area, with most settling in a handful of cities and neighbourhoods; Lynwood, Downey, West Los Angeles (off Pico Blvd.), Santa Monica, and Pasadena. In the case of Analco, it took longer for the U.S. to become a major destination; a reflection of just how entrenched migration flows to Mexico City had become. By the mid-1980s, however, migrants were beginning to follow the trend set by Comaltepec and other communities in the region. While Los Angeles County began as the preferred destination, a sizeable number of *Analqueños* have since headed to Las Vegas[47], with much smaller numbers settling in New York, Miami and North Carolina. In Los Angeles, *Analqueños* tend to be more spread out than their counterparts from Comaltepec, with locations stretching from Glendale in the north to Santa Ana in the south.

True to both communities, yet most pronounced in the case of Comaltepec, migration to the U.S. rose sharply during the late 1980s and 1990s as social networks became established between home and migrant communities. While many of the first migrants to leave for the U.S.

[47] A migrant residing in Los Angeles headed to Las Vegas in the late 1980s (leaving his family in LA), having heard that construction work was plentiful and well-paid. Once established, he sent for his family and encouraged others (friends and relatives) living in LA to make the switch. Soon, family and friends from Analco were making the trip to Nevada. By the late 1990s, there were more than fifteen families established in the city.

were men (aged 20-45), in recent years, increasing numbers of women have left as well as younger community members, who join family members in the North soon after finishing secondary school. Since 2002, the numbers migrating have levelled off. Indeed, a combination of economic recession and increased border enforcement – as reported by Cornelius and Lewis (2007) and Shelley (2007) – had led members of both communities to report a significant downturn in numbers leaving to the U.S. during 2008 and 2009. On a return visit to Oaxaca in October 2010, it was reported that flows of undocumented migrants to the U.S. had dried up altogether, attributed to the security risks associated with travel through the northern states of Mexico – where the federal government has been waging war with powerful drug cartels since 2006/7[48].

5.2.3 Migrant numbers and destinations

Data from the household survey (Table 5.1) show that four-fifths of surveyed households in Comaltepec had at least one migrant member during the first half of 2008, with this holding true for all of the households surveyed in the village of La Esperanza. In the case of Analco, the figure is considerably lower at just over half of all surveyed households. However, it should be noted that these data refer to current migrant numbers, and many households with no current migrants do have at least one member who has been a migrant in the recent past.

Table 5.1: Households with migrant members (*Source*: Household-migrant survey)

Village / COMMUNITY	Households with at least one migrant member (%)	Households with no migrant member (%)
Santiago Comaltepec	76	24
La Esperanza	100	0
San Martin Soyolapam	70	30
COMALTEPEC	82	18
ANALCO	54	46

Table 5.2 on the following page provides an even clearer picture of migrant numbers, along with principal country destinations. Among the three permanent villages of Comaltepec, more than half of all household members are currently living outside the community. In the head

[48] In addition to the role played by U.S. immigration policy, increased border activity in the past couple of years is tied to U.S. and Mexican efforts to weaken the drug cartels of Sinaloa and Chihuahua. The drug wars that have been raging for the past four years, have resulted in thousands of fatalities, and further discouraged would-be migrants in rural Oaxaca from heading north.

village of Santiago Comaltepec, a sixth of households surveyed reported that all children are currently living outside the village. Among current migrants, the survey data estimate that 54% of *Comaltepecanos* are in the U.S., with the remainder (46%) residing in different cities across Mexico. This may appear surprising, given the overwhelming shift to international migration over the past three decades. On closer inspection, however, the survey data show that a large proportion of Mexico-based migrants left the community many years ago, while for migrants who have left the home village since 1990, the U.S. (and Los Angeles specifically) accounts for approximately three-quarters.

Table 5.2: Numbers and destination of migrants (*Source*: Household-migrant survey)

Village / COMMUNITY	% of household members living outside village	% of migrant members in U.S.	% of migrants members in other parts of Mexico
Santiago Comaltepec	52	44	56
La Esperanza	66	66	34
San Martin Soyolapam	53	53	47
COMALTEPEC	57	54	46
ANALCO	43	43	57

*Analqueño*s, in contrast, have traditionally favoured a wider range of destinations than *Comaltepecanos*, and this is reflected in the larger percentage of migrant members resident in national urban centres (57%). Indeed, whereas 47% of migrant households in Comaltepec have the U.S. as the sole destination of migrant members, this is true for just 23% of migrant households in Analco (Table 5.3). Conversely, 35% of migrant households in Analco have Mexico as the sole destination, compared to just 8% in Comaltepec.

Table 5.3: Country destination for recent migrants (*Source*: Household-migrant survey)

COMMUNITY	% of migrant households with U.S. as sole destination	% of migrant households with U.S. and Mexico as destinations	% of migrant households with Mexico as sole destination	% of households with no migration
Comaltepec	47	28	8	17
Analco	23	35	35	7

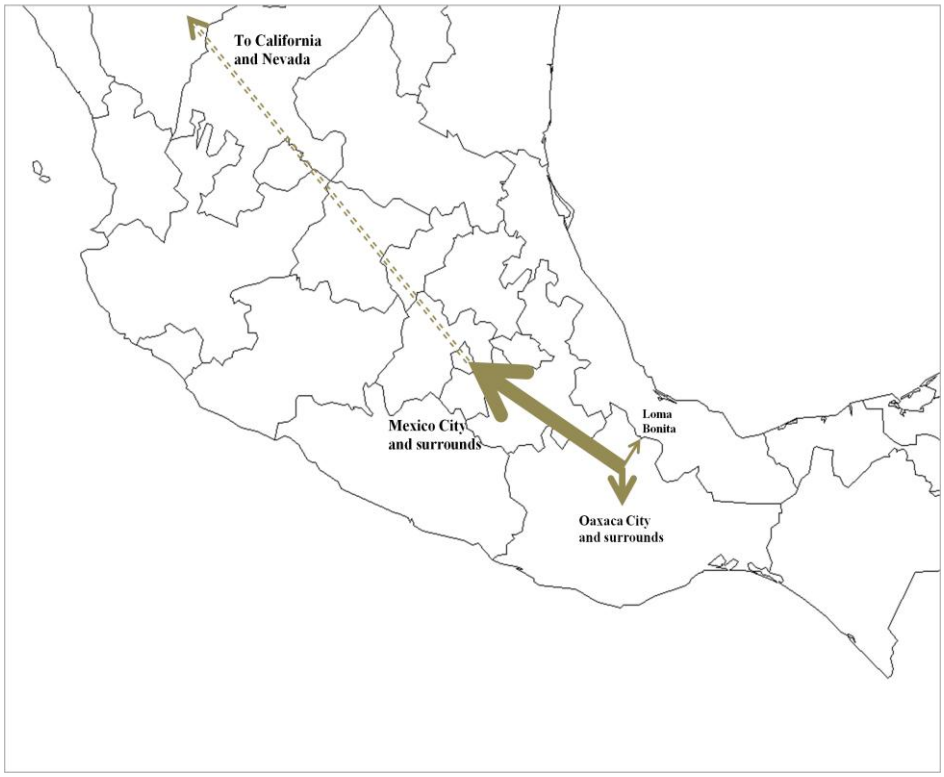
Data were also collected on the extended family unit. Table 5.4 shows that in Santiago Comaltepec, 63% of the siblings of surveyed household heads (HHs) are currently residing outside the community (with 24% residing in Los Angeles, 17% in Mexico City, 31% in Oaxaca,

and 28% in other parts of Mexico). In La Esperanza, 65% of siblings are residing outside the community (55% in LA, 19% in Valle Nacional, 7% in Oaxaca, 14% in DF, and 5% elsewhere in Mexico), while in Soyolapam, 51% of siblings are residing outside the community (61% in LA, 11% in Valle, 28% in Oaxaca). As siblings of household heads, many of these migrants are older community members (over 45 years of age) and left at a time when destinations within Mexico were more popular; a fact clearly illustrated by the low numbers who reside in the U.S.

Table 5.4: Numbers and destinations of migrant siblings (*Source*: Household-migrant survey)

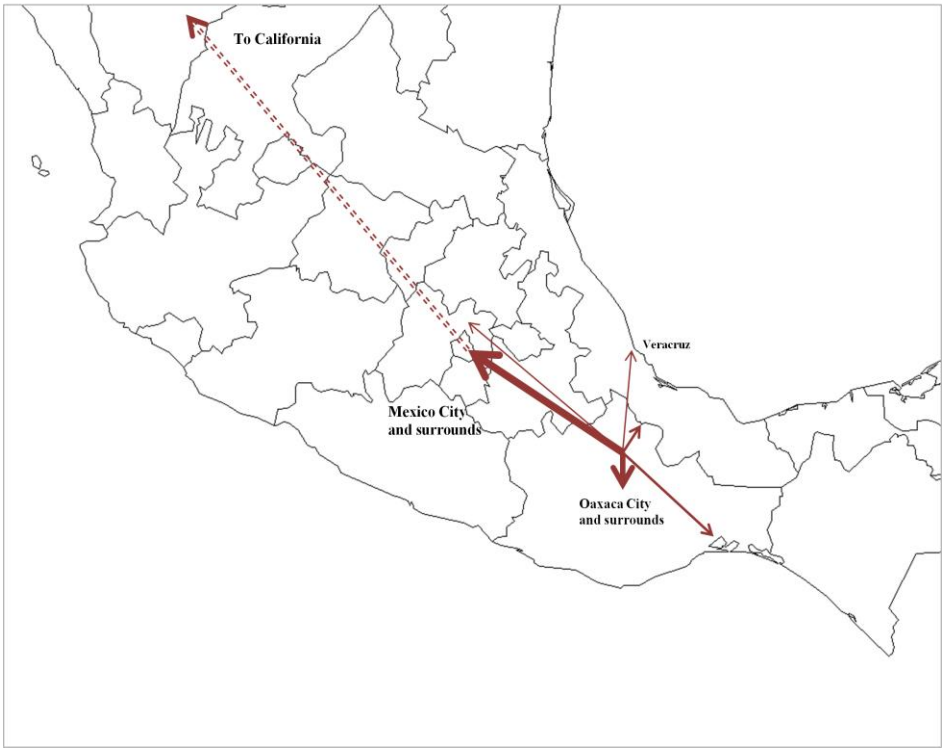
Village / COMMUNITY	% of siblings of HHs who reside outside the community	% of migrant siblings who reside in U.S.	% of migrant siblings who reside in other parts of Mexico
Santiago Comaltepec	63	24	76
La Esperanza	65	55	45
San Martin Soyolapam	51	61	39
COMALTEPEC	60	47	53
ANALCO	55	16	84

As a way to summarise the survey data, the maps (5.1, 5.2, 5.3 and 5.4) on the following two pages provide a visual representation of the volumes (approximate) and destinations pertaining to migratory flows from Analco and Comaltepec during the period 1960-2008.



Map 5.1: Principal migration flows from **Analco** to Mexican destinations

Map 5.2: Principal migration flows from **Analco** to U.S. destinations
(note that first migrants to head to Las Vegas came from Los Angeles)



Map 5.3: Principal migration flows from **Comaltepec** to Mexican destinations
(note that many migrants to Mexico City area subsequently settled in California)

Map 5.4: Principal migration flows from **Comaltepec** to U.S. destinations

5.3 Push and pull factors

5.3.1 An economic explanation of migration

> There is work here if you want to do it … there is work wherever you are willing to put the effort in. However, in the U.S. you have a better chance of a good and steady wage. The first thought is to eat and for that reason the opportunity to earn money is very attractive.
>
> Eusebio Ramón López Hernández, 59, *comunero* of La Esperanza
>
> Some of us are fortunate in terms of education and work opportunities but for the rest that want to stay here, what are they going to do? From ten only two will stay and those that remain are retired or close to retiring.
>
> Clemente a la vez Bautista, 57, *comunero* of Analco

Out-migration from Comaltepec and Analco has traditionally been a response to economic pressures[49]. This includes the need to earn money to build a house in the home village, put children through school, or simply provide food and clothing for the family. Nearly all survey respondents stated that there is little paid work in the village and what work there is, often *'no alcanza'* (does not provide enough to cover basic expenses). The daily wage in Comaltepec is about $130 pesos (US$10-11) and $100 pesos in Analco (US$8-9)[50]. Even if one is lucky enough to find work on a regular basis, this is rarely enough to cover the basic costs associated with schooling, feeding and clothing the average family of between five and six members. A similar amount (often more) can be earned in one hour in Los Angeles as a construction worker, gardener or nanny. For many, the U.S. provides an opportunity to earn enough for themselves while sending money back to the family in Oaxaca.

[49] While the focus here is firmly on the economic pressures felt by villagers in their day to day lives, Chapter 8 of this thesis discusses in some detail the external or macro-economic policies and structural changes that have been instrumental in creating or exacerbating many of these local-level pressures.
[50] U.S. dollar estimate for the period Sep 2008-July 2009.

Plate 5.3: Migrant *comaltepecanos* working on store remodel in Glendale, CA
Photo: Jim Robson

One of the biggest challenges facing *campesino* families today is how to make enough money from their farming activities to cover basic household expenses (food, clothing, school costs) – let alone consider building a new house made of concrete and corrugated steel. As Rafael Hernández explains, "There is work here but no economic resources to invest in farming activities, and so little chance to progress". Ricardo López López, 63 and a *comunero* from La Esperanza, adds: "You earn a lot more [in the U.S.] ...there is plenty of work here but you receive so little [money] for what you produce". Abel López Hernández, 28 years old and a *comunero* from Santiago Comaltepec, recently returned to the village after spending a year in Los Angeles. Like many others who farmed on the humid side of the community's territory, he did not want to leave his home village but was forced to because of the fall in prices for the region's main cash crop: "When the price for coffee was high we had enough resources to plant and harvest… but when those prices crashed many people had to stop growing coffee and look for other means to live". He felt that he had no choice but to leave for the U.S.

While the first wave of migrants headed to cities in Mexico, experience has shown that work opportunities in Oaxaca City, Mexico City or other national urban centres can be limited. Mexico is a country where mainstream urban society continues to discriminate against indigenous people, and this is a particular problem for those with little formal education. As Rodolfo Castro, a *comunero* from Santiago Comaltepec, notes: "Without an education there is no

future [for the migrant] in Oaxaca or any other part of the country… without your studies there are two options … work in the fields or migrate to the U.S.". Even when jobs can be found in Mexican cities, the pay is often poor. As Juventino Muñía from La Esperanza, notes: "There is no money here or in Mexico and for many people the best option is Los Angeles". Eutemio Allende Garcia, a 49 year-old resident of San Martin Soyolapam, concurs: "There is work here but no money…. Mexican money has no value and for that reason they [the migrants] head north [to the U.S.]". The general view in Comaltepec (and to a lesser degree in Analco) is that if you want to leave your village for paid work then it is best to head north where the wages are much higher.

However, not everybody (and this includes current and former migrant workers) believes that the best place to find work lies outside the community. As Gloria Hernández López, 30, told me: "We are here… we have lived here always and there is work to do". Another community member, Zeus, a 31 year-old from San Martin Soyolapam, agreed: "They say that there is work everywhere but the difference for me is that in Soyolapam there is work and food on the table, while in Mexico or Los Angeles one has to pay for everything … and so you always have to be earning". As Gudelia Méndez Hernández from Analco, adds, "Although young people have little interest in farming and there is no money in it, we have enough to maintain ourselves and our families".

The household survey data points to a similar diversity of opinion when respondents were asked whether the U.S., a Mexican city or the home community provided the best place for work. Over a third (35%) from Comaltepec responded that the community offered plenty of work if people were willing to forego cash for a more subsistence-based livelihood. Roughly a quarter believed that either Comaltepec or the U.S. were the best places for work, while 10% specified the U.S. on its own. Only 6% said Oaxaca, and it was striking that not one household in Comaltepec placed Mexico City or another part of the country at the top of the list. In Analco, 42% of respondents said that the community was the easiest place to find work, with just over a quarter (27%) selecting the U.S. Much like *Comaltepecanos*, only a minority (12%) specified Mexico City, and not one respondent considered Oaxaca City the best place to go. These findings suggest that national urban centres now hold little appeal.

5.3.2 Towards a cultural explanation of migration

As suggested previously, an economic model of migration (after Piore 1979; Stark 1981) does not apply to all who leave – especially those teenagers who head to a major city in Mexico, or more commonly to the U.S. soon after finishing school. Given that few of these younger migrants leave out of any financial necessity (in the sense that they rarely have dependents to support back home), this phenomenon helps support a more 'cultural' explanation of migration (after Durand and Massey 2004), where a few years spent living in the U.S. becomes a 'rite of passage' for Comaltepec and Analco youth. Eusebio Ramón López Hernández, 59 and father of three, explains: "They [the youth] all head north… the attraction of the dollar is very strong. However, these youngsters also migrate *para conocer* [to get to know] the North. Los Angeles has been a migrant destination for a long time now". Table 5.5 shows that for as many as a fifth of current migrants, a principal reason to leave was the opportunity to experience an urban lifestyle, rather than acting of any financial necessity.

Table 5.5: Rationale behind decision to migrate (*Source*: Household-migration survey)

Village / COMMUNITY	Decision to migrate was personal-work (%)	Decision was personal-know (%)	Decision was family-driven (%)
Santiago Comaltepec	75	15	10
La Esperanza	60	15	25
San Martin Soyolapam	80	20	0
COMALTEPEC	72	17	11
ANALCO	76	16	8

In most such cases, migrants were young (unmarried) males and females, and in only a few cases were they sent by their parents to earn money. For the vast majority (89% of current migrants from Comaltepec and 92% in the case of Analco), the decision to leave the village was personal and not family-driven. While migrants have never formed a homogenous group, they are more heterogeneous today than in the 1970s and 1980s, when out-migration first began to take hold in the region. Indeed, it is not clear that migration should still be considered a 'rite of passage' for many of today's first-time migrants. While members of both communities have considered a period spent in the U.S. as an opportunity to pass from adolescence to adulthood and prepare for the years ahead (when one has to comply with *cargos* and other community

obligations), interview findings suggest that a sizeable contingent of the current generation do not share this view and consider their long-term future to lie outside the home village.

5.3.3 Migrant networks

> The youngsters that are here in Mexico, they left to study and then to find work, while those in the north [U.S.] went because they wanted to *conocer* [know it] and to look for work … but nearly all those in the north also went because they have family members in the city where they arrived.
>
> Rogelio Luna Méndez, 36, *comunero* of Analco

Whatever the reasons for leaving, migration to Mexican and U.S. destinations is aided by strong social networks that have built up over a period of thirty plus years (Table 5.6). The importance of these networks cannot be overstated. According to survey results, over 90% of first-time migrants from Comaltepec have friends or family members already living in their destination city (typically Los Angeles), who can provide accommodation, help find work, and lend moral and financial support. Indeed, contacts in the North are more often than not depended upon to finance the trip to the U.S. for first-time migrants.

Table 5.6: Significance of migrant networks (*Source*: Household-migration survey)

Village / COMMUNITY	Migrant had family or friends to help them at destination (%)	Migrant had no friends or friends to help them at destination (%)
Santiago Comaltepec	92	8
La Esperanza	100	0
San Martin Soyolapam	87	13
COMALTEPEC	93	7
ANALCO	72	28

As Abel López Hernández, 28, explains: "Los Angeles is where all the *paisanos* are… that is where everybody heads to". Elvira Enuela Hernández López, 52 and mother of four, adds: "The children wanted to go … they chose Los Angeles because that is where most *Comaltepecanos* are". The presence of family and friends in the North makes the prospect of living in an enormous city like Los Angeles far less daunting. For *Analqueños*, the importance of migrant networks is also clearly evident, with almost three-quarters (72%) of first-time migrants benefitting from the support offered by friends or relatives in the destination city.

5.4 Changing Dynamics of U.S.-bound Migration

The mindset of Mexico-bound and U.S.-bound migrants has traditionally been quite different. Many of those who left for a Mexican urban centre (with family in tow) often did so without the intention of moving back to the village save perhaps to spend their retirement. In Analco, many families who left for Mexico City in the 1960s and 1970s are still there, with long-term jobs or running their own businesses, and with children who see themselves as much *Chilangos*[51] as *Analqueños*. In contrast, when the first migrants left for the U.S., they rarely expected to remain away for long. This manifested itself in a form of temporary, circular migration and promoted new house builds and the maintenance of strong ties at both a household and community-level. Circular migration was supported by a level of border enforcement in the U.S. that enabled undocumented workers to move with a level of impunity between their home village in Oaxaca and their city of destination in California or Nevada. Interviews in both communities showed that crossing the border from the late 1970s to early 1990s was relatively easy and the '*coyotes*' (people smugglers) generally affordable. Migrants would move regularly between the two countries – typically spending one or two years away before returning to Oaxaca. Indeed, many of the older, returned migrants that I interviewed (among the first to leave Comaltepec or Analco in the late 1970s and early 1980s) made four, five or six separate trips to the U.S. before returning to settle down permanently in the home village.

Over time, however, migratory patterns to the U.S. have changed considerably. Today, the circular movement of migrants has gradually given way to a form of *semi-permanent* or *permanent* migration, with migrants spending many years in the U.S. before they think about returning. According to survey findings, current migrants from both communities have so far spent between one and thirty years residing outside the home village, with the average hiatus standing at fourteen years (and counting). The reasons for this change are complex. For one, the vast majority (around 90%) of migrants continue to make the trip illegally (or *'sin papeles'*), since they are not eligible to apply for immigrant worker status under current U.S. legislation. As border policies have tightened – shifting the location of illegal crossings from California to the remote deserts of Arizona – the trip north has become more complicated, dangerous and expensive. Household survey data show that while *coyotes* were charging between US$200-$500

[51] The Mexican Academy of Language defines 'Chilango' as something "belonging to Mexico City, in particular referring to people native to the capital"

dollars in the 1970s and 1980s, the costs had risen to above US$1,000 by the early 1990s, and reached an exorbitant US$3000+ during the period 2007-2009[52].

Such costs make the decision to return home a tricky one for most migrants, since there is no guarantee that they will be able to make it back into the U.S. Indeed, these costs are so high that the first year in Los Angeles or another destination city is now typically spent paying back friends and family for the loans taken out to cross the border. As such, most migrants require a longer period of time away (multiple years) to accrue any savings at all. Not surprisingly, the longer they stay away the less likely it is they will return to settle in the home village – particularly the case for those who start families in the U.S. Among both migrant groups, I came across many individuals who left their village as single men and women in the 1980s and 1990s, and have since married and had children in the North. While children born in Los Angeles (or any other American city) can claim U.S. citizenship under current legislation[53], parents who are undocumented workers and born outside of the U.S. remain illegal aliens. This reality makes family trips back to Oaxaca a risky venture. I lost count of the number of older community members in either study community who have yet to meet their grandchildren because of such restrictions.

Table 5.7 provides household survey data on the number of current migrants who are expected to return to live in the home village.

Table 5.7: Percentage of current migrants expected to return to live in the home village (*Source*: Household-migration survey)

Village / COMMUNITY	% expected to return	% unlikely to return
Santiago Comaltepec	32	68
La Esperanza	50	50
San Martin Soyolapam	40	60
COMALTEPEC	41	59
ANALCO	33	67

In Santiago Comaltepec and in Analco, close to two-thirds of current migrants are not expected to return. The number of 'permanent' migrants from La Esperanza and San Martin

[52] Merino (personal communication, August 2010) noted that migrants from the Sierra Norte community of San Pablo Macuiltianguis had recently been charged or quoted as much as US$6,000, and also reported paying a *cuota de protección* (protection fee) to drug-traffikers operating along the Arizona border.

[53] There have been recent calls to end the granting of birthright citizenship to the U.S. born children of undocumented migrants. Much of this debate has turned on the meaning of the 14th Amendment to the U.S. Constitution, and whether the children of illegal migrants should be "subject to the jurisdiction of the United States" (Van Hook 2010).

Soyolapam is lower but still equates to over half of all current migrants from those villages. Those most likely to return are migrants who have papers, whose family has remained in the home village, or who have built a house in the village in the expectation that they will move back at some point. The following quotes provide an idea why some migrants remain unlikely to return:

> My husband is the only one from that group of friends that has come back … they tell him they are not returning because they do not have a house in the village.
>
> Rosa Manzano López, 32, citizen of Analco

> It is unlikely that they [her brother and sister] will return to live here because they have papers now in the U.S, and their homes and families are there. Mexico City, however, is no longer such a great destination and some are heading back to Oaxaca and Analco.
>
> Lucia Manzano, 32, citizen of Analco

> They [his children] are not going to return to Mexico because they have their life there [in the US] … in addition, they do not have papers so if they did come it would be very difficult for them to return north.
>
> Celso Elidas Hernández López, 65, *comunero* de Santiago Comaltepec

Interviews with migrant households suggested that migrants considered the most 'permanent' are those who have stayed away for so long (15+ years) that they no longer hold any material ties to the home community. They have established themselves in off-farm occupations, they have married in the North, and their children are in school or now working in the U.S. or Mexico City themselves. There is one very important caveat, however; that the majority of U.S.-based *Comaltepecanos* and *Analqueños* should be considered 'semi-permanent' rather than 'permanent' migrants, irrespective of the time they have spent in the North. This is because, as undocumented workers, the majority always run the risk of deportation if caught by the U.S. authorities, and remain prone to the whims of that country's border enforcement and immigration policies, at both federal and state levels[54]. As informal wage labourers, their futures are also

[54] In April 2010, for example, Jan Brewer, the Governor of Arizona, attempted to bring into law some of the toughest anti-immigration legislation in recent U.S. history, which allows police to stop and question anyone they

linked to the broader economic situation. Indeed, it is likely that (ongoing) economic difficulties in the U.S. will eventually translate into a sustained flow of migrants returning to Analco and Comaltepec. As of November 2008, this had yet to take effect to any noticeable level. The few migrants who had returned were individuals with minimal family ties in the U.S. Many migrants I spoke to in Los Angeles in August 2008 were intent to wait out any recession, and also keen to see what reforms the new man in the White House would introduce[55]. On a return visit to Analco in December 2009, some families had returned from Los Angeles and Las Vegas due to economic pressures, although they reported that the majority of migrants were "toughing it out".

5.5 Migrant Remittances

> Remittances are so important because there is little paid work here… and local wages are not enough to survive on.
>
> Municipal President, Santiago Comaltepec

Prior to the 1960s, *Comaltepecanos* and *Analqueños* worked the land to cover most if not all of their subsistence needs and generated little or no cash income. In the mid-1970s, the paving of Federal Highway 175 marked the beginning of an era of greater integration into mainstream Mexican society, which has led to multiple changes across the region in terms of education, healthcare, new employment opportunities, and the provision of basic public services. It also brought villagers closer to regional, national and international urban centres through out-migration, and since the early 1980s, the monies (remittances) sent back by those who left their villages have become a most important driver of change, altering the local socio-economic landscape.

One only has to wander through Analco, Santiago Comaltepec, La Esperanza or San Martin Soyolapam to see the impact of thirty years of remittances on these villages, and on housing in particular. The traditional adobe houses are now in the minority, with houses built of cement and other 'modern' materials dominant (Plate 5.4). These concrete structures, some of them two-story, rise above the more traditional houses beside them, promises of *El Norte*, the

---

have "reasonable suspicion" is an illegal immigrant (Guardian 2010). Brewer said that legislation is aimed at protecting the state's citizens from the dangers posed by immigration.

[55] On the presidential campaign trail in 2008, the eventual winner, Barack Obama, said it was impractical and immoral to deport the 12-20 million illegal immigrants living in the country. Since taking office, however, federal immigration reform has taken a backseat as Obama's administration focused efforts on shoring up the economy and bringing in long-overdue health reforms.

North, of the money that can be amassed by crossing into the U.S. For community members, new house construction is the most commonly cited benefit associated with out-migration, followed by an improved diet and better clothing. The municipal authorities estimate that dozens of migrant *comuneros* in Los Angeles and Las Vegas are building, or have recently built, houses in the two study communities.

Plate 5.4: New house builds in Analco
Photo: Jim Robson

Table 5.8 shows (estimated) amounts being remitted in 2008 by migrants back to their wife and children in the home village or to their parents in those cases where migrants left the village unmarried. While remittances are given as a monthly income, in practice it is more common for migrants to send money on a bi- or tri-annual basis. This is to reduce transaction costs and because work in the informal sector can often lead to an irregular cash flow[56]. The amount received by individual households in both communities varies tremendously. While a

[56] It is worth making a couple of points about the remittance data presented here. First, not all the money sent back as remittances is fully captured by the survey. For example, some respondents (parents) were often not aware of how much money their migrant (adult) children were sending back for house construction (either in the home village, or perhaps a nearby regional centre). Second, the survey was conducted during March, April and September 2008, when the U.S. was in the throes of an economic recession. This clearly had an impact on the amount of disposable income available to migrants in the U.S. and thus affected recent remittances sent back to the home village in Oaxaca.

number of migrant households will receive US$200 or US$300 a month, there are a similar number that may only receive US$100 or US$200 during a twelve-month period.

Table 5.8: Level of current household income through migrant remittances
(*Source*: Household-migration survey)

Village / COMMUNITY	% of MHHs[57] receive US$600-1000/month	% of MHHs receive US$200-US$500	% of MHHs receive US$100-US$200	% of MHHs receive little or no remittances
Santiago Comaltepec	6	25	22	47
La Esperanza	0	44	33	23
San Martin Soyolapam	0	33	33	34
COMALTEPEC	4	34	26	36
ANALCO	8	8	26	58

In comparing the two communities, we find some significant differences. While the data in Table 5.8 covered remittances received from both U.S.-based and Mexico-based migrants, it is estimated that 60-75% of current remittances come from migrants in the U.S.; alluding to the much greater earning power of those living and working in the North. Consequently, in Comaltepec – with a higher proportion of migrants in the U.S. – there is a greater percentage of migrant households (64%) receiving at least US$100 per month in remittances. In Analco, the figure drops to under half (42%). While a small number of migrant households (approximately 15%) in both communities live entirely off remittances, for a majority (50-55%), the money sent from migrant members is considered an "important" or "very important" supplement to local sources of income, and "a great help" in covering domestic expenses, includng school and medical bills. At the same time, over a third (38%) of migrant households in Comaltepec and more than half (58%) in Analco receive little or no financial support in the shape of remittances (Table 5.8). This is on top of the households in each community with no migrant members and thus no chance of receiving remittances.

The amount sent home is tied to earning power and the type of migrant in question. Some who go to the U.S. thrive, earning enough to raise concrete homes as symbols of their success, and maybe invest their savings in cattle or another productive activity. Others fare less well. The low-wage jobs many hold, combined with the cost of rent, electricity and other expenses, leave

[57] MHHs stand for Migrant households.

little money to send back to Oaxaca. The type of migrant is also important. When it is a head of household, or what may be termed a *traditional migrant*, a larger percentage of earnings are sent back to the family to cover household expenses and finance home improvements. This was a common scenario when migration to the U.S. began to take hold in the 1980s and early 1990s. However, the growing number of unmarried male and female migrants, unencumbered by financial demands from the home village, has seen average migrant remittances fall. In both communities, I would come across again and again the same scenario; parents left behind as children try their luck in the cities of Mexico, California and Nevada. While many would send money back for the first couple of years, as personal situations changed (they married and had children of their own), remittances reduced in size and frequency. As Ricarda Sosa Sosa, a 55 year-old mother of four from Analco, explains: "The money they [her two daughters living in the U.S.] sent us was very important … we have seen a big change now they can no longer help us". As Dolores López adds "It [the money] is a help… but no longer a major one because it really is very little that they can send us".

Consequently, for an increasing number of migrant households, the changing profile of those leaving the community means that remittances tend to be less important than they were five or ten years ago. Indeed, while they remain significant for a number of households, the current overall impact of migrant remittances is probably best described as modest in both study communities. With changing situations for increasing numbers of U.S.-based migrants, it is difficult to predict the impact that migrant monies will have on household and community economy in the coming years. For example, during the period that the fieldwork took place (2007-2009), the vast majority of migrant households were spending their remittance income primarily on food and clothing rather than construction (Table 5.9), a consequence of the more moderate remittance flows that have characterised trans-local village life in the past few years.

Investment in livestock, agriculture or another land-based activity was lower than these three main categories and only occasionally came up in discussions with survey respondents and other interviewees. Such patterns are also reflected in the way that people themselves view migration, with demographic and cultural impacts vying with economic benefits to colour and inform local perception.

Table 5.9: Categories of spending of migrant remittances
(*Source*: Household-migration survey)

Village / COMMUNITY	Average monthly remittances (US$)	% of migrant households (MHHs) who spend primarily on food and clothing	% of MHH who spend primarily on schooling	% of MHH who spend primarily on construction
Santiago Comaltepec	136	68	18	14
La Esperanza	77	55	22	23
San Martin Soyolapam	97	62	33	5
COMALTEPEC	130	63	24	13
ANALCO	102	75	10	15

5.6 Local Perceptions of Migration

> Prosperity comes from the house and from work, so in some cases migration has improved the village. From that perspective, many people have improved their lives from migration and remittances… however, '*uno no puede comer la casa*' [one cannot eat their house] and with that I mean that despite the pretty house, you now depend on migration and working in the North to make your living.
>
> Eusebio Ramón López Hernández, 59, *comunero* of La Esperanza

An important aspect of the migration survey was to determine local perspectives regarding the benefits of migration. As such, the survey asked respondents whether they believed that *'migration has been positive or negative for the village?*' The results are given in Table 5.10, and show that approximately half (46%) of households in Comaltepec felt that out-migration had been generally positive, 29% felt that it had been negative and 25% felt that it had been both positive and negative for the village.

Table 5.10: Household-level perception of impact of migration on village life
(*Source*: Household-migration survey)

Village / COMMUNITY	Migration has been positive (% of households)	Migration has been negative (% of households)	Migration has been *both* positive and negative (% of households)
Santiago Comaltepec	50	21	29
La Esperanza	66	34	0
San Martin Soyolapam	22	33	45
COMALTEPEC	46	29	25
ANALCO	50	21	29

While a majority of those interviewed in Santiago Comaltepec and La Esperanza felt that migration had benefited the village, only 22% of households in Soyolapam felt that migration had been positive. This may be attributable to the much smaller size of Soyolapam (just over twenty active households), such that the effects of local population loss are felt to a greater degree here than in either of the community's other two principal localities.

In general, the households that felt most positively about migration tended to be those that had most benefited from migrant earnings, in terms of housing and overall living conditions. However, there were many who benefited from migration in economic terms, yet acknowledged that for the village as a whole, the impact of migration had been far more problematic. Such divergent views are well illustrated by the following quotes:

> The great advantage [of migration] has been the improvement in local houses thanks to the money they [the migrants] send to build their homes here… without doubt we have seen an overall improvement in that respect.
>
> Municipal President (2007-2008), Comaltepec

> The village has benefited because before there was no money and now many have their *casas de material*, we now have a primary and secondary school, there is the church… the migrants have helped with a lot of that.
>
> Marcelo López Hernández, 71, *comunero* of La Esperanza

> In terms of infrastructure, migration has helped tremendously but in terms of the communal or social aspect, it has been very bad.
>
> Rafael José Hernández Castellano, 66, *comunero* of Comaltepec

> In economic terms, migration has improved the village because families now eat and dress better but the problem is that there are no people here and the village is becoming deserted.
>
> Rosa Manzano López, 32, citizen of Analco

> Migration has been negative for the village because of family break-ups and because traditional values have been lost.
>
> Vicente a la Vez Reyes, 42, *comunero* of Analco

> It depends on each case… for some it has been good, they build their house and they can live a little better. But there are others who do not know how to save and they enter a vicious circle… they spend everything they earn and then have to keep working in the north … some come back with more children than money!
>
> Eutemio Allende García, 49, *comunero* of San Martin Soyolapam

Two main points need to be made here. First, most remittances stay with migrant households. From the survey data, the benefits for the community as a whole are much harder to pinpoint. An obvious example of this concerns the construction of new houses financed by migrant earnings. While of great value to the families concerned, and an important source of work locally, housing is also a source of *'disequilibrio'* (inequality) between migrant and non-migrant families, and a perceived threat to internal harmony (*personal communication*, Municipal President, Comaltepec). Second, while respondents primarily focused on the economic benefits of migration (reflected in the high number of households that answered in the affirmative), when pushed, the vast majority conceded that from a communal perspective, the impacts had been more negative. Taking a different slant to the same line of questioning, and given the significance of international migration to both communities, households were asked '*is it worth migrating to the U.S?*' The results are given in Table 5.11. In Comaltepec, almost two-thirds of households said that it was, and only 7% claimed that it wasn't. In Analco, closer to four-fifths thought it was worth it, with 22% arguing against migration. However, while the majority clearly answered in the affirmative, many added an important qualifier – that it was *only* worth leaving if the migrant went with a clear idea of what they wanted to achieve, and then followed through with that plan.

Table 5.11: Household perception of value of migration
(*Source*: Household-migration survey)

Village / COMMUNITY	YES, worth migrating to Mexico or U.S. (% of households)	NO, not worth migrating to Mexico or U.S. (% of HHs)	Yes and No (% of HHs)
Santiago Comaltepec	71	7	22
La Esperanza	87	13	0
San Martin Soyolapam	33	0	67
COMALTEPEC	64	7	29
ANALCO	78	22	0

In both communities, people were very clear that a 'successful' migrant was somebody who earned, saved, and then returned to the village to invest that money in the family, in a house, in a business venture, in farming or some other productive venture. In contrast, 'unsuccessful' migrants were individuals who frittered away most or all of the money they earned in the U.S, returning with empty pockets and nothing to invest in the home village:

> It depends on each person… if you know how to manage your resources [money] then it is okay. The problem is that many do not know how to … sometimes the younger ones come back with drink and alcohol problems and cannot work like before. For me, the money they earn has no value… those that go can only work and earn while they are young, and then what? They are not in their village, they are not in their country … they do not have stability like we have here.
>
> Natalia López Hernández, 64, citizen of Santiago Comaltepec

> I do not think it is worth it … it is okay for those that know how to save but they only form about fifteen percent of migrants.
>
> Reynaldo López Hernández, 52, *comunero* of San Martin Soyolapam

Many such returnees would stay just a short time, before heading 'North' to repeat the same process all over again – displaying all the characteristics of Reichart's (1981) 'migrant syndrome'. A number of interviewees, including returned migrants, felt that many young migrants were leaving their villages without having the necessary long-term plans in places. It is interesting, therefore, to note that the high percentage of respondents who felt migration to be a worthwhile option, conflicts with a feeling evident among the general populace that there are as many 'non-successful' migrants as 'successful' ones.

Finally, some respondents were swayed by first-hand or second-hand experience of the recent economic downturn experienced by the U.S. As Zeus López, a 31 year-old from San Martin Soyolapam, explains: "Before it was worth it… when there was plenty of work. Now there are fewer opportunities, while here we have enough to get by". This reminds us that most destinations for unskilled and undocumented workers are notoriously fickle, and Los Angeles is no more immune to recession than many other places. When the going is good, and jobs are plentiful, then migrants will stay, new ones will arrive, and the remittances will continue to flow. However, just as Oaxaca City and Mexico City are no longer considered prime destinations because of the relatively low wages, Los Angeles is only a worthwhile destination for an illegal

migrant if there is work available. When that is no longer the case, then other places, including the home village, become more viable alternatives.

5.7 Summary

The first part of Chapter 5 has laid out the historical and contemporary dynamics of out-migration from the two study communities. Out-migration directly affects a majority of households in Analco and Comaltepec, with close to half of all family members living outside their home village. While out-migration is ongoing, migratory dynamics have evolved over time. Although the first migrants headed to Mexican destinations, international migration to the U.S. has since come to the fore. However, while many early migrants to the U.S. were married *comuneros*, who partook in a form of temporary, circular migration, recent years have seen a change in migration patterns that have resulted in longer absences and more intermittent remittance flows. A shift from temporary to permanent migration is highly significant and implies a new set of challenges for sending communities, and is one of the trends that inform analysis and discussion in the following chapters of this thesis.

PART II – The Impact of Demographic Change on Commons Institutions

5.8 Introduction to Chapter 5 / Part II

> One of the things valuable to the community are its customs, and own style of self-governing, which is the foundation for the strength of the village... however, out-migration has been extremely bad in terms of the social or collective aspect of community life.
>
> Rafael José Hernández Castellano, 66, comunero of Santiago Comaltepec

> We are losing our essence as a community.
>
> Santiago Manzano Bautista, 35, *comunero* of Analco

The second part of Chapter 5 begins by setting out the principal demographic changes – population loss and changes in age-sex structures – that ongoing out-migration has led to. The chapter then investigates the impacts that a dwindling and aging resident population has had on the key social institutions that characterise life in the two study communities. As Chapter 4 explained, both study communities are self-governed by long-standing customary practices (*usos y costumbres*), whereby multiple aspects of communal and municipal life are administered through the obligatory and unpaid participation of village rights-holders (*comuneros*) in positions and posts of responsibility (*cargos*) and collective work days (*tequio*). Out-migration has directly impacted this central pillar of community life through a **reduction** in the number of **'active'**[58] *comuneros* - reducing the pool of available labour for meeting traditional *cargo* and *tequio* demands and thereby placing a heavy burden on a dwindling resident population. New attitudes among resident and non-resident *comuneros* have emerged, further influencing migration flows to and from the community.

Analysis of this kind calls into question the continuity (or discontinuity) of traditional forms of governance and social organisation in northern Oaxaca, while giving voice to a principal concern of the local people who participated in this research. The chapter is brought to a close by discussion of the cumulative impact of demographic change on the quality of communal and municipal governance locally. This is a critical, yet under-investigated,

[58] 'Active' refers to those who live in the village and participate regularly in the assemblies, *tequios* and *cargos* of the community.

consequence of out-migration, and highlights how important community responses (analysed in Chapter 7) to out-migration will be.

5.9 Demographic Changes

5.9.1 Population growth and decline (1930-2008)

Graph 5.1 shows the 'active' population of the two study communities between 1930 and 2008. 'Active' population refers to individuals of all ages residing in Analco or one of the three permanent localities of Comaltepec, and thereby participating regularly in community life. Data are taken from INEGI[59] census and population counts (1930-2005) and local community census (December 2007).

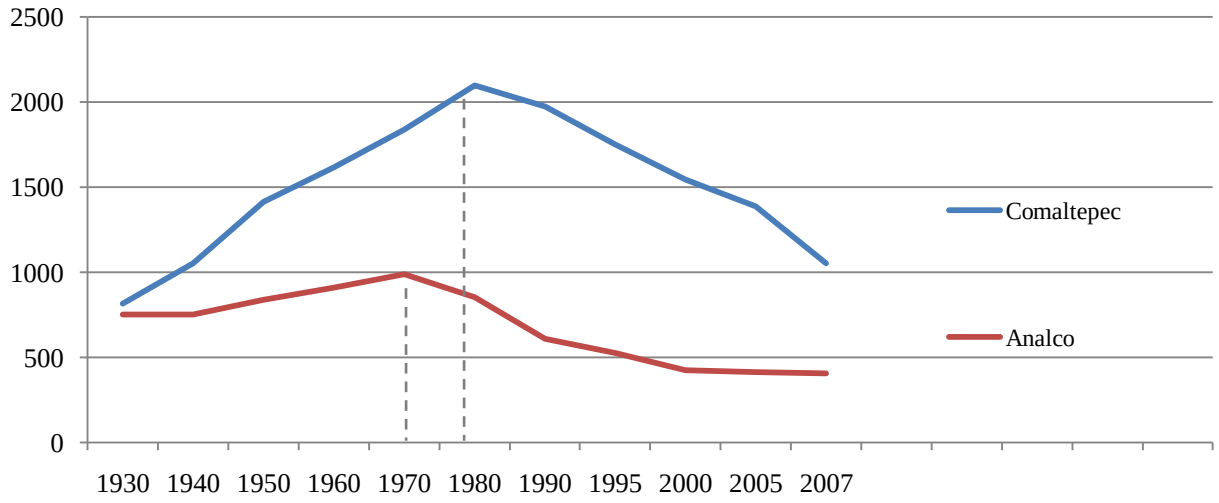


Figure 5.2: Population Change in Comaltepec and Analco (1930-2008)
(*Source*: INEGI census and population counts)

The populations of both communities increased during the period 1930-1970, with the most rapid population growth experienced by Comaltepec; attributable to minimal out-migration at that time and high birth rates. Despite high growth rates, the resident population in Analco grew more modestly, given that the community was losing members to the pull of Mexican urban centres as early as the late 1950s. Analco's population peaked in the 1970s at just over 900 residents, as rising out-migration combined with family planning initiatives to result in a

[59] INEGI (Instituto Nacional de Estadística Geografía e Informática) is the government institution responsible for carrying out a national census (every ten years) and population count (every five years).

negative growth-rate for the first time. During the 1980s and 1990s, the community's resident population fell sharply, levelling out since the turn of the century at around 400, an overall fall of approximately 55%. The peak in Comaltepec's resident population came a decade later, in 1980, but its decline has been even more dramatic; due, primarily, to the numbers leaving for the U.S. over the past thirty years. The community's population fell from 2096 to 1050 during this period (a fall of 50%), with a growth rate of -2.43% for the period 1990-2000. Unlike Analco's resident population, the number living in Comaltepec continues to fall and if current rates were to continue, the community would have a resident population the size of Analco's by 2020.

5.9.2 Changing age-sex structure

Arguably, the most important demographic characteristic of a population is its age-sex structure. This is doubly so for *campesino* communities dependent upon intra-household labour for most productive activities. Migrants to Mexican and U.S. destinations are mostly men and women aged between 17 and 45, and the loss of community members of a productive age has had a profound impact on the age-sex structure of those left behind. Figure 5.1 shows a series of age-sex population pyramids for the community of Analco for the years (clockwise from top left) 1980, 1990, 2000 and 2008. Males are shown on the left and females on the right of each pyramid. The first pyramid represents a time (1980) when the resident population was close to its peak, while the final pyramid represents a moment in time (2008) that followed an extended period of population loss, driven in large part by elevated out-migration rates. Moving from 1980 through to 2008, there is a clear transition from a (broad base) expansive pyramid indicating high birth rate and relatively rapid growth through to a (narrow base) constrictive pyramid showing much lower percentages of children and a greying population. The number of children under the age of 15 has decreased dramatically, which is likely a result of reductions in both the community's adult population (of reproductive age) and family size (from an average of 8-10 children in the 1960s to an average of 3-4 today). The resident population above 65 has increased ten-fold during the period 1980-2008, an indication of falling death rates and the number of migrant retirees returning to the community aged 50 or above. The other very notable aspect is the overall slimming, or population loss, among productive age groups (residents aged between 20 and 45). This seems to have affected the male and female population in equal measure. In particular, there was an important reduction in the number of men aged between 20-29 years of age. A similar pattern was observed for women, although not as obvious.

Figure 5.3: Age-sex pyramids[60] of resident population in Analco 1980/1990/2000/2008 (*Source*: INEGI population counts and local 2008 community census)

[60] Pyramids show increasing age groups (0-4, 5-9, 10-14 and so forth, up to 60-54 and 65+), males on the left-hand side and females on right-hand side, with X-axis showing percent of total resident population.

Figure 5.4: Age-sex pyramids of resident population in Comaltepec 1980/1990/2000/2008 (*Source*: INEGI population counts and local 2008 community census)

In the case of Comaltepec (Figure 5.2), while the move from an expansive to a constrictive (from positive to negative population growth) age-sex pyramid is clearly evident, the transition has been less pronounced than in the case of Analco. For example, while the resident adult population has aged, the community managed to keep a generally broad base (high numbers of children under the age of 15) for an extended period of time. This may be an indication of high levels of international (US) migration from Comaltepec, whereby male migrants would traditionally travel on their own and leave family (wife and children) behind in the home village. This is also why the slimming among productive age groups has likely affected the male population more sharply than the female population. Only in the pyramids for the years 2000 and 2008 do we begin to see the impact of long-term and elevated out-migration. The base of children under the age of ten has contracted significantly, as has the proportion of 25 to 39 year olds, while the resident population aged 65 or older forms a much larger group within the community than was the case in 1980.

5.10 Number (and age) of resident and non-resident *comuneros*

The impact of population loss and a changing age-sex structure (among remaining residents) on communal governance is most clearly illustrated by analysing demographics among the current pool of *comuneros* (commoners, or village rights-holders). For each community, an analysis was made of the numbers of resident *comuneros*, their level of compliance with communal and municipal obligations, and their age structure. A summary analysis then compares the two communities to draw out commonalities and differences. The numbers of non-resident *comuneros* are also provided, thereby showing how many rights-holders are currently migrants and thus unable to participate fully in community and village life.

5.10.1 Community of Santiago Comaltepec

5.10.1.1 Santiago Comaltepec (Head village)

The data presented for the head village of Santiago Comaltepec are based on a revision of the '*control de tequios*' register for the year 2008, analysis of those who attended the December 2007 and March 2008 assemblies, and interviews with both communal and municipal authorities. In the late 1970s, when the community was at its peak in terms of resident population, there were approximately 400 *comuneros* in the village. Table 5.12 shows that the number stood at just 168 in 2008, representing a fall of over 50%.

Table 5.12: Numbers of active and retired resident *comuneros*, Santiago Comaltepec

Resident *comuneros*	Active	%	Retired[61] (over 50 years of age and completed 6 years of *cargos*)	%	Non-resident *comuneros*
168	104	62	64	38	215

A greater number of *comuneros* (215, or 55% of the total) are currently non-resident. Among resident *comuneros*, just over 100 are fully 'active', with the remainder officially 'retired' from active service. This reflects an 'aging' resident population, with 43% of *comuneros* over the age of 50 (Table 5.13).

Table 5.13: Age range of resident *comuneros*, Santiago Comaltepec

Age Range	No. of resident *comuneros*	% of total
20-30	29	17
30-40	29	17
40-50	37	22
50-60	41	24
60+	32	19

5.10.1.2 La Esperanza

Data on the municipal agency of La Esperanza come from analysis of the village authorities' '*control de tequios*' for 2008 and interviews with Jesus Hernandez Hernandez (Municipal Agent) and Juan Hernandez Lopez (Secretary) that were conducted in February and March, 2008.Similar to the head village, there are more non-resident (55%) than resident *comuneros* in La Esperanza (Table 5.14).

Table 5.14: Numbers of active and retired resident *comuneros*, La Esperanza

Resident *comuneros*	Active	%	Retired (over 60 years of age)	%	Non-resident *comuneros*
45	34	76	11	24	55

However, this equates to just 45 active resident *comuneros*, which represents a much smaller pool with which to cover *tequio, cargo,* and other local labour demands. Although a

[61] The rule that applies in Santiago Comaltepec (where those aged 50 yrs or over do not have to take part in *tequios*) does not apply in La Esperanza or San Martin Soyolapam. In these villages, *comuneros* are encouraged to participate in *tequios* if they are physically able to do so (regardless of age). In all three villages, the rule of six years of cargo service and then 'retirement' still officially applies, although is rarely adhered to in either La Esperanza or San Martin Soyolapam.

relatively high proportion of resident *comuneros* (76%) are considered active, Table 5.15 shows an aging population, with 48% of active *comuneros* over the age of forty. With only eleven active resident *comuneros* under the age of 40, the pool of individuals physically able to fulfil *cargos* and carry out demanding *tequios* is severely limited, and suggests that the situation is likely to worsen over the short- and medium-term.

Table 5.15: Age range of 'active' *comuneros* resident in La Esperanza

Age Range	No. of *comuneros*	% of total
20-30	3	6.5
30-40	8	17.5
40-50	8	17.5
50-60	15	33
60+	11	24.5

5.10.1.3 San Martin Soyolapam

The data presented here were accurate as of May 2008. It is based on an analysis of 'active' *comuneros* present at an April 2008 village meeting, as well as a revision of the '*control de tequios*' and a register maintained by local authorities under the moniker "*Comuneros* who reside in others parts of the country or in the North". This information was supplemented by interviews with the municipal agent and secretary.

San Martin Soyolapam is by far the smallest permanent settlement in the community (aside from the roadside hamlet of Metates), and thus the most prone to the loss of resident *comuneros*. Table 5.16 shows that the number of 'active' resident *comuneros* had fallen to 20 by mid-2008; considered far too few by the village authorities to adequately carry out the range of communal and municipal works needed in urban, agricultural and forest zones. Over half (29) of village *comuneros* were non-resident in 2008.

Table 5.16: Number of active and retired resident *comuneros*, San Martin Soyolapam

Resident *comuneros*	Active	%	Retired (over 60 years of age)	%	Non-resident *comuneros*
28	20	71	8	29	29

Table 5.17: Age range of *comuneros* resident in San Martin Soyolapam

Age Range	No. of *comuneros*	% of total
20-30	8	28
30-40	3	11
40-50	4	15
50-60	5	18
60+	8	28

As with the head village and La Esperanza, the age structure of resident *comuneros* clearly reflects the 'aging' population, with close to half (46%) of *comuneros* over 50 years of age and coming to the end of their 'active' service. Indeed, only 11 individuals were under the age of 40 in May 2008.

5.10.1.4 Summary

The findings from the three permanent settlements of Comaltepec are remarkably consistent, given their quite distinct geographical locations and land-based activities (temperate grains and fruits in Santiago Comaltepec; coffee and sugarcane in La Esperanza; ranching in San Martin Soyolapam). Firstly, there are now more non-resident (migrant) than resident *comuneros* in all three places. Secondly, the resident population in all three villages is aging, with over 40% of *comuneros* over the age of 50. Since La Esperanza and San Martin Soyolapam are much smaller populations (150 and 80 inhabitants respectively), a negative growth rate means that the pool of labour has reached critically low levels (34 and 21 active resident *comuneros,* respectively) – the consequences of which will be discussed later in this chapter.

5.10.2 Community of San Juan Evangelista Analco

The data presented for Analco are based on interviews conducted with the communal and municipal authorities, interviews with migrant leaders in Oaxaca City and Los Angeles, and a revision of *comuneros* present at the December 2007 general assembly. Analco has a resident population of just over 400, and according to the communal authorities, a resident *comunero* population of 104[62] (Table 5.18). This compares to well over 300 resident *comuneros* in the late 1970s, when the community's population was peaking at approximately 900 inhabitants. Of these 104 resident *comuneros*, it is estimated that 82 (or 79%) are 'active' and thus expected to

[62] However, at the December 2007 general assembly, which is a time of the year when most resident *comuneros* are present in the village, only 94 were in attendance.

comply with cargo and *tequio* obligations. The right-hand column of Table 5.19 shows that an estimated 240 *comuneros* are currently non-resident or migrant *comuneros*. This represents a 70+% fall in resident *comunero* numbers since the late 1970s.

Table 5.19 shows the age range of resident *comuneros*. More than a third are over sixty years of age, suggesting that a large number of men who would have been retired from 'active' service in the 1970s or 1980s, are still participating in the *cargo* and *tequio* systems. Fewer than half (43%) of Analco's resident *comuneros* are under the age of 50 and only nine individuals are under the age of 30. The small number of active males of a productive age is of great significance since these are the community members who take on the brunt of communal and municipal workloads.

Table 5.18: Number of retired and active resident *comuneros* in Analco

Resident *comuneros*	Active	%	Retired	%	Non-resident *comuneros*
104	82	79	22	21	240

Table 5.19: Age range of *comuneros* resident in Analco

Age Range	No. of *comuneros*	% of total
20-30	9	9
30-40	18	17
40-50	18	17
50-60	23	22
60+	36	35

5.10.3 Commonalties and differences between the two study communities

Overall, out-migration has made serious inroads into the numbers of active, resident *comuneros* in both Comaltepec[63] and Analco (Table 5.20). In Comaltepec, under half of the community's *comuneros* are resident in one of the three home villages, and only two-thirds of these are considered fully active. This equates to less than 30% of the combined total of resident and non-resident *comuneros*. In Analco, less than a third of recognised *comuneros* are resident in the home village, and while four-fifths are still considered fully active, this only equates to less than a quarter of the total overall. As such, while non-resident today outnumber resident *comuneros* in both study communities, the comparative change has been greater in Analco –

[63] Taking into account combined data from the head village of Santiago Comaltepec, La Esperanza and San Martin Soyolapam.

attributable to a longer history of out-migration and greater flows of residents to national urban centres (within Mexico), which have (historically) encouraged a more permanent form of migration.

Table 5.20: Numbers of resident and non-resident *comuneros* in Comaltepec and Analco

Community	Resident *comuneros*	Active	%	Retired	%	Non-resident *comuneros*
Comaltepec	241	158	66	83	34	299
Analco	104	82	79	22	21	240

Consequently, both communities have suffered (and continue to suffer) from significant shortfalls of male labour[64]. In terms of relative numbers, Analco has been the hardest hit, since the community has always been considerably smaller (in terms of population and territory) than Comaltepec. In the mid- to late-1970s, when the populations of both communities were at their peak, Analco was home to around 300 resident *comuneros*, while the figure for Comaltepec was closer to 500. Between that period and 2008, Analco has seen its resident *comuneros* fall in number by approximately two-thirds to just over 100, while the decline in Comaltepec has been almost as severe – by around half to 241.

While resident *comunero* numbers in Analco have fallen so much that the local governance system has been placed under severe strain (much more on this will be discussed in subsequent sections and chapters), the situation in Comaltepec is less problematic (at a community level), given that total *comunero* numbers are considerably more healthy. However, the issue here is less about overall numbers but more about geography and where exactly the shortfall in active *comuneros* is most evident. Community population, identity and territorial presence are spread out among three permanent settlements, with both La Esperanza and San Martin Soyolapam considerably smaller than the head village of Santiago Comaltepec. It is in these two smaller villages that low *comunero* numbers are most apparent.

[64] Interestingly, a higher proportion of resident *comuneros* are considered active in Analco than in Comaltepec. This is likely a result of the differences in the internal regulations of the two communities, whereby in Analco it is stipulated that *comuneros* are expected to comply with *cargo* obligations until the age of 60, with no age limit for *tequios*, while in Santiago Comaltepec, men in the head village at least retire from *tequios* at the age of 50 and from cargos after completing six years of 'service'.

Table 5.21: Age structure of resident *comuneros* in Comaletpec and Analco

Age Range	Comaltepec	%	Analco	%
20-30	35	15	9	9
30-40	40	17	18	17
40-50	47	20	18	17
50-60	63	26	23	22
60+	56	22	36	35

In terms of age structure (Table 5.21), the overall findings were similar for both communities – 'aging' populations characterised by low numbers of men of a productive age (18-45 years). Approximately 48% of resident *comuneros* in Comaltepec and 57% in Analco are over the age of 50. At the same time, only 15% of Comaltepec *comuneros* are under the age of 30, with the figure dropping to a paltry 9% for Analco. These findings suggest that in both communities the numbers of *comuneros* within the most productive age range will continue to be low for the foreseeable future, again affecting participation in key village institutions. This, of course, will depend on the age of return for current and future migrants. The specific impacts that the reduction in resident numbers has had on local institutional arrangements provides the focus for the next section.

5.11 Impact on *Cargos* and *Tequios*

5.11.1 Community cargos

Both Comaltepec and Analco are "sovereign" indigenous villages (after Hunn 2008), self-governed by customary practices, legislated by a general community assembly (*la asamblea general de comuneros*) and enforced through three primary institutions:

1) The **Municipal Executive**, or *Cabildo*, headed by a Municipal President, with certain judicial powers exercised by the *sindico* municipal, which is charged with enforcing municipal decrees. The administration also includes a town mayor (*alcalde constitucional*), a secretary, and up to half a dozen "councilmen" (*regidor de hacienda, regidor de salud, regidor de educacion*). Traditionally, there are *suplentes* (assistants) for each officer, delegated to stand in for their respective officials in their absence. Assisting these officials are the mayors and *topiles* who make themselves available for routine tasks in the service of the *cabildo*, and a *comandante de policia*.

2) The **Commissioner for Communal Property** (*Comisariado de Bienes Comunales*), a three-person committee responsible for assuring the integrity of the community's

property, most notably, the communal forestlands and the resources contained therein. The *Comisariado* is also responsible for authorizing the leasing of land within the municipality, whether from the community to individual citizens or from one citizen to another, and oversee harvests of community natural resources, most notably timber and non-timber forest products.

3) **Surveillance or Oversight Council** (*Consejo de Vigilancia*), another three-person committee charged with surveillance of communal lands and reviewing the activities of the *Comisariado de Bienes Comunales*, as well as maintaining peace, harmony and respect among village inhabitants.

For all three of these local government bodies, postings constitute part of the *cargo* institutional system, and are filled on a rotational basis. In addition to these local government bodies, *comuneros* are also elected to carry out *cargos* to administer other areas of traditional and contemporary community life:

1. **Forest enterprise**, or *unidad de aprovechamiento forestal*. Responsible for administration of commercial forestry activities and adherence to the restrictions established in the community land use plan.
2. **Religious practices** (*Mayordomos, fiscales, Mayor de iglesia, madrinas*)
3. **Local development** (committee serving as liaison to the village health clinics, school committees, community store committee, drinking water committee)
4. **Festivities and customs** (committees responsible for organising the annual village fiesta and other important celebrations)
5. **New initiatives** (for example, community ecotourism)

There are also groups, such as *consejos de ancianos, principales, consultivos* or *caracterizados*, that provide an important consultative service to the community, particularly when resolving conflicts and providing advice on sensitive issues. Although not officially part of the *cargo* system, these still act as additional responsibilities for a small number of resident *comuneros* (specifically, older community members held in good standing by their peers).

5.11.2 Cargos vs comuneros

With the assistance of a number of key informants, including interviews with the current municipal and communal authorities, a systematic approach was employed to identify the *cargos* that characterise the two study communities today. In doing so, it was possible to estimate that among the various village authorities and committees, in 2008 there were an estimated 83 *cargos*

in Comaltepec and 53 *cargos* in Analco (Table 5.22). If we then combine the number of *cargos* in each village and community with the number of active *comuneros*, it is possible to calculate a **comunero: cargo** ratio for each village. The findings, shown in Table 5.23, are striking.

With just over 100 resident *comuneros* living in Analco, and only 82 of these considered fully active, the *cargo* system has become strained and a source of increased burden for those who remain. With the ratio close to one and a half resident active *comuneros* per *cargo*, while there are still enough *comuneros* to cover all of the *cargos* that characterise the civic, religious and communal aspects of village life, by necessity there are now at least a few *comuneros* holding down more than one *cargo* at any one time. In addition, most of those not providing 'service' can only expect to enjoy a maximum of one term's 'rest' (12 to 18 months) before given a new post to perform. As Rosita Pacheco Pérez, a 28 year old from Analco explains: "We suffer from a lack of people … there are no citizens, no people to carry out *cargos* … those that are here are older people, there are few youngsters and it is the same group of citizens that have to do all the work".

In Santiago Comaltepec, the overall ratio for the community is a little more manageable at close to two active resident *comuneros* per *cargo*. This means that when not performing a *cargo*, each *comunero* would expect at least one term's rest. The situation is further improved because of the formal obligations made of the community's non-resident (migrant) *comuneros*, who must contribute to the *cargo* system in order to maintain communal rights[65]. However, restricting analysis to the community-level only, fails to tease out some important differences between Comaltepec's three permanent settlements. While *comuneros* in the villages of Santiago Comaltepec and La Esperanza are the least burdened with two resident *comuneros* per *cargo*, the *comunero:cargo* ratio drops to 1.42 in the tiny village of San Martin Soyolapam; where the resident population is suffering even more from the demands of the local governance system than their counterparts in Analco. In Soyolapam, there are now four municipal *cargos*, in addition to committees for the village school and church. On top of that, *comuneros* from the village can be named to carry out a *cargo* in the CBC or the CV, which implies moving to the municipal centre of Santiago Comaltepec for a year and a half. As the pool of available labour dwindles further, the few remaining *comuneros* have a higher chance of being selected for such a post.

[65] This is a key difference between the two communities and will be discussed in greater detail in Chapter 7.

Table 5.22: Categories and numbers of *cargos* in operation during 2008

Cargo Classification	Santiago Comaltepec	La Esperanza	San Martin Soyolapam	COMALTEPEC	ANALCO
Municipal Executive	9	-	-	9	9[66]
Other municipal cargos	15	-	-	12	9
Municipal[67] Agencies	-	4	4	8	-
Commission for Communal Property	2	0.5	0.5	3	3
Surveillance Council	2	0.5	0.5	3	3
Religious committees	3	3	3	9	3
Local development committees	12	6	3	21	18[68]
Festivities and customs	6	3	3	12	5
Forest Enterprise	3	-	-	3	-
Ecotourism	-	-	-	-	3
Total	52	17	14	83	53

Table 5.23: Estimated *comunero: cargo* ratios for 2008

Village / COMMUNITY	No. of *cargos* (estimated)	Number of active *comuneros*	**Comunero: cargo** ratio
Santiago Comaltepec	52	104	2.00
La Esperanza	17	34	2.00
San Martin Soyolapam	14	20	1.42
COMALTEPEC	83	158	1.90
ANALCO	53	82	1.55

[66] These are *Presidente Municipal, Sindico Municipal, Sindico Judicial, Regidores* (Finance, Health, Education and Infrastructure), and *Alcalde* (first and second)

[67] Four *cargos* are maintained in the agencies: *Agente, Secretario, Comandante* and *Auxiliar*.

[68] Local development *cargos* officially correspond to the *auto-transporte* (2), *tienda comunitaria* (3), and *escuela primaria* (3) committees, in addition to the ecotourism committee, which for the purposes of this study I have placed in its own category. However, there are a number of one-year posts within local development committees (tele-secondary school, kinder garden, and health centre) that are *sociales* rather than strict *cargos*. I have included them here because despite their lower status – which riles the men and women that perform these roles – they are still seen as moral obligations and as time demanding as many official one-year *cargos*.

Table 5.24: Categories and numbers of *cargos* (estimated) in operation (late 1970s)

Cargo Classification	Santiago Comaltepec	La Esperanza	San Martin Soyolapam[69]	COMALTEPEC	ANALCO
Municipal Executive	9	-	-	9	9
Other municipal cargos	27	-	-	27	27[70]
Municipal Agencies	-	3	-	3	-
Commission for Communal Property	3	-	-	3	3
Surveillance Council	3	-	-	3	3
Religious committees	3	3	-	9	3
Local development committees	6	3	-	12	9
Festivities and customs	6	3	-	12	6
Forest Enterprise	-	-	-	-	-
Ecotourism	-	-	-	-	-
Total	57	12	-	69	60

Table 5.25: Estimated *comunero: cargo* ratios for the late 1970s

Village / COMMUNITY	No. of *cargos* (estimated)	Number of active *comuneros*	**Comunero: cargo** ratio
Santiago Comaltepec	57	290	5.08
La Esperanza	12	90	7.50
San Martin[71] Soyolapam	-	-	-
COMALTEPEC	69	380	5.51
ANALCO	60	255	4.25

[69] San Martin Soyolapam was only established as a permanent settlement in the early 1980s, and became a municipal (or police) agency in the early 1990s. As such, local residents had no municipal cargos to perform in the late 1970s.

[70] In the late 1970s, there were many supporting cargos in the municipality that are no longer present in the communities; each member of the Municipal Executive had a *suplente* (helper), while village order was maintained by two *mayores*, each assisted by four *topiles*. There were also between eight and ten community policeman. *Suplentes* in the Executive remained in the post for three years, whilst other *cargos* were one year in duration.

We can see that the governance system in both communities has been badly affected by out-migration. *Comuneros* are straining under the pressures created by increased (obligatory) labour demands that take up considerable amounts of time, taking heads of households away from other productive activities and family. To put these demands into perspective, it is possible to compare the situation today with that of the late 1970s, when the two communities were at their peak in terms of resident population. At that time, there were many more active *comuneros* and not necessarily a great difference in the number of *cargos* that needed to be performed. While there was no forest enterprise in Comaltepec to administer, no ecotourism project in Analco to manage, and no secondary school or college in either community (thus fewer three-person development committees), there were considerably more municipal *cargos* to carry out.

It is important to note that the data presented in Tables 5.24 and 5.25, which refer to *comunero* and *cargo* numbers in the late 1970s, are based on the best estimates of the local village authorities. Although these figures cannot be considered wholly accurate, the data are solid enough to highlight the degree to which today's resident *comuneros* are burdened compared to previous generations (when cross-referenced back to Table 5.23). The findings suggest that in the late 1970s, rights-holders would have enjoyed a *comunero: cargo* ratio of around 5, which means that there was a far more 'rest' between *cargo* obligations, allowing *comuneros* to concentrate on farming and other productive activities. In a contemporary context, while *comunero* numbers have fallen dramatically, *cargo* numbers have decreased only slightly in Analco (from 60 to 53) and actually increased in Comaltepec (from 69 to 83). In both communities, any decline in *cargo* numbers through the disappearance of low- and medium-level municipal postings has been tempered by the emergence of new development committees and community enterprises such as forestry and ecotourism. In the case of Comaltepec, the establishment of La Esperanza and San Martin Soyolapam as municipal (police) agencies (in the 1980s and 1990s, respectively) led to a number of local governance *cargos* that did not exist previously. This has further increased the burden placed on village residents, with active *comuneros* in La Esperanza and San Martin Soyolapam numbering 34 and 21 respectively. In the opinion of the local authorities, this is considered far too few to adequately cover all the work that needs to be done. In San Martin Soyolapam, the municipal agent and secretary told me that the number of active *comuneros* would need to be doubled (to over 40) if pending work was to be completed.

In summary, analysis clearly shows the cumulative impact of three decades of elevated out-migration, which have made the customary governance system more demanding than ever before. Prior to large numbers of people leaving their villages in the 1980s and 1990s, there were enough *comuneros* in both communities to cover all municipal and communal *cargos*, while also providing a number of years 'rest' to rights-holders not selected to carry out a particular service. In recent years, however, a significant reduction in the pool of communal labour has become the number one 'problem' associated with out-migration (according to both the household surveys and the interviews held with village authorities and rights-holders of all ages), as *cargo* demands have become the burden of a dwindling pool of active resident *comuneros*.

5.11.3 'Forced' changes to the cargo system

The multiple stresses generated by out-migration have led to a number of 'forced' changes to the *cargo* system in both communities. Rather than being anticipatory or proactive institutional adaptations to out-migration, these coping mechanisms are a reaction to a reduced pool of communal labour.

5.11.3.1 Disappearance of municipal cargos

> The majority of *comuneros* have migrated and so there are few of us remaining to cover all the *cargos*... one change is that they are reducing the number of *cargos* in some areas. For example, in some of the committees there are just six members (three men and three women) whereas before there would have been twelve (six men and six women).
>
> Artemio Sosa Rodriguez, 51, *comunero* of Analco

With a shortfall of resident *comuneros*, some *cargos* have disappeared. For example, both communities have traditionally elected multiple *mayores* and *topiles* to provide support to the key municipal *cargo*-holders. When Analco was at its peak population, in the late 1970s and early 1980s, there were two *mayores* with four *topiles* for each *mayor*. These have now been largely dispensed with, such that only one *mayor* and one *topil* remain and these have become paid positions; financed by monies sent by migrants living in Las Vegas. In the municipal centre of Santiago Comaltepec, *topiles* have also been reduced in number from twelve to the current four. In both municipalities, each *cargo*-holder of the municipal executive used to have a *suplente* (or assistant) but this is no longer the case. In Analco, *suplentes* were taken away from

the municipal authority structure as long ago as the mid-1980s. To date, it is the 'supporting' *cargos* that have been dispensed with, and particularly within municipal government. What this means, of course, is that communities are left to '*do the same or more with less*'. Although considered lower-level *cargos*, these positions have traditionally provided an important administrative and supportive role, and their removal means that the demands placed upon medium-level and top-level *cargo*-holders are greater than was the case previously.

5.11.3.2 Discontinuation of the 'escalafon'

In Analco, there is no longer a strict adherence to the '*escalafon*' – the local name used to describe the stratified nature of the *cargo* system, where *comuneros* start with a low-level *cargo* before moving up to positions of greater responsibility. In Comaltepec, the *escalafon* system has been discontinued altogether in the two smaller villages of La Esperanza and San Martin Soyolapam. In Soyolapam, for example, the municipal agent and secretary (for the period 2007-2008) were twenty-four and twenty-two years old, respectively, whereas older, more experienced individuals would normally fill these positions. In other communities in the region, such as Capulalpam de Mendez, recent non-adherence to the '*escalafon*' has been a direct response to claims of corruption involving mature incumbents of top-level positions. In contrast, in Analco, La Esperanza and San Martin Soyolapam, the change has been a necessary response to a dwindling pool of 'traditional' candidates.

It is debatable the degree to which this change has handicapped affected communities and villages. The *escalafon* was deemed important because it gave younger *comuneros* time to gain experience and show their worth, before taking on the greater responsibility of 'leadership' roles within the community. This is no longer possible if young residents are elected for high-level posts before their 'time'. The danger with the 'sink or swim' approach is that the quality of local governance can be diminished. On the other hand, the selection of 'immature' *comuneros* to fill important *cargos* can provide the incentives for young people to stay in the village because they feel more involved in local affairs and valued by older residents. In Analco, for example, young *comuneros* in their early twenties commented to me that they sometimes feel alienated from older community members, and believed that their greater involvement in communal decision-making and administration would help remedy this. In addition, electing younger members as

local leaders can help bring in new ideas and perspectives.[72] Many *comuneros* under the age of thirty-five have post-secondary education, and may therefore be in a better position to deal with a range of contemporary issues. Communities, for example, have far more contact today with external agencies and funding sources than would have been the case twenty or twenty-five years ago.

5.11.3.3 Weakening of rule enforcement on age limits and years of 'service'

In Comaltepec, after completing six years of *cargos*, a *comunero* can 'retire' from further commitments, while upon reaching fifty years of age he is no longer obligated to participate in *tequios* (collective work days). While this is still respected in the head village of Santiago Comaltepec, it may not continue if out-migration rates remain high. For many years now, this internal agreement has been rescinded in La Esperanza or San Martin Soyolapam, where there is no longer enforcement of these long-standing rules. In practice, all fit and able *comuneros*, irrespective of their age, can be asked to hold down *cargos* and encouraged to take part in *tequios*. In Analco, while there is no limit on the number of *cargos* (or years of service) that can be performed, there is a retirement age of sixty. Although this ruling is still officially respected, it is not unusual to find 'over-age' men holding down less-demanding *cargos*. This is the reason why the number of active resident *comuneros* in Analco, at eighty-two, is well in excess of the number (sixty-five) under the age of sixty.

5.11.4 Impacts on the tequio system

Out-migration has impacted municipal and communal *tequios* in a variety of ways. In some cases, it has led to fewer days of *tequio* being dedicated to less important or less urgent communal and municipal work, while for indispensable projects the number of days of *tequios* has been increased to make up for a shortfall in available labour resources. In terms of municipal *tequios*, these collective workdays have generally increased in frequency, since an equivalent or greater amount of work is now carried out by a reduced pool of active *comuneros*. A half-day or full-day *tequio* is organised by the municipal authorities most Sundays in Analco, with other

[72] In Soyolapam, the Municipal Agent and Secretary (2007-2008) came across as intelligent, energetic individuals who took their responsibilities seriously and fully committed to community and village service. They also brought with them innovative ideas unlikely to have been as forthcoming from older, more 'entrenched' *comuneros*.

days organised as needed. In the head village of Santiago Comaltepec, meanwhile, municipal *tequios* are now rarely used for maintaining and improving basic urban services, with this work carried out by municipal *cargo*-holders as part of their daily activities, or increasingly contracted out to professional services.

The impact of demographic and cultural change on agricultural or forest-related *tequios* has been particularly dramatic. In the head village of Santiago Comaltepec, a number of interviewees spoke of the discontinuation of multi-day *tequio* camps in the forest, where truckloads of *comuneros* would head into the mountains to work for several days on reforestation projects, the maintenance of forest roads, or the opening up of territorial boundaries (*linderos*)[73]. In the smaller, more isolated settlements of La Esperanza and San Martin Soyolapam, *tequio* still plays an important role in performing both village-based and forest-based work. Consequently, both villages are suffering from serious labour deficits. As Eutemio Allende García, 49, told me: "We are only twenty or so 'active' *comuneros* so there are many more days of *tequio*… up to three or four days a month … it is very hard". To provide some context here, in low out-migration communities in the region (Ixtlan, Capulalpam de Mendez), there are rarely more than twenty days of *tequio* per year, or less than two a month. The shortfall in communal labour in Analco, La Esperanza and San Martin Soyolapam means that a lot of work never gets started, while the projects that do get off the ground often take a long time to reach completion. It is important to stress that the disappearance of *tequios* is not solely a reaction to a decline in the number of resident *comuneros*. The reduction in the number of agricultural *tequios*, for example, is linked to a more general phenomenon of agricultural abandonment in the region, and the weakening of the subsistence farming base. In La Esperanza, *tequios* are no longer practised in farming zones that were set aside to grow a village *milpa* crop, with a similar practice discontinued in Analco, where wheat and barley used to be grown communally.

Finally, as a consequence of a communal labour shortage, the previous enforcement of strict age limits for *tequios* has been relaxed in Analco, La Esperanza and San Martin Soyolapam. In the two agencies of Comaltepec, the age limit of sixty for *tequios* is no longer enforced, with older 'retired' members encouraged to participate if physically able to do so. In Analco, the age limit for municipal *tequios* is sixty, while for communal *tequios* it is seventy. In

[73] The establishment of a forest enterprise and the technical support provided by UZACHI has helped to take over some of this forest-based work.

practice, however, since the early 1990s, all able bodied *comuneros* have been encouraged to take part in *tequios* irrespective of age.

5.12 Quality of municipal and communal *cargo*-holders

While the top *cargos* (municipal president, mayor, and president of the *Comisariado de Bienes Comunales*) require a certain level of education and leadership quality, the pool of appropriately qualified *comuneros* has shrunk over time. It is increasingly difficult for the 'right' person to be found for the most important positions within the community. Indeed, interviewees from both communities noted how difficult it can be to name the three candidates required by the local electoral procedure. Again, because there are so few resident *comuneros*, this problem is more acute in Analco than it is in Comaltepec.

An ability (or inability) to fill *cargos* with qualified people, and ensure that local communal and municipal governance adheres to customary standards has become a major concern. Not least because both Comaltepec and Analco are municipalities as well as agrarian communities, and so enjoy an important degree of autonomy in terms of both civic and communal governance. Among the criteria used by state and federal government to evaluate whether a community is equipped to govern a municipality is to look at the number of *cargos* being performed, and whether the resident population is large enough to maintain a sufficient number of local government positions. In Analco, in particular, the number of resident citizens qualified to fulfill local government positions is reaching a critically low number. Although they have yet to be approached by state government officials, there is a feeling among residents that the community could lose its status as a municipality if currents trends continue. This was evident in discussions I had with local people throughout 2008 and 2009. While some *cargos* can be (and have been) dispensed with, others are key for communal and municipal governance and cannot be lost without undermining the system. If the community is stripped of its municipal status then it would have to become an agency and civic governance transferred to the jurisdiction of a neighbouring community. Although the community would maintain control over the governance of its territorial (communal) resources, decision-making on civic matters would be shared with a neighbouring community. In Comaltepec, the situation is less serious from the perspective of municipal governance, given that there are enough *comuneros* and citizens in the head village for the community's municipal status to be assured for the immediate future.

However, the administration of communal resources is being weakened as the presence of community members across such a large, diverse territory recedes, and the smaller localities struggle to fill local government positions with skilled personnel.

5.13 Impact of demographic change on other areas of village life

There are a whole host of other areas of village life that have been impacted by the demographic changes brought on by out-migration. It is worth looking at some of these because, cumulatively, they can make life more difficult for remaining residents and younger families in particular. When you combine this with a demanding local governance system and limited economic opportunities, these additional pressures can become determining factors in swaying people to decide that their futures lie outside the village.

Beyond new housing, modern appliances, better clothing and a changing diet, perhaps the most telling change can be seen in the local school system. In Analco, in 2008, there were approximately 50 children in the village primary school with five teachers. In the secondary school, however, the situation is far more serious, with just 27 students enrolled for the 2007-2008 school year. With so few students, the school is only just viable as a running concern. For a number of years now, the municipal authorities have been offering *becas* (scholarships) to attract children from other villages to increase enrolment. If numbers continue to drop, or if not enough *becas* are made available, then it is quite possible that the school will close. This would mean that *Analqueño* youngsters would have to travel to another village (probably Ixtlan) for their secondary-level schooling; implying (often considerable) additional costs for the family, such as travel and lodging, which would have to be raised through off-farm wage labour.

In Santiago Comaltepec, the situation in the head village is much healthier, where many more resident families mean that primary, secondary, and preparatory schools are all well attended. The secondary school and preparatory school (CECYTE[74]) both supplement the number of local students with children from surrounding villages (principally from the Upper Chinantla region) that do not have similar schools of their own. However, in the villages of La Esperanza and San Martin Soyolapam, student numbers are falling and, because of the limited population base, they are now reaching critically low levels whereby their viability over the

[74] *Colegio de Estudios Científicos y Tecnológicos del Estado de Oaxaca*.

medium-term is in doubt. The secondary school in La Esperanza now depends on students from neighbouring villages to keep numbers above an accepted minimum level.

In addition to schooling, other 'essential' services in these villages, such as health clinics and public transport, are also being affected and downgraded in response to a falling population. The health clinics in San Martin Soyolapam and La Esperanza, for example, are now only staffed between two and four days a month. At other times, residents have to travel to Valle Nacional for medical attention, up to an hour's drive away (and with only irregular public transportation). In Analco, the community places great value on a permanently manned health centre (with both doctor and nurse on call) and an ambulance for taking patients to the regional hospital in Ixtlan. However, as the village population continues to fall, there is a risk that this will be downgraded to a health clinic (with one resident nurse). In Analco, there is no longer a public bus service from the village to nearby Ixtlan de Juarez – an important administrative and commercial centre – where a number of residents run stalls at the Monday market in Ixtlan, selling fruit, vegetables and tacos. Likewise, in Comaltepec, the once daily service to Oaxaca City has been downgraded to a twice weekly trip (Tuesdays and Fridays).

5.14 Summary

This chapter has shown that demographic change driven by (ongoing) out-migration has led to a major reduction in the number of active, resident *comuneros* (rights-holders) in both study communities. This has placed multiple pressures on the *cargo* and *tequio* institutional systems that act as a central pillar of community life, identity and participation, and these pressures have resulted in a number of 'forced' or reactionary changes to the local governance system. As will be discussed later, increased *cargo* and *tequio* demands are beginning to influence migration flows to and from the community. As out-migration begins to affect other areas of village life (schools, health services), yet more people are encouraged to leave and a vicious cycle or spiral emerges.

CHAPTER 6 – IMPACT OF MIGRATION ON TERRITORIAL LAND USE AND BIODIVERSITY

Plate 6.1: Heading back with the corn harvest from *tierra caliente*, Analco
Photo: Jim Robson

6.1 Introduction

> This ancient subsistence way of life is hard and may not satisfy young people's ambitions: to dress in style, to earn enough money to buy a car or truck, to go to university, or to become a teacher, businessman, lawyer, doctor, or famous musician. Some have been very successful, and their examples are both an inspiration and a temptation to escape the limits of traditional peasant life.
>
> Eugene Hunn (2008:24)

Traditionally, people across northern Oaxaca have depended for most of their food on subsistence agriculture supplemented in some areas by animal husbandry. Hunting and gathering are of lesser importance, though the gathering of medicinal and edible forest plants and the collection of firewood remain regular activities for many resident families. Indeed, one could consider the *campesinos* of highland Oaxaca to be "rich" rather than "poor", in the sense that the basic physical requirements of food, clothing, and shelter for themselves and their families are by

and large assured by two things: their collective control of adequate land and their knowledge of how to make a living from their communal resources. It is a view held by residents in both study communities. When interviewed, many (particularly older) *campesinos* in Analco and Comaltepec rejected the notion of being impoverished, feeling blessed to have access to sufficient land to cover most of their domestic needs. While most families receive a limited economic income, they do have an asset (land) not shared by those who have left for the cities.[75] In this way, the term 'subsistence', as applied to the two study communities, does not fit particularly well with the usual portrayals of poverty and extreme hardship.[76]

At the same time, the premise of 'rich' rather than 'poor' subsistence farmers[77] will only remain the case if the past, present and future balance between the local population and its land base remains within certain limits. As this chapter shows, maintaining an age-old balance in a contemporary setting is proving a very real challenge to villages in the northern Sierra. As individuals, families and communities become increasingly engaged with national and international markets for wage labour, the relationship between local people and their farming and forest-based practices has changed and continues to change. Making use of data from household surveys, interviews with farmers, and territorial mapping exercises, this chapter identifies and discusses the impacts that out-migration has had on farming, forest use, and on resource and environmental practices more generally. With extensive land-use change driving changes to the agricultural-forest mosaic, a mix of anecdotal and empirical evidence is then used to speculate on the consequences for biodiversity found on both sides of the Sierra Madre mountain range – a region, remember, where it is the diversity of small-scale productive land uses, together with a combination of long-standing and novel conservation measures, that have led to high environmental variability along steep altitudinal gradients.

[75] Very few of those leaving their communities are doing so because of a shortage of agricultural land; a driver commonly associated with out-migration from other parts of rural Mexico and Latin America.
[76] Hunn (2008:19) believes the term 'subsistence' has become a "*curse in the mouths of modern experts in rural development*", because its common usage implies that meeting basic dietary requirements is a trivial matter.
[77] The term "farmers" used throughout this Chapter follows the definition of the IIED to include people who grow crops and harvest tree products as well as those who work with livestock.

6.2 Impact on Farming Practices

> Migration has had a huge impact on agriculture. People no longer work in the countryside and buy what they need with remittances... year on year they grow less.
>
> Germán Rosendo Kraulitz, 47, *comunero* of La Esperanza

> Migration has been very negative… everyone has completely forgotten about the countryside. We are abandoning our fields and there is no knowledge.
>
> Clemente a la vez Bautista, 57, *comunero* of Analco

6.2.1 Number of families farming and area under cultivation

Table 6.1 shows the percentage of households surveyed in each community that continues to farm. In La Esperanza and Soyolapam, the vast majority of households surveyed (89% and 90% respectively) still work land, with a smaller percentage (75%) doing so in the head village of Santiago Comaltepec. In Analco, 85% of households are still involved in farming. While such findings suggest that agriculture remains a major productive activity, it was not so long ago that practically all households would farm. Over the past 30 years, more and more households have turned their back on agriculture, choosing to depend on off-farm activities to cover their basic food and material needs. In the head village of Comaltepec, approximately a quarter of households have stopped farming altogether. The data that best illustrate the drop-off in farming is the decrease in average area under cultivation per farming household (Table 6.1, columns 3 and 4).

Table 6.1: Percentage of farming households and area under cultivation (permanent settlements of Analco and Comaltepec) (*Source*: Household-migration survey)

Village / COMMUNITY	% of households that farm	% of households that do not farm	Area under cultivation in 2008 (ha per household)	Area under cultivation previously[78] (ha per household)
Santiago Comaltepec	76	24	1.04	2.1
La Esperanza	89	11	2.33	2.72
San Martin Soyolapam	90	10	1.7	1.9
COMALTEPEC	85	15	1.69	2.24
ANALCO	85	15	0.89	2.2

[78] 'Previously' does not refer to any specific year. Rather, it is household-specific and refers to the last time that most members of the family were resident in the village and contributing labour to land-based activities.

While the decrease is less noticeable in the two smaller villages of Comaltepec, those still farming in the head village of Santiago Comaltepec and in Analco are now working less than half the area of land they were just five to fifteen years ago. In some cases, farming has become almost a hobby, and a way for elderly residents (whose children have left the village) to maintain customs out of habit.

6.2.2 Subsistence versus commercial production

The reduction in area under cultivation is reflected in the number of households who grow crops for domestic consumption only (Table 6.2). In Analco, approximately two-thirds of farming households fall into this same category. With the average area under cultivation below a single hectare, few farmers produce a surplus. In Comaltepec, there is some considerable variation in the findings across the three permanent settlements. Among the households surveyed in the head village of Comaltepec, only 14% produce for both domestic consumption and for sale in local or regional markets. For staple crops like corn and beans, insufficient land is under cultivation (on a per household basis) to produce for sale in local markets. At the same time, only a handful of families from the head village continue to spend time in the community's humid lands growing cash crops such as sugarcane, banana or coffee.

Table 6.2: Percentage of households producing for domestic consumption only or for sale in local / regional markets (*Source*: Household-migration survey)

Village / COMMUNITY	% of farming households that produce only for domestic consumption (DC)	% of farming households that produce for DC and sale in local or regional markets
Santiago Comaltepec	86	14
La Esperanza	62	38
San Martin Soyolapam	40	60
COMALTEPEC	63	37
ANALCO	70	30

In La Esperanza and San Martin Soyoalpam, however, a larger average area under cultivation means that a higher proportion of households are still able to produce for the home and for local or regional markets. Several factors are at play here. First, local conditions allow for up to two corn harvests a year. The wetter, more humid conditions are also favourable to a range of cash crops. In La Esperanza, *panela* (unrefined block of sucrose and fructose) from sugarcane is sold locally, while different licors (*tepache* and *agua ardiente*) distilled from

sugarcane juice are sold for consumption at village fiestas across the region. In Soyolapam, the flatter topography makes cultivation a lot easier, and is the only zone where mechanised farming is possible. The use of *mano de vuelta*[79] has also helped increase productivity, such that a surplus of corn is sold most years to non-farming families in the municipal centre.

6.2.3 Deficits in farm labour

> It is difficult to find a *mozo* [local wage labourer] and it is with *mozos* that we are able to harvest.
>
> Natalia López Hernández, 64, citizen of Santiago Comaltepec

> I do everything... sometimes my sons help me during their vacations… but I do not hire *mozos* because there are not any.
>
> Eusebio Ramón López Hernández, 59, *comunero* of La Esperanza

> They have all left, so now we cannot advance much for the lack of labour… no-one grows coffee anymore in Metates because there is no money in it and no *mozos*, which is a major limiting factor.
>
> Camilo José López Hernández, 67, *comunero* La Esperanza

The trend of producing for domestic consumption only is set to continue as family members move away from the village and the pool of available labour continues to dwindle. In both communities, the labour required to work a hectare or less of land has traditionally been provided from within the family. Working more land than that normally requires surplus cash to hire local workers (*mozos*) during key moments in the agricultural calendar (specifically tilling and planting in April/May and harvesting in October/November). The funds for this would have to come from the profits of the previous year's harvest or from remittances sent home by migrant family members. Table 6.3 shows that the majority of households in both communities currently depend wholly on intra-family labour. However, a significantly higher percentage of households in Analco find themselves in this position, likely a result of Comaltepec having far more US-based migrants and thus a higher cash income from migrant remittances.

[79] *Mano de vuelta* is the name given to the form of unpaid cooperation between small groups of farmers, who help each other during major events in the agricultural calendar (ploughing, weeding and harvesting). Once widespread, this custom is now only practised with any frequency in San Martin Soyolapam – helping increase productivity as well as mitigate the deficits in farm labour that have resulted from high rates of out-migration locally.

Table 6.3: Use of intra-family labour resources vs hired help
(*Source*: Household-migration survey)

Village / COMMUNITY	% of farming households that depend totally on intra-family labour resources	% of farming households that use combination of family labour and hired help (*mozos*)
Santiago Comaltepec	69	31
La Esperanza	56	44
San Martin Soyolapam	62	38
COMALTEPEC	62	38
ANALCO	82	18

There is an additional problem. Even if households have the money to contract workers, it is getting more and more difficult to find this kind of help, simply because there are so few wage labourers remaining in the village. In addition, those that do remain can often earn more working in an off-farm activity (construction, for example). As a consequence, households are becoming increasingly dependent upon intra-familiar labour resources to get their fields ploughed, sown and harvested, independent of whether they have the money to hire outside help or not. In this way, it is the number and quality of able-bodied workers within the extended family that now determines the amount of land that can be worked by each household. As communities are left with an aging, increasingly frail group of resident farmers, families are restricted in what they can achieve. The American anthropologist, Dan Bauer, commenting[80] on his experiences in the Chinantec community of San Pedro Yolox (which borders Comaltepec to the north), stated that in the late 1970s "about ninety percent of the village households farmed land and a third of those raised coffee". In contrast, by 2001 only "two or three families [were] still growing coffee and many families have migrated… since most of those leaving are men between the ages of 20 and 40, a large number of households find themselves without the labour needed to farm". This picture resonates strongly with the situation in both Comaltepec and Analco, suggesting that labour shortages form part of a region-wide phenomenon.

6.2.4 Source of food staples

The reduction in the relative importance of subsistence farming is perhaps best illustrated by looking at how families cover their basic food needs, which thirty years ago were heavily dependent upon family grown crops, with some basic items like sugar and milk bought at the

[80] Extract available online at http://www.lafayette.edu/news.php/view/22

local community food store. Respondents to the household surveys were asked: *"Over the past twelve months, where has the family's food come from?"* The findings are shown in Table 6.4.

Table 6.4: Principal source of food for households in Comaltepec and Analco (*Source*: General household survey)

Source	Proportion (%) of total (per household) COMALTEPEC	Proportion (%) of total (per household) ANALCO
Food grown locally by the family	32	43
Food grown locally but not by the family	2	9
Food bought from a local market (not grown in the community)	65	38
Food acquired through trade	0	6
Food acquired as a gift or form of support	0	3
Other (specify): Government support programs	1	1

In Santiago Comaltepec, almost two thirds of food consumed in the village is now sourced from CONASUPO and other local markets, rather than through family farming. Approximately a fifth of households meet half of their food needs from farming, with the other half purchased from local markets. Only a fifth (20%) of households meets the majority of their domestic food requirements through cultivating local fields. In Analco, the figures are similar, although compared to Comaltepec there is a greater relative dependence on farming for meeting local needs; more than a quarter of households still source the majority of their staple foods through sustainable means. However, a sizeable proportion of households surveyed (30%) buy a proportion of their food from neighbours, while the vast majority (92%) purchase at least some of their food from the local market or community store. Close to a third (30%) of households source the majority of their food in this way. A small number of households also get food through trade with neighbours for other products, as a gift from resident and non-resident family members, while many households with infant or elderly members get some basics such as sugar, soya and milk powder through government welfare support programs such as *Oportunidades* and *70 y más.*

These findings point to an increased dependency on the market rather than subsistence agriculture, and thus a greater need among households to generate a cash income. Perhaps the best indicator of this shift has been the demise of the home-grown tortilla, as explained in Text Box 6.1 on page 180. Some families are able to contribute to the coffers through selling farm

produce, but these are now in the minority, with most dependent on a combination of off-farm employment and migrant remittances. However, given that migrant remittances have fallen in recent years (Chapter 5), it is possible that resident families will have to increase their reliance on subsistence farming practices in the near future.

6.2.5 Reduced territorial mobility

In addition to fewer families farming, most of whom now work a smaller acreage, the other major change to farming practice concerns the reduced territorial mobility of community members and a shift towards a more sedentary lifestyle. As illustrated by the varied quotes below, this change is most apparent in Comaltepec, a community blessed with extensive and diverse communal lands. Here, farming families have customarily undertaken a form of agricultural transhumance that sees the seasonal movement of people from their residential base in the head village of Santiago Comaltepec to *rancherías* (ranches) located in *tierra caliente* (in and around the *ejido* of Rancho Chuparosa) or more commonly in humid zones on the windward side of the Sierra Madre range[81]. In addition to working plots close to their homes, many families have also maintained small coffee, banana or sugarcane plantations at one of the many ranches located between La Esperanza and Metates. Some of these families ended up settling permanently at Rancho Trucha, Rancho San Bernardo, Rancho San Pedro, and the like. Indeed, it was thanks to the existence of these small settlements and ranches that the community was later able to establish and populate the villages of La Esperanza (in 1962) and, to a lesser degree, San Martin Soyolapam (in 1984)[82].

For the past thirty to forty years there has been a steady reduction in the numbers working *en el campo* (in the countryside), and far fewer families dividing their time between dry and humid territorial zones. As prices for cash crops, such as coffee, crashed or remained depressed, and population loss allowed remaining farmers to have 'their pick' of the best land (both in terms of soil quality and proximity to the home village), ranches on both sides of the range have

[81] An ancient trade route (*camino antiguo*) connected the tropical lowland zone that surrounds San Martin Soyolapam with the head village of Santiago Comaltepec. This was a three to four-day trek that took local traders up and over the community's highest peaks, and along which a number of fixed camps were established. This route is now overgrown and broken in many parts, having not been used since the 1950s, when the first unpaved road was built connecting the region to Oaxaca City (to the south) and Tuxtepec (to the north).

[82] While farming families based at Rancho San Bernardo were happy to establish the village of La Esperanza (taking advantage of a far less isolated location to facilitate the sale and transportation of produce), San Martin Soyolapam was less easily settled. Although some families who went there had farming ties with the lowland tropical zone, others left the head village only because they was no land available at that time to farm or build a house.

emptied. The following quotes ascribe to how farming families were previously far more mobile in terms of where they cultivated and grazed their animals:

> I had more animals before … in the 1970s I had maybe seventy head of cattle by El Mamayel. I sold them in 1978 because I needed the money (to buy a pick-up) and because too many had been eaten by jaguars.
>
> Rafael Hernández Castellano, 66, *comunero* of Santiago Comaltepec

> When my husband was around, we worked at Rancho Puerto Antonio… we had *cafetales*, *milpa* and banana … two or three hectares… but we are now sad here [because] so few are working [in the countryside].
>
> Dolores López López, 71, citizen of Santiago Comaltepec

> We had half a hectare of *maíz blanco* close to the village and around four hectares at Rancho Chuparrosa. My husband told me that there were some eighty hectares under cultivation at Chuparrosa but now there is no more than twenty-five hectares planted. When the children were at secondary school in Ixtlan, my husband went to work at Soyolapam to grow enough corn to sell and get enough money to cover those school expenses.
>
> Natalia López Hernández, 64, citizen of Santiago Comaltepec

Community residents are now restricted to Santiago Comaltepec, La Esperanza, San Martin Soyolapam and the tiny roadside hamlet of Metates. Many of the farmers I interviewed who live in Santiago Comaltepec said that they were not keen on farming the windward side of the range because of the oppressive conditions (heat and humidity) and perceived dangers (including snake bites from the notorious *víbora sorda*[83]).

[83] Possibly a palm viper (*Bothriechis* sp*)*, which is known to inhabit lowland and montane tropical forests in this part of southern Mexico. Bites cause a great deal of pain, tissue destruction, and internal bleeding. If untreated, they can lead to loss of limb or death in some cases. Farmers in the La Esperanza area, providing they can arrange transport, are at least an hour's drive from the nearest clinic with anti-venom.

Text Box 6.1: A Tale of Two Tortillas

On a cold winter morning, as Doña Eva heated the *comal* and prepared breakfast for her husband and four children, we talked at length about the 'dying' tradition of making tortillas by hand from family-grown corn. Eva typically spends the early morning at the *molino* (community mill), grinding kernels into enough cornmeal dough to make the day's tortillas. She nearly always makes her tortillas at home, and it is rare for her to buy ready-made ones from a village *tortilleria*.

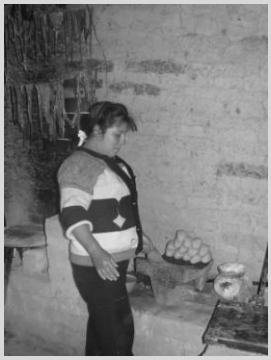


Photo: Jim Robson

For her family, being able to grow their own corn is very important, with a daily supply of homemade tortillas considered an indicator of both a productive household and relative food self-sufficiency. Tortilla is normally eaten with every meal and, together with beans, continues to form the basis of local people's dietary and nutritional intake. A family the size of Eva's would consume a kilo of tortillas a day, which means that close to a hectare would need to be under cultivation to produce enough corn to last them the year. Families like Eva's, however, are now in the minority, with only a fifth of households in Analco planting enough corn to provide for their domestic needs – a direct consequence of the intra-household labour deficits driven by out-migration. Indeed, most farming families do not harvest enough corn to last them more than six months. A similar number of households have given up farming altogether and now buy their tortillas or corn from local vendors.

There are multiple drawbacks associated with these changes. First, with more families buying the cheaper, imported corn from the local community store, there are concerns over the quality and nutritional value of 'non-local' tortillas. Second, there is an increasing financial burden, with non-farming families under pressure to bring in enough cash to buy from elsewhere. In Analco or Comaltepec, the average family would need to spend around US$2 a day on tortillas to meet daily consumption needs, which adds up to US$700 or more over a 12-month period. Third, if they are not farming, then they are less likely to be collecting firewood and thus more dependent on gas for cooking – yet another expense.

Today, a lot can be learnt about an Oaxacan village just by asking how commonplace it is for people to make their tortillas by hand, using locally grown corn. As territorial ties and farming continue to decline, the home-grown tortilla is losing its status as a central feature of traditional village life and identity. It is a demise that mirrors many of the wider changes being felt as people migrate to the cities, or those who choose to stay, leave behind the life of a *campesino*.

In fact, only a handful of ranches continue to attract seasonal farmers (Rancho Chuparosa, Puerto Eligio, Puerto Antonio), while not one is home to any kind of permanent population. Rancho Trucha, for example, was home to fifteen families as recently as the early 1980s, but is now completely deserted. Life was often very different in these small, isolated ranches. Plate 6.2 shows a deserted homestead at Rancho San Pedro – the *ranchería* closest to the head village (a forty-five minute walk to the west). Tomas Hernández Hernández (2007-2008 President of the *Comisariado de Bienes Comunales*) told me that living there felt a world away from Santiago Comaltepec: "Life in San Pedro was good and I was sad to leave [his family moved to the head village when he was 14]… I still miss it, although growing up there made it difficult for me to relate to people in Comal[tepec], which to me was like a city… it was a different world. It was how the *paisanos* must feel now when they first arrive in Los Angeles!" I heard similar stories from others who had grown up at Rancho Trucha, San Bernardo and other *rancherías* in the 1960s, 1970s and as recently as the 1980s. For better or for worse, it is an upbringing and way of life that young *Comaltepecanos* are simply no longer exposed to.

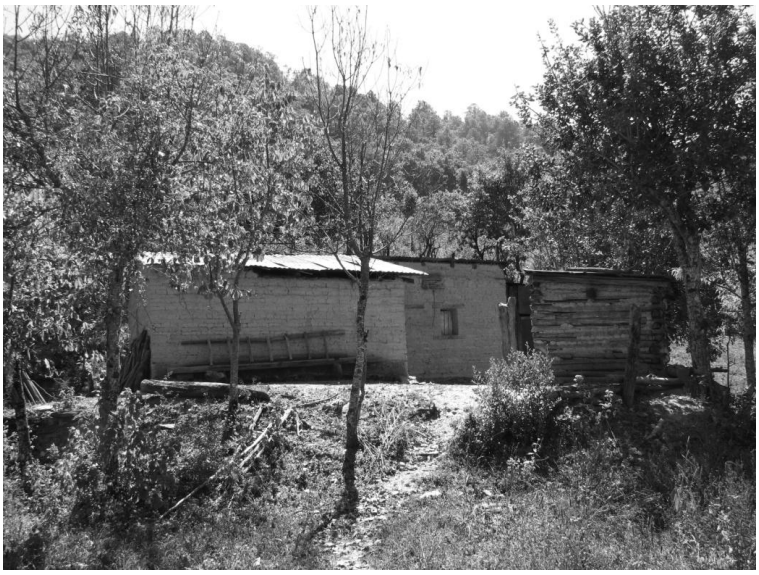


Plate 6.2: Deserted homestead, Rancho San Pedro, west of Santiago Comaltepec
Photo: Jim Robson

In Analco, the community's territory is much smaller and so any change in members' territorial mobility is less obvious compared to Santiago Comaltepec. Nevertheless, here too we can see a trend towards less mobile resource users, with the vast majority of *campesinos* now

carrying out their land-based activities within a 30-50 minute walk of the village. The main area of permanent rain-fed agriculture is shrinking in size year on year. Specifically, farmers are no longer working lands on the community's higher slopes (*tierra fria*) (above 2,300 masl) or in the drier zone (*tierra caliente*) to the west of the village (1,700 – 1,900 masl). Considered a transition zone where dry pine-oak forest begins to give way to tropical dry forest mixed with cactus shrub (*matorral*), this area provides excellent climatic and soil conditions for certain varieties of bean, as well as the ubiquitous *milpa*. Forty years ago, large swaths of hillsides were under heavy cultivation. Today just one family has a ranch in the area. Neighbouring plots were abandoned in the 1970s and 1980s, as farmers and their families migrated to the cities, or because farmers began to take advantage of a reduced overall demand for land to cultivate plots closer to the village.

6.2.6 Change in crop diversity

Fewer and less territorially extensive agricultural zones have had an impact on the type and diversity of crops being grown in Comaltepec and Analco. The right-hand column in Table 6.5 lists the crops that have either disappeared or have become significantly scarcer from local fields.

Table 6.5: Principal crops grown in each village (during the 2008 agricultural year)

Community / Village	**Principal crops grown locally (during 2008 agricultural year)**	**Crops no longer widely grown**
Santiago Comaltepec	Maize (yellow, white), beans, squash, miltomate, pea	Wheat, barley, potato, apple, pear, black corn, mottled corn
La Esperanza	Maize (white, pinto, black), beans, sugarcane, coffee, banana	Black corn, coffee
San Martin Soyolapam	Maize (white, yellow, pinto), beans, coffee, banana	Coffee
Analco	Maize (yellow, white, pinto), beans, squash, mustard, cilantro, pea	Wheat, potato, mottled and black corn

Such findings support what is known as the 'displacement hypothesis', whereby monocrops displace the use of multiple native varieties and reduce diversity (Shiva 1993). On the higher slopes above the head village of Santiago Comaltepec and the community of Analco, crops such as potato, and black and mottled corn varieties, are conspicuous by their absence from local dinner tables. They are rarely grown today because so few farmers are maintaining plots at

elevations (> 2300 m.a.s.l.) that provide the cooler conditions these crops require. Similarly, wheat, barley and some older bean varieties that favour the drier, warmer lands (< 1800 m.a.s.l.) to the west of the head villages are no longer grown. Most such fields were abandoned between 20 and 35 years ago, and throughout the research period, I came across just one family (in Analco) that was planting wheat (in 2009).

On the humid side of Comaltepec's territory, the most obvious crop to have lost favour is shade-coffee, which was grown extensively in the 1970s and 1980s. Humid montane forest, found at an altitude of between 800 and 1500 m.a.s.l, provides the ideal climatic and soil conditions for growing high quality Arabica coffee. Unfortunately, the family-based coffee producers of Comaltepec have found it increasingly difficult to sustain this way of life, with falling (and unstable) coffee prices and labour shortages forcing many to abandon their *cafetales* (coffee groves). As the influx of U.S. dollars inflated local wages, it has become even more difficult to turn a profit from coffee, with most groves abandoned during the 1990s.[84] The fall in coffee prices and high out-migration rates are clearly connected, with the low profitability of the region's most visible cash crop becoming one more reason why people packed their bags and headed to the cities. Although the last few years (2006-present) have seen an improvement in market prices, they are still not enough to offset the labour costs when migration is present. Presently, only a handful of families in La Esperanza grow coffee and produce for domestic consumption or to sell within the village. Nearly all of the growers from Santiago Comaltepec have since returned to farming on the dry side of the mountains or left the community to seek off-farm labour in the North.

In remaining agricultural zones, the classic Mesoamerican triumvirate of maize, bean, and squash continues to form the main subsistence crops, and the mainstay of many families' daily food intake. However, *milpa* agriculture has experienced a steady decline in recent years (particularly on the leeward side of the range). Most abandoned *milpa* fields have been turned over to pasture or, more commonly, undergone a process of ecological succession and the

[84] In the study region, it takes up to five years for a coffee plant to mature and produce berries. It is only at this point that the beans can be harvested, so coffee is not something that farmers can switch into quickly. The market that *Comaltepecanos* are able to access means that even if farmers could swap into coffee in an instant, by the time they have harvested, dried and processed the crop ready for auction, the price of coffee may have fallen dramatically. Farmers would then be forced to sell their crop for the market price which is frequently lower than the cost of producing it. This is precisely what happened to the region's coffee farmers in the 1990s and is the reason why so many decided to stop producing and look for alternative sources of income.

development of secondary forest. In other cases, and in response to a need to increase family income, farmers have turned to mono-crops for sale within the community or at local markets. These 'cash crops' vary from year to year in response to fluctuating market demand. This is particularly the case in Analco, where close proximity to Ixtlan has encouraged a number of farmers to grow pea, mustard, cilantro (or other 'green' crops) to sell at the weekly Monday market.

6.2.7 Changing weather patterns

Although clearly not an impact of out-migration, increasingly unpredictable weather is also leading farmers to question the worth of investing their time, money and effort into subsistence activities. In a world obsessed by all things 'climate change', the main debates usually concern what is happening to coastal areas and small islands, with discussion dominated by talk of cyclones and ice sheets. However, an often over-looked fact is that a disproportionate number of the most at-risk people live in inland areas dependent upon rain-fed agriculture. In Oaxaca, unpredictable or extreme climatic events have the potential to seriously affect agriculture, given that well over half of the state's harvests are dependent on seasonal rainfall. In an economically deprived and mountainous region like the Sierra Norte, rain-fed maize production is the most important agricultural activity for the majority of subsistence farmers. Table 6.6 shows that in the two study communities, irrigated fields are virtually non-existent and restricted to limited streamside plots and orchards, or home gardens.

Table 6.6: Agricultural land use categories, Santiago Comaltepec and Analco
(Source: General household survey)

Agricultural land use category	Average area per household in Comaltepec (ha)	Average area per household in Analco (ha)
Cultivated land (irrigated)	0.01	0.01
Cultivated land (rain-fed)	1.27	1.01
Pasture	0.3	0.35
Fallow	0.56	0.27
Rented from others in village	0.3	0.43
Fruit orchards (% of households)	15%	9%

Through interviews with farmers, together with field visits to witness the effect of bad weather on harvests, the evidence points to an increased level of unpredictability now associated with local weather patterns. The *milpa* system, for example, is based around a fairly rigid

agricultural calendar. The primary ploughing and planting is timed for the first solid spate of rain, which marks the onset of the summer wet season. If the rains do not begin in earnest until mid-June or later, agricultural outcomes for the year can be seriously affected. Equally, periods of intense rain and high winds can damage the crop, bending over the stalk or 'burning' the *mazorca* (Plate 6.3). Table 6.7 provides a summary of perceived climatic changes and, where relevant, their impact on farming outcomes.

Table 6.7: Summary of farmer perceptions about changing weather patterns

Community / village	**Summary of perceived changes**
Santiago Comaltepec	Late and more intense rains. Extreme weather events in winter in recent years (snowfall, high winds).
La Esperanza	Increasingly common periods of heavy rainfall, which at the wrong time can 'burn' the corn ears
San Martin Soyolapam	Hotter 'dry' season (March/April/May), with cooler rains coming later each year. Oppressive conditions for working.
Analco	Difficult to predict onset of rainy season[85]. Fewer but more intense rain events – can damage crops (heavy rain and wind can bend over corn stalks)[86]. In *tierra templada*, less rain overall has dried out open areas to such a degree that levels of surface run-off has increased considerably.

Strategies to cope with changing climatic events vary, and include bringing forward or postponing the planting date, switching to more resistant varieties of maize, applying agrochemicals, and changing cultivars. For example, one response to late and unpredictable rains is to plant at higher altitudes and select fast-maturing varieties. Another is to favour the more robust white and yellow corn varieties. Equally, those farmers with the necessary resources may cultivate in two or three fields at different elevations and of varying soil types to compensate in advance for the uncertainties of local rainfall. All such measures are farming-based strategies. The prevailing socioeconomic conditions (an aging population, labour deficits, poor market access, limited government support), however, have decreased local farmers' capacity to cope with such adverse and unpredictable weather events. Mexico, for example, is a country with an increasing dependency on food imports – with more than US$90 million invested during the 1990s for this purpose (Perez 2005). Maize prices have subsequently dropped dramatically. With

[85] The 2009 maize and *milpa* crop was due to be harvested in January 2010 because of late rains, and the harvest is not expected to be a good one.

[86] September 2010 saw a period of intense rains hit large areas of southern Mexico. On a return visit to Oaxaca in October 2010, farmers in Analco commented that significant proportion of the year's corn harvest (over half) was expected to be lost.

such socioeconomic stressors working in tandem, unpredictable and adverse climatic events have become a more acute source of vulnerability than previously. As late and/or intense rains continue to affect crop outcomes, farmers have developed coping strategies that lie outside the agricultural sector, such as seeking temporary work locally or in nearby centres, renting out their fields, or (most commonly) migrating to Mexican or U.S. cities in search of alternative livelihood options.

Plate 6.3: Corn cobs (*mazorka*) 'burnt' by heavy rains
Photo: Jim Robson

6.2.8 Changing attitudes to farming

> There are lands to work but man has become very lazy… previously, everybody was a *campesino* and nobody left the village, but now many youngsters leave as soon as they are grown up, and few enjoy '*la pica del palo*' [hard manual work in the fields].
>
> Anonymous Analco resident

Many older *comuneros* are saddened that young people are no longer content working in the countryside and providing for their families by means of a subsistence-based livelihood. As many admit, younger community members '*ya quieren otras cosas'* (now want other things) and an increasing number of families (especially in the main village of Comaltepec) are no longer growing corn or other staples but, rather, living off migrant remittances and buying subsidised corn from local stores. This change has not just come about through out-migration, but is recognised by many as forming part of a larger process, where television, radio, Internet, roads

and other aspects of 'development' have served to connect the village with the outside world, and further integration with mainstream Mexican and North American society.

Since mechanised farming is impractical because of the difficult topography (in addition to the cost), most land-based activities are carried out by hand. The tilling and ploughing of fields is aided by teams of oxen (known as a *yunta*), but these animals are expensive to purchase (up to US$1,500 for a pair), and beyond the reach of many families[87]. Most young people see farming as difficult, back-breaking work, and through informal chats and interviews with school children (8 to 17 years of age) in both communities, it is clear that the majority are more attracted to off-farm occupations. Given that so few show an inclination to continue with customary farming practices, it appears that the trends reported in section 6.2 are set to continue as the importance of agriculture to the local economy declines across the region.

6.3 Impact on Forest Use

Table 6.8 provides a summary of official views as to the impact of out-migration on aspects of forest use and forest management. In villages, the authorities were clear in stating that the pressure on local forests from farming, livestock and domestic use has been greatly reduced, and that forest cover had increased due to a community-wide phenomenon of agricultural abandonment. In Santiago Comaltepec and Analco, most of the areas that surround the head village have been affected in this way. In San Martin Soyolapam and La Esperanza, while zones set aside for the cultivation of staples such as maize and beans have reduced in area, the greatest impact has been felt in areas of montane tropical forest, where small-scale coffee plantations had been widely established in the late 1970s.

In terms of forest-based activities, all three villages in Comaltepec noted that there were fewer people today involved in forest management and protection, an indication of a reduced pool of adequately trained *comuneros*. In terms of commercial forestry, Comaltepec has found it increasingly difficult to find local people skilled and/or willing to work in the community's sawmill and logging operations. In 2008, only 15 local men were employed in these two activities. There were just two teams involved in felling trees, whereas in the 1980s and 1990s there used to be four teams working simultaneously. This is due to a lack of skilled chainsaw operators, which contrasts markedly with earlier years when the community had a large group of

[87] In Analco, for example, only six or seven households possess a *yunta*, renting them out to other families for approximately US$20 a day – an important source of income for the owners.

workers to choose from, the majority of whom had received their training during the FAPATUX forest concession period.

Table 6.8: The impact of out-migration on forest practices

IMPACT	**Santiago Comaltepec**	**La Esperanza**	**San Martin Soyolapam**	**Analco**
There is less pressure on the forest from agriculture and livestock	YES	YES	YES	YES
Forest cover has increased due to agricultural abandonment	YES	YES (in coffee areas in particular)	YES (in coffee areas in particular)	YES
There are fewer people involved in forest management and protection	YES	YES	YES	NO
There has been a loss of trained forest workers	YES	NO	YES	n/a
There is less interest in forest use	NO	SAME	SAME	NO
Migrants oppose forest extractions	NO	NO	NO	NO

The lack of available workers is also tied to local wage inflation being driven by migrant remittances. Men can earn more from working in and around the village (building new houses or looking after migrants' agricultural plots) than they can from working in the forest for the community forest enterprise (CFE) (*Unidad forestal*). Migrants earning dollars in the U.S. are willing to pay local workers $10 or $20 pesos more per day than the daily wage ($130 pesos) offered by the communal authorities. Analco has not been affected in this way, largely because the community has yet to develop any kind of commercial forestry operation. The limited nature of forestry operations is seen in the number of surveyed households that depend upon the forest for a significant share of their monthly income (Table 6.9).

Table 6.9: Household dependence on forest resources
(*Source*: General household survey)

Community	Number of households dependent on forest resources for significant part of their monthly income	% of total households
Analco	1	0.76
Comaltepec	15	5.66

While only 5% of households in Comaltepec are financially dependent upon the forest, the figure drops to below 1% of households in the case of Analco; where a single *comunero* (employed by the CBC) earns his income from logging for community and individual member needs. Domestic forest use is another area that has been clearly impacted through demographic change and the shifting practices of both migrant and non-migrant households. Respondents to the general household survey were asked if "*the time dedicated to collecting forage, firewood, timber and other forest products had increased or decreased over the past ten years*". The results are shown below.

Table 6.10: Time spent collecting forage, firewood, timber and other forest products (*Source*: General household survey)

Community	% of households spending *more* time	% of households spending *less* time	% of households spending *same* amount of time
Analco	27	46	27
Comaltepec	23	54	23

In Analco, while 27% of households spent more time in harvesting activities than they did ten years ago, 46% of households spent less time in the forest collecting timber and non-timber forest products (NTFPs). The remaining 27% stated that they spent the same amount of time compared to ten years ago. In Comaltepec, 54% of households surveyed said that they had reduced the amount of time they spent harvesting forest products. In 23% of households, the same amount of time was spent as ten years ago, while for a similar number of households, harvesting activities now took up more of their time.

The reasons for spending less time harvesting forest products are multiple, and include: (i) a smaller household size that reduces the demand for firewood and other NTFPs; (ii) the advanced age of many heads of household, with many less able and willing to carry out non-essential chores; (iii) a preference for modern materials in new house builds; and (iv) the increased use of gas as a substitute for firewood. In both communities, well over half of all households now use gas for heating water and cooking. While many households switch between a firewood stove (for making tortillas, for example) and a gas stove for more convenient forms of cooking, an increasing number of households now use gas for all of their domestic cooking and heating needs. Perhaps unsurprisingly, these tend to be households that no longer farm, and depend entirely on an off-farm income – with migrant remittances a major contributor.

The other significant factor contributing to a reduction in consumption levels of firewood and other NTFPs, concerns the fact that fewer people are farming and those who are, now tend to work plots closer to their homes. The collection of firewood is a major chore, made far easier for those families who still farm and with ready (daily) access to the stands of oak, *madrono* or *limoncillo* found close to the fields where they work. Similarly, the harvesting of NTFPs such as mushrooms, medicinal herbs and wild fruits, is normally undertaken opportunistically as farmers and their family members use the network of forest trails that take them to and from their *parcelas* (agricultural plots). As fewer people collect edible and medicinal plants and fungi, they form a less important component in the diet of many households.

6.4 Declining Resource Use amid Shifting Communities of Practice

> Tell me and I'll forget; show me and I may remember; involve me and I'll understand.
> - Chinese Proverb

In the two study communities, resource use and associated knowledge can be classified according to the following activities:

1. *milpa* agriculture
2. mono-crop cultivation
3. home gardens and orchards
4. animal husbandry
5. gathering of wild plants and fungi
6. hunting
7. harvest of medicinal plants
8. harvest of ornamental plants
9. domestic forestry and firewood collection
10. commercial forestry
11. ecotourism
12. biodiversity conservation and watershed protection (for PES[88])

Eight of the first nine are long-standing 'customary' practices, while mono-cropping, commercial forestry, ecotourism, and biodiversity conservation are among resource activities that have developed in the region over the past thirty years or so. Based upon household surveys,

[88] PES is short for 'Payment for Environmental Services'.

interviews with land users and general field observations, Table 6.11 shows how levels of participation in these activities have changed since out-migration took hold in the 1980s and 1990s. Given the changes already described in this chapter, the findings laid out in Table 6.11 are hardly surprising. However, they do serve to reinforce the belief that customary land-based practices are on the wane. As the collective pool of land-based skills and knowledge shrinks, this makes it harder for resident youngsters, or those returning to a *campesino* way of life, to access the advice and support they may need during their apprenticeship or 'relearning' period.

Table 6.11: Increase or decline in natural resource practices across the study communities

Resource Practice	Status - Analco	Status – Santiago Comaltepec	Status - La Esperanza	Status - Soyolapam
Milpa agriculture	Decline	Decline	Decline	Decline
Monocrop cultivation	Increase	Increase	No discernable change	No discernable change
Home gardens and orchards	Decline	Decline	Decline	No discernable change
Animal husbandry	Decline	Decline	Decline	Increase (moderate)
Gathering of wild plants and fungi	Decline	Decline	Decline	Decline
Hunting	No change	Decline	No change	No change
Harvest of medicinal plants	Decline	Decline	Decline	Decline
Harvest of ornamental plants	Decline	Decline	Decline	Decline
Domestic forestry and firewood collection	Decline	Decline	Decline	Decline
Commercial forestry	New practice	Relative decline	n/a	n/a
Ecotourism	New practice	Relative decline	Increase	No change
Forest conservation (PES)	Increase	Increase	Increase	Increase

In Analco and Comaltepec, the subsistence economy depends upon a widely shared body of traditional environmental knowledge (TEK) (after Heckler 2009), which is focused on the communal territory and its plant and animal resources. In this way, TEK is a 'place-based' complex that integrates knowledge of species, resource practices and spiritual/ cultural beliefs and norms (Robson et al. 2009), which are also interrelated to perceptions of landforms, soils, climates, vegetation types, stages of ecological succession, and many other aspects of the natural environment (Martin 1993; Chapela 2005; Robson 2007, 2009).

If we apply understandings of TEK to the broader field of learning theories, one model in particular – *situational learning* – resonates strongly. Posited by Lave and Wenger (1991), it focuses on the interactions and observations among and between people in social contexts, and the establishment of a 'community of practice' in which conversation and participation can occur. In the introduction to their book, William F. Hanks explains: "Rather than asking what kind of cognitive processes and conceptual structures are involved, they ask what kinds of social engagements provide the proper context for learning to take place" (1991:14). Based upon observations of different trades and apprenticeships, Lave and Wenger (1991) argue that people begin by learning at the periphery of a 'community of practice', with mastery of knowledge and skill requiring newcomers to move toward full participation in the socio-cultural practices of the community. Learning is seen not as the acquisition of knowledge by individuals but rather a process of *social* participation, with the nature of the *situation* most significant. The focus is on the ways in which learning is "an evolving continuously renewed set of relations" (Lave and Wenger 1991:50).

As applied to TEK, the idea of *situated learning* fits in well with resource knowledge production in the fields and forests of northern Oaxaca. Of most significance is the understanding that learning is in the *relationships* between people. In this way, learning is in the conditions that bring people together and organise a point of contact that allows for particular pieces of information to take on relevance; such that without the points of contact, without the system of relevancies, there is no learning, and there is little memory. Rather than belong to individual persons, learning involves the various conversations or interactions of which they are a part. The major lesson here is that there is an intimate connection between knowledge and activity or practice:

> TEK will only live on if it is a meaningful part of the daily life of the people who own it. Use it or lose it. The people [of Analco and Santiago Comaltepec] will decide whether they wish to guard their sovereignty over the land that has sustained them for the past millennium, and if they so choose, their deep knowledge and appreciation of the living world around them will sustain them.
>
> Eugene Hunn (2008:238)

With far fewer people participating in land-based practices, especially those considered customary activities, the venues for existing TEK to be tested and for new TEK to be produced become less and less visited. This problem is further exacerbated by the dwindling pool of knowledge-holders. This fact became most clear to me when the communal authorities in Santiago Comaltepec struggled to come up with the names of residents who could act as guides for the forest transect and territorial mapping work that I needed to carry out. Likewise, in La Esperanza, Don German and Don Felipe were the only able-bodied men in the village with sufficient knowledge and experience to guide us during our sampling work in the cloud forest. While there are still innovative farmers in Comaltepec and Analco – who continue to produce TEK through the application of long-standing practices, as well as experimenting with new resource activities (cloud forest honey, ixtle palm) – most of these individuals are now over 50 years of age. Their sons and daughters are invariably in the U.S. or studying in a Mexican city, with few expected to return. As one such farmer, Don Eusebio from La Esperanza, told me, "My sons do not go in the countryside or up into the mountains . . . they don't know them".

This pattern, replicated across the Sierra, is a real problem since it is today's children that form the communities' medium- and long-term futures. Hunn (2008:224) talks about "precocious acquisition" with regards to human cognitive development and children's relationship with their biotic environment. In terms of the production and reproduction of TEK, Hunn found that children master the process of naming plants in their first few years of life. In his ethno-botanical study of San Juan, a Zapotec community located in the southern highlands of Oaxaca, he showed that village children achieve near-adult mastery of local botanical knowledge between seven and twelve years of age. While these children begin as learners (apprentices) in communities of practice (after Lave and Wenger 1991), they can move remarkably quickly towards full participation:

> They acquire this knowledge without systematic instruction, while helping older relatives weed and harvest subsistence crops, tending household gardens, and gathering wild plants. By the age of 12, this knowledge includes several hundred plant names, the ability to apply those names with a high degree of accuracy, and the ability to extend nomenclatural patterns productively, plus knowledge of the characteristic features of each plant named and of the seasonal development, local habitat and community associations, and uses of a large majority of named plants.
>
> Eugene Hunn (2008:226-227)

The findings from this study clearly show that the community of practice in Analco and Comaltepec has begun to shift from one based on farming and forestry to one based around a cash economy, and from a predominantly rural to an increasingly urban environment. Under such a shift, the knowledge that the community produces has changed considerably. TEK remains, yet is produced, held and shared by an ever-decreasing number of people. As men and women see their futures elsewhere, and not 'on-farm', they seek the knowledge and skills most relevant to their current and future lifestyle choices (Bebbington et al 2007). As practices change, so does the associated knowledge. The production of knowledge for an increasing number of people is now tied to the practices of 'shopping for food' or 'crossing the border', rather than the names, characteristics and ecologies of local medicinal plants. TEK has not been 'lost' or 'eroded', since it is bound up in practice and *in-situ* teaching; thus as long as somebody continues to work the land, such ways of knowing will persist and new TEK will be produced. However, as fewer people farm and fewer people work in the forest, the knowledge tied to soils, climate and species is less relevant to the community as a whole. In addition, a question mark remains as to whether the innate circuitry associated with children's precocious acquisition of TEK will be confounded in new settings.

While many long-standing practices enjoy a reduced status and sense of place, emerging land-based activities such as ecotourism, commercial forestry and conservation require new sets of knowledge and skills. These may build upon existing knowledge systems, but as novel practices they will also generate knowledge and skills quite different from those of customary farm or forest-based occupations. While some people will decide to stay in their villages because of the opportunities offered by these new activities, their reliance on customary systems may still

be limited. The local eco-tourism guide may know as little about farming as their cousin who left for Los Angeles fifteen or twenty years ago.

6.5 Implications for Biological Diversity

6.5.1 Mapping and photographing land use change and forest encroachment

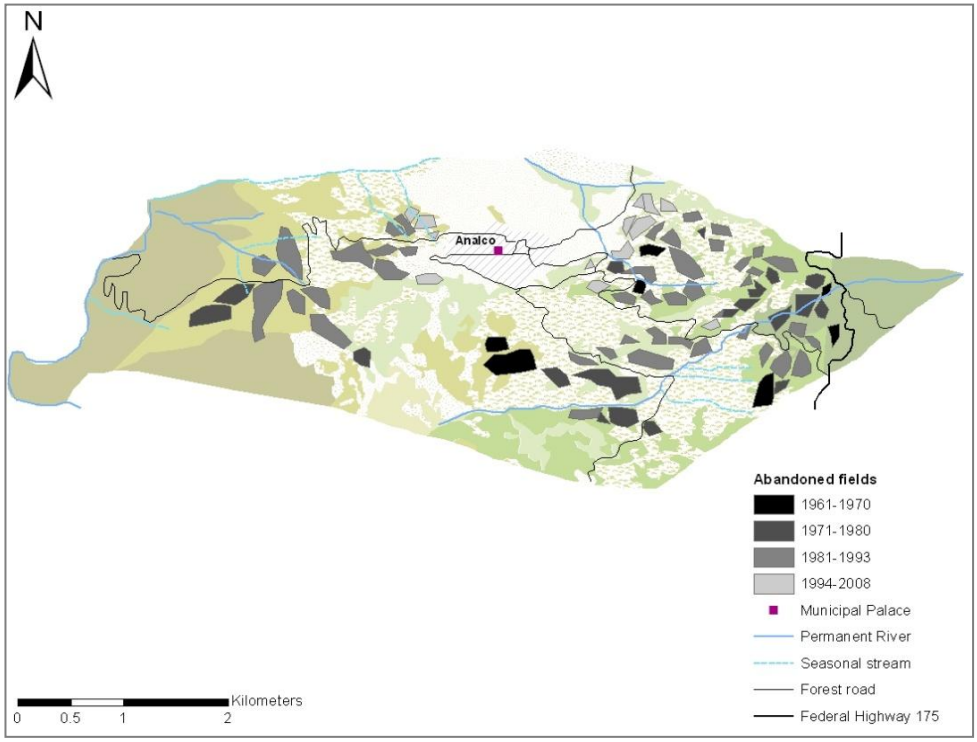
In both study communities, shifting communities of practice are driving environmental change through a general abandonment of agricultural areas, reduced pressure on the resource base, and a subsequent process of natural forest regeneration in old corn and bean fields. Since the onset of out-migration in the 1960s and 1970s, resident farmers have, in an almost systematic fashion, abandoned those plots furthest from their homes in favour of more accessible farmland less than an hour's walk from the village centre and closest to roads with vehicle access. Maps 6.1 and 6.2 clearly show the general distribution of agricultural zones that were abandoned during the periods 1960-1970, 1971-1980, 1981-1993, and those that have been reclaimed by new vegetative growth, or left for pasture, over the past fifteen years (1994-2008).[89]

Taking a closer look at these zones, one is able to see the effect of agricultural abandonment on the ratio of forested to non-forested areas, with photographic evidence bearing witness to processes of ecological succession from grassland communities to secondary forests of varying maturity in old fields and terraces (Plates 6.4, 6.5, 6.6, 6.7, 6.8 and 6.9). In temperate-cold and temperate-dry zones, new stands of pine (as a pioneer species) have colonised old corn and bean fields[90]. On the windward side of the range, far fewer areas of cloud forest are being opened up for long-fallow agriculture, or thinned out for the establishment of small-scale shade coffee and banana plantations.

[89] It is important to note that while the location and date of abandonment of fields are wholly accurate, the size and shape of the polygons are not since the perimeters were not plotted using GPS. Rather, they are based upon field observations and, in some cases, have been enlarged because of restrictions of the GIS software (ArcMap version 9.3) employed.

[90] In the higher, temperate lands, agricultural plots have long been abandoned, leading to the development of pine-dominated forest across large areas, with oak-dominated forest (as a shade-tolerant species) in some of the oldest abandoned areas. In drier lands further west, former *milpa*, bean and wheat fields have been replaced by early successional forests, dominated by *Pinus oaxacana* and *P. michoacana*.

Map 6.1: Extensiveness and pattern of agricultural abandonment around head village of Santiago Comaltepec (1961-2008)



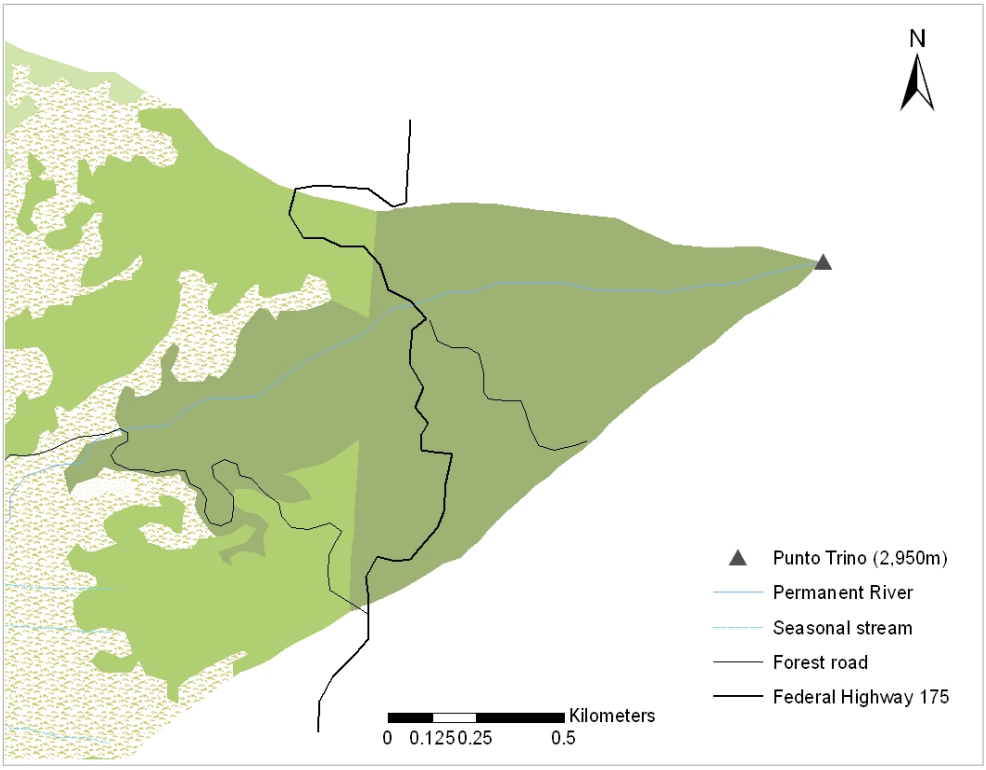
Map 6.2: Extensiveness and pattern of agricultural abandonment across the communal territory of Analco (1961-2008)

Plate 6.4: Pine as pioneer species in areas of dry oak-pine forest
Plate 6.5: New pine growth in plot abandoned in 2003, Santiago Comaltepec

Clockwise from top left: Plate 6.6: New growth on corn field abandoned 5 years previously.
Plate 6.7: Forest growth on plot abandoned 12 years previously.
Plate 6.8: Maturing secondary forest, 18 years after abandonment.
Plate 6.9: Secondary forest (pine) on corn terraces abandoned in the early 1980s

All photos: Jim Robson

In Analco, the community's pine-oak forest covers approximately 350 hectares. Half of this lies to the east of the federal highway and it is this area that most local people consider to be the community's principal forest area (or '*puro monte*'). This is for two main reasons. Firstly, it is designated a conservation forest, such that no commercial forestry or agricultural activities are permitted to take place here, although local people are still allowed to extract NTFPs and timber for domestic purposes. Secondly, the area that lies to the west of the highway has always been considered a production (agriculture and pasture) rather than a conservation zone. However, thanks to widespread and ongoing agricultural abandonment, the higher reaches of this production zone are now heavily forested (Map 6.3).



Map 6.3: Forest resurgence west of Federal Highway 175, Analco

Indeed, there is now so much forest that when I first interviewed local people, I was confused as to why they only considered the area east of the highway to be '*puro monte*'. Such local perception will likely change as forest cover continues to increase and stands of secondary forest mature. In a similar fashion, a large area to the west of the village, once heavily cultivated, is now completely abandoned, and home to stands of immature pine forest (Plate 6.10).

Plate 6.10: Hillsides west of village of Analco (formerly under cultivation), now covered in young pine forest (*P. oaxacana* and *P. michoacana*).
Photo: Jim Robson

In Comaltepec, interviews with farmers and other community members suggest that approximately 60% of the community's agricultural lands have been abandoned over the past thirty to forty years. Around the main village of Santiago Comaltepec, the consensus among interviewees was that only 20–30% of original agricultural zones are currently in use. Generally, forest encroachment is most evident in agricultural zones located furthest away from permanent settlements and/or access roads. However, the process of abandonment is now affecting areas that lie closer to village centres, such that forest growth is now apparent in some areas for the first time in living memory. In La Esperanza, fewer areas are being opened up for long-fallow agriculture, while large areas of *cafetales* have been left to the whims of new forest growth. Only in San Martin Soyolapam is forest resurgence in some zones tempered by ongoing clearance in others. In some instances, the collapse in coffee prices and population loss through out-migration has saved some forest from being cleared or disturbed. For example, local residents noted that the forested hillside behind the village would have been cleared for pastureland if most of the population had not already left for the US. At the same time, improved market access for beef and the introduction of a more productive grass for pasture has encouraged local ranchers to increase their herd size and (pending approval from the communal authorities) clear further tracts

of primary forest to open up more and larger *potreros* (grazing pens) (Plate 6.11).

Plate 6.11: Clearance of tropical evergreen forest to open up larger *potreros*, San Martin Soyolapam.
Photo: Jim Robson

6.5.2 Effect on ecological processes and habitat characteristics

While a trend of agricultural abandonment and forest resurgence fits the general theory of 'forest transition'[91] previously reported within the context of Latin America and Mexico (Klooster 2003; Rudel et al. 2005), there is still uncertainty about the type and particular characteristics of forest transitions that will occur under differing socio-economic and environmental conditions. For example, it is unclear what impact these changes have for forest biodiversity beyond an obvious increase in forest cover. Although a substantial research literature exists relating to deforestation processes (Fahrig 2003), edge effects (Ries et al. 2004), forest dynamics and succession (Shugart 1998), among other principles and processes of landscape ecology (Turner 2001), the impacts of human activity on forest biodiversity remain poorly defined. In addition, research attention has generally focused on lowland tropical forests, and while this is understandable given their importance to global biodiversity, it is unclear whether findings are applicable to other forest types (Newton 2007). In Mexico, for example, tropical and temperate montane forests are widely recognised as centres of high diversity and

[91] Forest transition theory suggests that economic development eventually leads to forest recovery, such that out-migration in the context of Mexico is seen as playing a positive role in forest encroachment (Velazquez et al. 2003).

endemicity for many different groups of organisms (Rzedowski 1993; Challenger 1998), yet little is known about how flora and fauna respond to human disturbance at different intensities. In the Sierra Norte, traditional land use has always driven secondary succession with impacts on forest composition, structure and regeneration through practices such as long fallow rotational agriculture, ground fires, lopping of hardwoods for fuel wood, pine for timber, and sporadic cattle grazing. Recent progress in landscape ecology and its application to conservation management has highlighted the importance of assessing threats to these processes at both a forest patch and forest landscape scale (Figure 6.1).

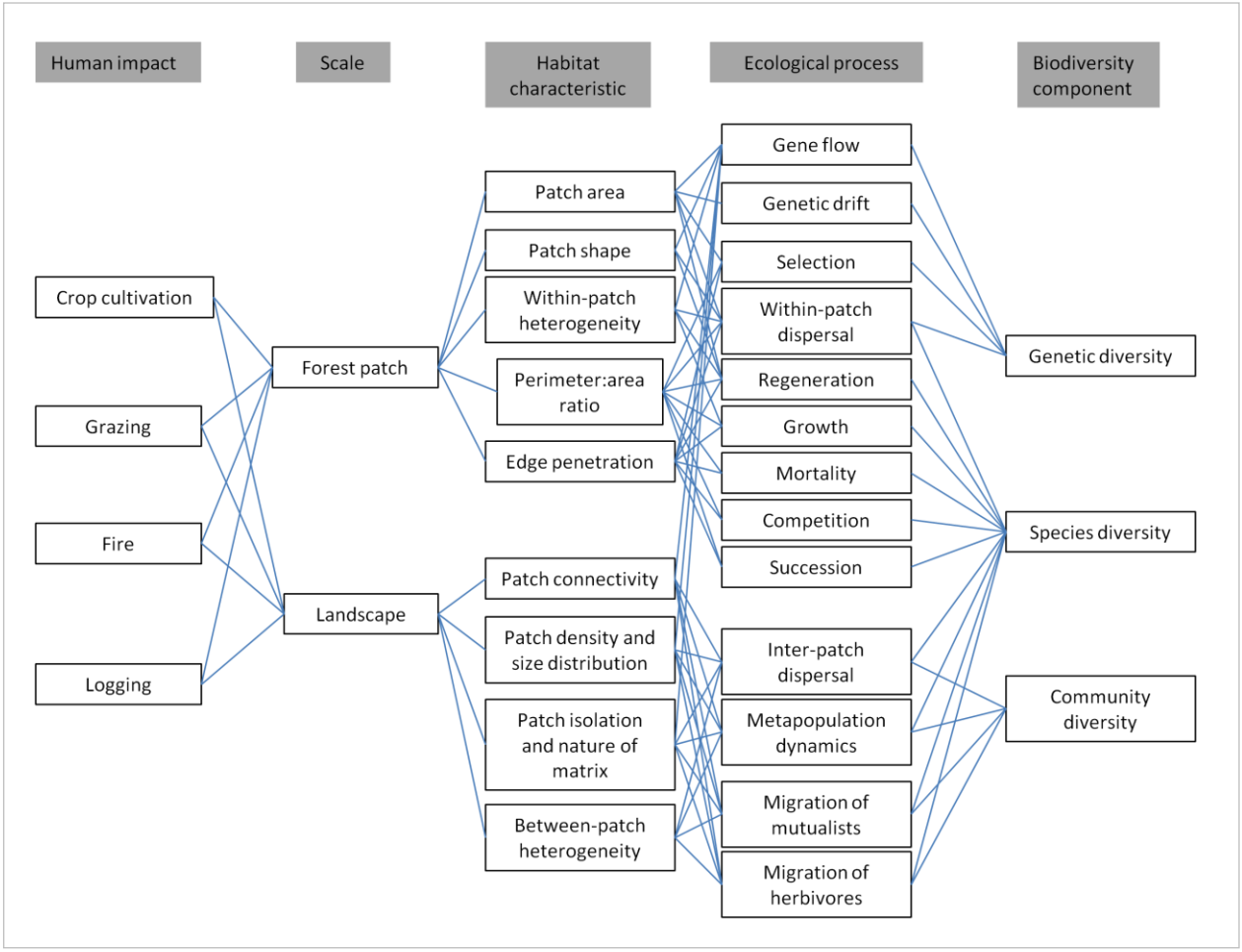


Figure 6.1: The potential impacts of human activities on biodiversity in forest landscapes (Newton 2007:8)

Despite an obvious lack of empirical field data, it is still possible to use a mix of anecdotal evidence, general field observations, and findings from studies carried out in other

parts of Oaxaca and southern Mexico, to speculate on how reduced edge effects, changes to patch number and size, and interruptions to processes of ecological succession in the agricultural-forest mosaic may impact (negatively as well as positively) different elements of biodiversity, and the processes that generate and maintain those elements (biological integrity).

6.5.2.1 Ecological succession and disturbance

Spatial heterogeneity has been identified as one of the factors that may permit the coexistence of a high number of species (Tilman 1982). In this way, a low to moderate source of disturbance can prevent a reduction of diversity by generating spatial heterogeneity in forest areas. In the absence of disturbance, many species typical of secondary forest will go extinct, while disturbances may enhance genetic diversity by allowing shifts in selection regimes.

Away from areas of undisturbed natural forest, historical forest disturbance in both Analco and Comaltepec, and the Sierra Norte generally, has been far more subtle than the catastrophic clearances evident in other parts of the country (such as Veracruz, Tabasco, and Chiapas) (Challenger 1998), helping to create a beneficial mix of primary and secondary forest characterised by relatively small perimeter/forest patch area ratios. While extensive areas have been cleared in and around Metates and San Martin Soyolapam (mainly for cattle ranching), in most other zones, disturbance has been more localised and small-scale, helping to keep sizeable tracts of primary forest intact. Although secondary forests typically hold less biodiversity than primary forests, they still play important roles in watershed protection and providing habitat for both generalist and specialist species. They also buffer mature forest fragments from edge effects, and increase the degree of connectivity between them. Of perhaps greatest importance, they act as a key source of firewood and other NTFPs for local resource users, again protecting primary forest from heavy exploitation.

Secondary succession is a particularly important process in landscapes subjected to long-fallow agriculture. Around La Esperanza, areas of cloud forest are cleared by tree felling, drying of the plant material and burning of that material. Maize is cultivated for three to five years, after which cultivation moves to another piece of land. A fallow period commences, allowing the development of secondary vegetation. The length of fallow can vary widely but tends to decline as human population increases. In contrast to other parts of the country, a number of social factors in northern Oaxaca have allowed the recovery of secondary forest for periods of time sometimes longer than a century. First, population densities have historically been low and,

second, shifts in the economic activities of land users have resulted in cornfields at higher altitudes being permanently or semi-permanently abandoned for decades. In particular, the introduction of small-scale shade coffee plantations in the 1970s and 1980s reduced pressures in areas above 1,300m. Work by Rey-Benayas et al. (2007) suggests that secondary succession in areas of cloud forest involves relatively rapid changes in species richness, particularly during the first forty years after abandonment. Species richness appears to depend on fallow time and on species composition, with local perspectives (see Text Box 6.2) showing that succession in wet, humid country tends to result in diverse formations of secondary vegetation, with differences in dominant species, time of recovery and the size of the secondary forest a result of the microclimatic conditions that create a patchwork of ecological niches up and down the mountainside.

Such evidence suggests that it is the level and type of disturbance inflicted by long-fallow rotational agriculture and other farming activities that can contribute to enhancing biodiversity – a finding supported by Del Castillo and Blanco-Macias's (2007) work in other areas of northern Oaxaca. Abandoned fields provide conditions for succession, the establishment of pioneer species, and eventually secondary forest growth that exhibit a different mix of species to adjacent primary forest and thus higher plant diversity locally. At the landscape scale, the biodiversity benefit of having a mix of primary and secondary forests thus becomes apparent from the perspective of overall tree diversity, since the trees found in secondary forests are virtually absent in old-growth and primary forests.[92] As such, while large areas of primary forest exhibit much higher species richness (with several canopy layers), limited extensions of secondary forest play an important role in increasing overall diversity.

[92] Although this section focuses on the potential benefits of secondary forest formations, by no means do I wish to underplay the importance of old-growth or primary forests, which are critical suppliers of environmental services; locally and regionally in terms of regulating hydrological resources, and through acting as a carbon sink, both in terms of tree biomass and soil organic matter. They also harbour the highest abundance of epiphytes, and other groups of organisms, such as large mammals and frugivorous birds (a group particularly susceptible to forest disturbance, see Giraudo et al. 2008). The role of old-growth forest in trapping cloud water is also higher than that of young forests. Adjacent old-growth forest acts as an important source of colonists to the developing secondary forest, thereby facilitating the transition from pine to broadleaf in temperate and tropical montane forests. Indeed, forest succession very much depends on a source pool of old-growth forest, as many species typical of early stages cannot succeed under their own canopy (Wirth et al. 2009).

6.5.2.2 Patches, gaps and edge effects

Edges may induce changes in the abundance and distribution of species, which in turn produce changes in species interactions, such as predation, herbivory, pollination and seed dispersal (Lopez-Barrera et al. 2007). It has been stated that edge effects may have negative consequences for biodiversity as edges modify forest structure, tree regeneration and mortality. Nevertheless, the variety of results found in recent years and evidence from Mexico (Davidson-Hunt 2004; Lopez-Barrera et al. 2007) indicate that edge effects on biodiversity are not immediately obvious nor necessarily adverse in nature. In the study region, the reduction in cultivated areas has led to changes in the mosaic of forest patches, generally leading to fewer but larger patches. This has led to changes in forest edges, which have been shown in northern Oaxaca to have a weak but positive effect on tree diversity (Rey-Benayas et al. 2007). These same authors argued that such a positive response of tree diversity to forest edges is likely the result of traditional shifting cultivation, since agricultural systems employed in the region create a matrix dominated by semi-natural vegetation in various states of modification, which does not lead to dispersal barriers to most tree species; in contrast to the traditional concept of fragmentation. Edges can allow many species to disperse and flourish, and affect both pioneers and late-successional species. After a gap is opened in the forest, pioneer species such as pine tend to colonise the forest edge[93]. Although shade-tolerant late successional species have a lower chance of colonising these sites, observations in the field showed that mature trees growing near the edge can still persist.

Edges, therefore, may generate positive or negative conditions for forest biodiversity dependent upon what surrounds them. In cloud forest they may actually represent opportunities for forest regeneration and forest fragment expansion. Fog capture in these patches greatly influences biological diversity, as many species (ferns, bryophytes) depend on the water dripping from rich insect pollinator assemblages, as their flower displays become more attractive than in the forest interior (Lopez-Barrera et al. 2007). Similar effects are likely occurring in edges of riparian vegetation strips, where birds are observed to deposit a large number and diversity of seeds (farmer interviews in La Esperanza). Habitat generalists are particularly well placed to exploit the opportunities presented by increased edges through low to moderate rates of forest

[93] Along the forest edge and in the gaps created by tree fall or clearing, direct sunlight penetrates such areas and causes changes in temperature, humidity and soil moisture which stimulate seeds to germinate and dormant seedlings to begin accelerated growth (Martin 1995)

fragmentation. In both study communities, the evidence provided by local land users suggests that the traditional mix of forested and open areas has provided for a complex, patchy landscape to which a number of species respond (Lara 2007; Robson 2008). In both dry and humid zones, many species frequent open areas where grains and wild and domesticated fruits are grown. In particular, many birds (*faisan*, among others), butterflies, and a number of forest mammals (white-tailed deer, wild boar, *tejon*, racoon, among others) are frequent visitors to these areas (field observations and interviews with local land users, 2007-2008).

Increasing forest cover, however, impacts this mosaic by reducing the edge contrast between forested and open areas. Such changes are likely to have an effect on wildlife habitat quality, ecological processes and ultimately both localised and landscape-level biodiversity. At a landscape scale, what we are seeing is that forest patches along the altitudinal gradient are increasing in size with increased connectivity forming larger forest patches (see Watson (2002) for more on this). Although (to the best of my knowledge) no empirical studies have been carried out locally to understand the impact this change is having on different elements of wild biodiversity, the anecdotal evidence collected through interviews with local farmers and field observations suggest that fewer birds and mammals are now seen in agricultural areas as the ratio of forested to open areas changes. While studies may show that the most affected species are generalists rather than specialists, until that work is carried out, we can speculate that the return to a more heavily forested landscape, with the loss of landscape features associated with patches of cropland and pasture, may have a negative impact on the overall diversity of some species groups[94].

[94] In particular, it is likely that a significant number of bird and butterfly species have been adversely affected by agricultural abandonment. According to Navaro et al. (2004), Oaxaca is home to Mexico's highest bird diversity (736 species, representing 67% of the national total), with the Sierra Norte recognised as one of the most diverse and important regions (Conabio 1999). In terms of butterflies, Martinez et al. (2004) found that 85% of the state's species are found in the cloud forests and humid tropical forests of the Upper and Lower Chinantla. Indeed, in identifying the most important localities in Oaxaca, the study listed Metates in first place (with 368 species), Puerto Eligio in fifth place (with 231 species) and La Esperanza in seventh place (with 201 species). In both cases, high numbers of birds and butterflies are most abundant in edge areas where natural forest mixes with multi-crop agro-forestry systems or areas of long-fallow agriculture (from La Esperanza to Metates), or open areas of pasture and cropland (around Analco and the head village of Santiago Comaltepec). Farmers across territorial zones were consistent in noting that bird and butterfly diversity in the agricultural-forest mosaic is much reduced compared to thirty or forty years ago.

6.5.3 Agricultural biodiversity

It is not only wild biodiversity that is impacted through land use change driven by out-migration and associated processes. Through varied crop selection – a result of both farmer experimentation and as a response to high environmental variation found locally – both study communities have long been home to high levels of agricultural or agro-biodiversity[95]. With large-scale agricultural abandonment taking place across the region, and remaining farmers favouring mono-crops[96] over multi-crop systems, this looks set to change[97]. Agro-forestry systems provide an obvious example (Plates 6.12 and 6.13).

Plate 6.12 (left): Multi-crop agroforestry, Puerto Eligio, Comaltepec.
Plate 6.13 (right): Shade Coffee, Vista Hermosa, Comaltepec. *Photos*: Jim Robson

[95] The International Institute for Environment and Development (IIED, http://www.diversefoodsystems.org/keycon.html) defines agricultural biodiversity as the "variety and variability of animals, plants, and microorganisms that are important to food and agriculture. It comprises genetic resources (varieties, breeds, etc.), species used directly or indirectly for food and agriculture (including crops, livestock, forestry and fisheries), fodder, fibre, fuel and pharmaceuticals, species that support production (soil biota, pollinators, predators, etc.) and those in the wider environment that support agro-ecosystems (agricultural, pastoral, forest and aquatic)". Agricultural biodiversity takes into account not only genetic, species and agro-ecosystem diversity but also cultural diversity, which influences human interactions at all levels. The definition thus includes domesticated, semi-domesticated, manipulated or "wild" species, with no clear-cut demarcation between natural and managed plant and animal populations.

[96] Non-organic, monoculture farming is considered one of the most damaging forms of agriculture as it drains the soil of nutrients and depletes the biodiversity of the general area (by taking potential food source and habitat away from birds, insects, and some mammals).

[97] This adds credence to the belief that the major threat facing agro-biodiversity in regions such as Oaxaca is the functional extinction of crop varieties through globalised rural transformation (personal communication, Dan Klooster). In this sense, perhaps too much attention has been placed on other threats such as the genetic pollution of maize varieties, which has dominated debate in the last decade or so.

In and around La Esperanza, Vista Hermosa, Rancho Trucha, Puerto Eligio, Puerto Antonio and El Mamayel, coffee and other shade crops were established across extensive areas of humid and tropical montane forest. When I first visited some of these areas, I was struck by how difficult it was to distinguish the boundary between natural vegetation and the actual coffee groves. This is because coffee is grown as a shade crop, functioning as the understory of montane forest. Farmers do not clear-cut, or use commercial pesticides or chemical fertilizers, but rather use careful hand culturing to leave the land intact, with little visible erosion. In other words, this *metodo rustico* (rustic method) (Challenger 1998:494) allows for forest structure to remain largely unchanged, with minimal canopy interference. Field observations around Vista Hermosa and Puerto Eligio showed that small-scale systems like these can include up to twenty native tree species. In some instances, coffee is grown together with bananas (up to ten different varieties) and other crops (avocado, mamey, vanilla), as part of multi-crop systems that also use native trees to provide shade, maintain humidity and improve soil fertility. Both shade coffee and multi-crop systems have been shown to exhibit high levels of beta-diversity and floristic heterogeneity (Bandiera *et al*. 2005) – considered to be of particular importance for tree conservation. These cropping systems also provide an important food source to many native birds and butterflies, including the *faisan*, or Crested Guan (*Penelope purpurascen*), which local farmers note is particularly fond of coffee husks[98].

As agro-forestry systems have been abandoned across mountainous terrain between 1,000 and 1,600 m.a.s.l, a key reservoir of agricultural biodiversity has therefore been negatively impacted. Indeed, the survey data show that no more than a fifth of respondent households in La Esperanza continue to maintain shade-coffee or multi-crop systems, while the number of families from Santiago Comaltepec that still cultivate groves on the humid side of the mountains can be counted on two hands.

In addition to agricultural plots that are located away from the home village, the majority of households in Analco and Comaltepec have customarily planted fruit trees in their yards (apricot, cherry, apple, pear) and adjacent gardens (*solares*), along with small amounts of corn, beans, chepil (*Crotalaria longirostrata*) and many other useable species. These small plots of land, or *home gardens*, which are cultivated relatively intensively by their owners, are a source

[98] Although not considered threatened by IUCN, this species is rarely seen in Oaxaca outside of remote or protected forests due to deforestation and hunting.

of edible, medicinal, ornamental and other useful plants, and thus act as a rich source of ethno-botanical information (Martin 1995). In Analco, households have used these spaces to maintain local varieties of *maíz pinto, maíz blanco, maíz morado* and *maíz amarillo* that are no longer cultivated in other parts of the community (Lara and Manzano 2005). On the humid side of the range, in La Esperanza and San Martin Soyolapam, home gardens are arguably even more significant, where they act as the *in situ* seed bank for an incredible range of crops, including: tepejilote palm (*Chamaedorea tepejilote*), corn (local varieties), avocado (native variety), tomato (native varieties), papaya, coffee, grapefruit, tamarind, vanilla (local variety), mango, chilli, banana, plantain, and coconut, among other tropical fruits.

Despite their obvious importance, home gardens are becoming less prevalent as fewer families have the time, resources or perceived need to maintain them – a trend that mirrors the wider decline in farming activities. This will have negative impacts on levels of agricultural biodiversity, not least because these gardens are embedded in, and complement the functions of other aspects of the larger land use system. From studies conducted in northern Oaxaca, Aguilar-Stoen (2008) has shown that home gardens are not static or discrete in space and time, but are continually transformed by farmers. Plants are moved when conditions for growth are favourable and farmers manipulate those components. The high levels of biodiversity harboured by these land-use units are "maintained and enriched by farmers' practices, particularly plant and seed exchange". Indeed, other reports have shown that plant diversity tends to be higher in home gardens where owners actively exchange plant material with their neighbours (Watson and Eyzaguirre 2008). Maintaining diversity in this way is important since it can help to increase the resilience of local farming systems in the face of changing climatic, demographic and economic conditions. Consequently, the loss of home gardens may have far-reaching effects on the health of the social-ecological system overall.

6.6 Summary

Contemporary societies in rural Oaxaca are developing present and future economies through courses of action that are only partly tied to customary lands and territorial resources. While the inequities of the global market economy have limited the economic benefits that communities can accrue from resource-based practices and expertise, new opportunities have emerged based upon a range of 'off-farm' activities. While the market has no doubt played an

important role, cultural factors and changing attitudes have also encouraged a more sedentary existence and reduced territorial mobility among residents and non-residents alike. The consequences are multi-fold: (i) fewer people are farming; (ii) farmers are cultivating less land than before; (iii) farmers are working closer to permanent settlements; and, (iv) farmers are growing fewer crop varieties, with a shift to mono-crops rather than traditional multi-crop systems. As the numbers who farm begins to fall, resource and environmental practices decline in general. In place of customary land-based livelihoods, new communities of practice are emerging through ongoing processes of cultural adaptation, where the embodiment of new skills and perceptions become the product of a changed learning environment.

These new socio-cultural practices are driving changes to the forest landscape. Changes in ecological succession, patch size and edge effects are all having an impact on wild and agricultural biodiversity. In many parts of Mexico, anthropogenic disturbance can be described as chronic, widespread and increasing in intensity (Challenger 1998), with native forests subject to intense human pressures. In Oaxaca's northern highlands, however, forests have traditionally been subjected to low intensity logging and rotational (*milpa*) agriculture, which involve localized forest clearance to enable crop cultivation over a limited time period. Such activities have led to pronounced spatial heterogeneity in forest structure and composition, and created a forest-agricultural mosaic that comprises a complex mix of vegetation types and natural features. It is the close conjunction of agricultural activities as a source of disturbance, together with adjacent secondary forests and old-growth forests that contributes to the maintenance of biodiversity in this part of the world.

While both study communities are characterised by a mosaic of cornfields, secondary forests of different ages after abandonment, and large unbroken tracts of primary forest, the ratios between these different vegetation categories are now in a state of flux. Widespread agricultural abandonment has initiated a process of ecological succession on a scale unheard of previously. Del Castillo and Blanco-Macias (2007) found that the relationship between agricultural disturbance and species diversity in southern Mexico is non-linear, with diversity displaying maximum values at intermediate intensities of disturbance. A landscape composed exclusively of old-growth forest, thus in the absence of long-fallow agriculture or other sources of disturbance, does not sustain most of the common species of young secondary forests. However, at the other extreme, a landscape with high deforestation rates would result in many

species being threatened with extinction locally. The main finding here is that extremes are likely to generate lower environmental variation than a landscape composed of a mixture of forests of different ages and croplands. Del Castillo and Blanco-Macias (2007:174) concluded that "a maximum diversity is likely to be achieved in situations in which agriculture is neither very frequent nor very uncommon in both time and space".

The scenario at play in northern Oaxaca is therefore of great interest and significance because it focuses on: (i) increasing rather than decreasing forest cover; and, (ii) a reduction in contrast between forested and non-forested areas, rather than increased fragmentation. The findings from this study actually suggest that large-scale agricultural abandonment will lead to lower rather than higher environmental variation – which, in turn, implies negative as well as positive impacts for biodiversity at the landscape scale. Such a finding goes against the grain of conventional thinking in the field of conservation biology[99], and is significant for adding a layer of complexity to how we perceive forest transitions in tropical country contexts.

[99] As a discipline, conservation biology still focuses most of its energy on the conservation of specialist species, rather than overall biological diversity.

CHAPTER 7 – COMMUNITY RESPONSES TO OUT-MIGRATION: PERCEPTIONS, ADAPTATIONS AND OBSTACLES

Plate 7.1: Men chatting, Analco
Photo: Jim Robson

7.1 Introduction

In his book, *Collapse: How Societies Choose to Fail or Succeed*, the American evolutionary biologist, physiologist and environmental historian Jared Diamond made reference to the factors that lay behind the collapse of great civilizations, from the Maya of Mesoamerica to the Norse of Iron Age Greenland. He suggested that societies and groups may do disastrous things because they fail to anticipate a problem before it arrives. There may be several reasons for this. One is that there may be no prior experience of such problems, and thus a group is not sensitised to their possibility. Another common reason is that the problem may have taken the form of a slow trend concealed by up-and-down fluctuations. Then again, there could be failure to succeed in tackling a problem that a group does perceive and tries to solve. From Diamond's perspective, there are several possible explanations for this outcome. The problem may just be too difficult and beyond local capacities, or failure may result because efforts are too little or made too late.

Such ponderings are central to this thesis, which concerns the perception of *Analqueños* and *Comaltepecanos* to the past, present and future impacts of out-migration, their responses as a

collective to these impacts, and an evaluation of how successful such responses have been in reducing community vulnerability to change. In doing so, the chapter builds on the findings presented in Chapter 5 to evaluate the degree to which community institutions influence migration flows and investments. While most work on migration tends to focus on the individual factors driving the decision to migrate, community factors are rarely considered. I begin by discussing individual and community-level perceptions of out-migration. Next, the institutional adaptations of each study community are analysed. Such proactive strategies are an attempt by affected communities to negotiate the meaning of migration through collective action and thereby reduce vulnerability to ongoing demographic and cultural changes. An important part of this analysis concerns the emergence of hometown associations (HTAs) as translocal institutional arrangements, which provide a platform by which migrants can invest in the home (sending) community and help maintain customary governance arrangements. Lastly, I discuss the unpredictable nature of migration dynamics and the changing profile of migrants from northern Oaxaca. Combined, these two aspects can serve to undermine institutional adaptations and other community-level responses to change.

7.2 Individual and Community-level Perceptions of Out-migration

Perception is the process by which an awareness or understanding of sensory information is attained. What one perceives are a result of interplays between past experiences and the interpretation of what is being perceived, and is necessarily influenced by cultural norms and mores. The role of culture and cultural influences on perception has long been discussed (Nisbett 2003), and continues to form an important component of scholarly thinking.

7.2.1 Individual-level perceptions

Chapter 5 and Chapter 6 showed that residents of both communities were vocal about a range of impacts that out-migration has had on day-to-day living – from civic governance to the continuity of customary farming practices. Approximately half of survey respondents felt that migration had been good for their village, an opinion largely based on the material and economic gains made by migrant families through investing remittances / earnings in new house builds or remodels, a new vehicle, or some family-based productive activity. The rest were of the opinion that migration has had an overall negative impact on village life, or took a more balanced view that acknowledged the material benefits of migration while noting the drawbacks from a

'collective' or social standpoint. In this way, the negative aspects associated with out-migration were tied to what has been lost; namely, human and cultural resources.

In Santiago Comaltepec, which maintains a relatively large resident population (800+), there were fewer concerns, but in the much smaller community of Analco and the sparsely populated villages of La Esperanza and San Martin Soyolapam, adults of all ages complained about the increasingly burdensome nature of the local governance system. While Chapter 2 previously alluded to the tensions that have – to some degree – always accompanied the governance system employed in rural Oaxaca, tensions have heightened as villagers swap farming and forestry for a migrant lifestyle. As fewer and fewer people of a productive age stay behind, the system becomes ever more demanding for the 'stay-behinds'. This can change people's opinion, encourage more to leave and discourage absent community members from returning. A vicious cycle emerges. In this way, changing individual-level perceptions begin to influence migration flows to and from the home community. The altruistic nature of the *cargo* and *tequio* systems is particularly problematic for younger members of the community (both resident and non-resident), whose interests and desires can be quite different from those of their parents and grandparents.

7.2.2 Community-level perception

However, while there are strong individual-level perceptions regarding out-migration, this does not mean that a similar perception can be automatically expected at the community level. 'Community-level' in this instance refers to the spaces of authority and governance where decisions are made (General Assembly of *Comuneros*) and where existing rules and regulations are modified and new ones are developed (communal statute, or *estatuto*). Jared Diamond (2005) concluded that the Maya civilisation failed, in part, because the elites lived in walled cities, insulated from the environmental degradation that was to lead to their eventual demise. He sees a similar problem in the Western world today with the powerful living in gated communities, standing aloof from the rest of society and the world. How applicable is this scenario to the *campesino* villages of northern Oaxaca? Are the leaders[100] of Analco and Comaltepec as aloof,

[100] One could argue whether either community has leaders in the traditional sense, given that top positions in both the municipal and communal authorities are temporary, rotational postings that change every 18 months, and the decision-making power of these individuals is limited given that community-level projects and initiatives are decided upon (through a form of referendum) by the whole communal assembly rather than any individual or group of individuals.

or are they able to perceive the changes and impacts brought on by out-migration just as clearly as the wider community membership?

In answer to that question, and in stark contrast to the great civilizations that Diamond made reference to, the long-standing governance system employed in northern Oaxaca is based on a collective decision-making process, where each household is represented at the community-level (via the General Assembly of *Comuneros*). In addition, community leaders are local residents, elected by their peers on a rotational basis. As such, the system allows for the perceptions of individual members to find a voice at the community level. In this way, if enough individuals and families share the same concerns, the village will discuss and act upon these collectively.

In both communities, out-migration has been a topic for formal debate since the early 1990s, when General Assemblies were first used as a platform to discuss possible responses to ongoing demographic and cultural change. A number of these issues have also been discussed by other committees, such as the *Consejo de ancianos* in Analco and the *Consejo de caracterizados* in Comaltepec. The members of these committees are respected, experienced *comuneros* who meet on an *ad hoc* basis to tackle the 'issues of the day' and develop strategies to meet ongoing challenges faced by the community. To date, discussions at an Assembly and *Consejo* level have focused upon the mechanisms by which the community can mitigate the impact of out-migration and manage future flows. These can be separated into:

(i) Mechanisms to cope with the dwindling pool of available labour; and,
(ii) Mechanisms to establish the obligations of non-resident *comuneros* and citizens.

In this way, potential responses take the shape of changes and modifications to pre-existing village institutions, which form the focus of the next section.

7.3 Institutional Adaptations to Demographic and Cultural Change

The institutional responses to out-migration can be placed into two distinct categories: reactive coping responses or more 'proactive' adaptive strategies (Table 7.1). 'Coping responses' refer to institutional changes that have been 'forced' upon the community by the effects of demographic and cultural change. In contrast, **'adaptive strategies'** refer to institutional adaptations designed to mitigate the effects of demographic change, manage the flow and/or

timing of migration, and increase the flow of financial resources from absent migrants to the home community.

Table 7.1: Categorising institutional responses to out-migration

	Mechanisms to deal with dwindling pool of communal labour	**Mechanisms to establish obligations of migrant (translocal) community**
Coping responses (reactive)	1. Discontinuation of the *escalafon* 2. Relaxation of 'retirement' age 3. Reduction in number of low-level *cargos*	
Adaptive strategies	1. Reduction in duration of *cargos* 2. Expanded role of women	1. Defining legal rights and obligations of migrant *comuneros*

7.3.1 Reduction in duration of cargo term

Traditionally (from 1953-1992 in the case of Comaltepec and from 1966-1997 in the case of Analco), medium-level and top-level *cargos* of the municipal and communal authorities were 36-month postings. A major institutional response, therefore, has been the decision to reduce the duration of these *cargos* to 18-month postings. The official *cargo*-holder now works for eighteen months, while his or her '*suplente*' (who is named at the same community elections) takes over at the end of the first 18-month term in order to complete the formal 36-month or three-year term. As a response to the pressures created by population loss, the reduction in duration of medium-level and high-level *cargos* has been a poorly studied consequence of demographic change.

7.3.1.1 Logic

In both communities, the logic justifying this change was consistent. By reducing their length, it was felt that *cargos* would become less of a burden, allowing those in office to return to their normal day-to-day activities after a considerably shorter period of time than was customary. While in office, *comuneros* often find themselves unable to pursue other productive activities. In the absence of an important labour resource, affected households may lack the hands necessary

to plant, look after and harvest the number of crops they normally would. This problem is exacerbated as sons and daughters migrate in the late teens or early twenties, leaving resident families with fewer hands. Forced to buy, rather than grow, corn and beans for part, if not all of the year, families are faced with a heavy financial burden while the husband (*comunero*) complies with his civic or communal duties. This is a particular problem for the families of incumbents with high-level responsibilities, which may demand full-time work. In Comaltepec, for example, the duties of members of the communal authorities (as well as top-level positions in the municipal executive) are full-time for most of the year.

The decision to reduce the duration of *cargos* was therefore widely supported among the membership of both communities. Communal and municipal authorities felt such an adaptation would encourage more people to stay in the community rather than migrate, while making a return to the home village a more attractive proposition for non-resident *comuneros*. In Comaltepec, for example, the change to a shorter term was considered critical before any attempts were made to formally obligate migrant *comuneros* to participate in the *cargo* system (either personally by returning home, or through the use of a paid substitute).

7.3.1.2 Drawback

The logic driving this institutional response runs into problems, however, when one considers that shorter postings now mean there is a much quicker turnover of *cargo*-holders.

First of all, there is less rest for *comuneros*. By 'rest', I refer to the amount of time that passes between an individual resident *comunero* finishing one *cargo* and being elected to carry out another such post. Today, it is becoming unusual in less populated centres to get more than one term's (eighteen months) rest before being called back to service. Indeed, it is possible to come across *comuneros* who have moved from one *cargo* straight into another – a scenario that is likely to increase in incidence as the resident population continues to fall. The scale of the problem becomes clearer still if we cross-reference back to Chapter 5, which showed the comunero: *cargo* ratio in the late 1970s. At that time, there were around five resident *comuneros* per *cargo*, which means that *comuneros* would have regularly multiple years rest between postings. The problem associated with a lack of 'rest' featured commonly in local peoples' testimonies:

> There is no rest [from the *cargos*) and everybody complains about it, and this is another reason why people leave.
>
> Rosita Pacheco Pérez, 28, citizen of Analco

> We are missing people… there is little rest between *cargos*, which becomes another factor in peoples' decision to migrate. There is not enough work for all the people who want to own a home or a car, and for that reason they have to leave. If people stay here it is '*puro cargo*' [pure cargo]… they have made changes to the system but at the same time there are more committees to serve on. Ecotourism is a good example.
>
> Vicente a la vez Reyes, 42, *comunero* of Analco

> There is no rest between *cargos* and no follow-up (between the authorities) because they change every year.
>
> Guillermo, 24, *comunero* of San Martin Soyolapam

Consequently, the reduction in duration of municipal and communal *cargos* has served to nullify much of the headway made by other strategies designed to create a less demanding system. Although local people were happy to see shorter *cargos*, they are now quick to complain about the lack of 'rest' that comes as a result of this institutional response. Was this problem perceived or foreseen by the community when they decided to shorten the *cargo* term? When I interviewed community and village authorities during 2008, they said that it had been discussed in the assembly as an obvious drawback, but most felt it worth the sacrifice in order to reduce the burden of the 36-month post. Despite honourable intentions, the adaptation has therefore failed to make the governance system less burdensome to users, while it is unclear how well the change has served to influence migration flows as per the original intention. Data from interviews show that it has not significantly influenced the decision-making process of would-be migrants. This is supported by out-migration rates over the past 10-15 years, which have yet to show any obvious or consistent decline.[101]

Second, the reduction in duration of medium-level and high-level *cargos* has led to a much quicker turnover of communal and municipal authorities, and this is affecting the quality

[101] Any decline in out-migration rates is more likely due to other factors. For example, a recent fall in U.S.-bound migration is linked to the impacts of a global economic recession (2007- 2009), which in particular affected the sectors that have traditionally employed migrant Oaxacans in urban centres in the North (construction, hospitality etc.)

of the work that each authority is able to achieve. As an anonymous informant from Analco told me:

> If I had the opportunity to make a change, I would propose that the *cargos* of the municipal and communal authorities last six years, because as it is now, they are just one and a half years... if one tries to do something, a job, an improvement for the community, well, it can not be planned properly, all the needs of the community are not understood, things are done in the short term.

The shorter period of office is leading to a lack of follow-up (continuity); over-frequent reviews, and sudden changes in direction with regards community affairs. Primarily, this is because:

1. There is less time for the incoming authority to 'learn the job' and fully assume its responsibilities before having to make way for the next set of incumbents;
2. A shortened term discourages authorities from pursuing longer-term projects (that last more than 1 or 2 years) or when long-term projects are in place, there can be a problem of *seguimiento* (follow-up) from the incoming authorities; and,
3. The problems with a non-existent transition period and general lack of *seguimiento* (follow-up) from the incoming authorities become more pronounced.

In Analco, these impacts have been cited as playing a significant part in delays in getting both the community's ecotourism project off the ground and the communal statute updated. As Nupo told me, "nothing ever gets done… new people come in with new ideas and existing projects get put to one side". In the context of administering communal forest resources, and this is relevant to both communities but particularly Comaltepec, a shortened term is likely impacting the streams of money that are raised through participation in national and international resource conservation and management schemes, which tend to imply two to five year commitments.

Throughout my time in northern Oaxaca, this issue of inertia among community authorities was mentioned on multiple occasions, convincing me that it constitutes a seriously underestimated and under-investigated consequence of a particular response to the pressures created by out-migration. In this way, it requires a great deal of attention, and certainly more than I was able to afford.

7.3.2 Expanded role of women

As *comuneros,* men customarily control municipal and communal offices in Comaltepec and Analco, as they do in most Oaxacan communities.[102] However, there is no formal prohibition on women serving in any administrative posts, up to and including the municipal presidency.[103] In other words, there is no legal impediment to their involvement. Rather, the fact that *cargos* and assemblies have traditionally been the sole domain of male *comuneros* is attributable to the strength of '*machismo*' that continues to characterise rural life in many regions of Mexico (after Hunn 2008).

Despite this common heritage, in recent years women have become more involved in village affairs and governance across northern Oaxaca, driven in large part by ongoing out-migration and associated demographic and cultural change. There are, however, important differences in the degree and type of female participation, and this is illustrated by the contrasting experiences of the two study communities. In the case of Comaltepec, the community has restricted the use of female labour to a few treasury and secretarial positions, and women have filled these positions in representation of an absent (migrant) husband. No concerted effort, therefore, has been made to allow women to become actively involved in community decision-making and governance. During the main research period (2007-2009) there were no women carrying out medium-level *cargos* in either the municipal or communal authorities. In Analco, however, women have been awarded *cargos* in the community since the early 1990s. While some of these women are substituting for an unavailable husband, a number of women have been officially named the principal incumbent. During the research period (2007-2008), women were performing 6 of the 18 *cargos* that make up the municipal and communal authorities, and four of these six were the official *cargo*-holder. No woman has yet held a top-level *cargo* in Analco,[104] but none the less, this represents an important development and can be considered a proactive,

[102] An obvious exception is the matriarchal society of Juchitán, a regional centre in the Isthmus of Tehuantepec (south-eastern Oaxaca) where trade is exclusively in the hands of women.
[103] Some scholars see indigenous autonomous rule as state reinforcement of the patriarchal structure. Only male members of the communities are traditionally chosen to perform duties for the communal assemblies, and are therefore the group who vote on agrarian and land tenure decisions on behalf of an entire (heterogeneous) community (Walker and Walker 2008). However, while women are generally excluded or discouraged from the decision-making process, any gender bias should be viewed not as a consequence of the *usos y costumbres* governance system *per se* but rather "the influence of cultural values widespread in Mexico" (Hunn 2008).
[104] There have been female candidates nominated for the top posts of municipal and communal president but one has yet to be selected at assembly elections.

adaptive strategy towards reducing community vulnerability to the negative impacts of demographic change[105].

Why is it that women in Analco are more involved in the running of village affairs than their counterparts in Comaltepec? Through extensive participant observation and conducting informal interviews in both communities, it became apparent that their greater and more meaningful involvement is reflective of not only increased labour demands placed on a much smaller resident population, but also indicative of the more equitable standing that women enjoy within local society generally[106]. Having participated actively in village governance for close on two decades, women's presence in office has become more readily accepted by men as part of contemporary village life[107] – a change that can only be described as positive, and one that may be replicated in other communities over time.

7.3.3 Establishing obligations of migrant comuneros

The final adaptive strategy, and arguably the most significant, represents the direct method by which the study communities have attempted to manage out-migration. It concerns the modification of long-standing communal statutes to establish new rules and obligations for non-resident (migrant) *comuneros*. The decision taken by an adult member of a household to migrate must, more often than not, factor in community obligations, and so these obligations can determine whether a would-be migrant leaves in the first place and, having migrated, how long he or she stays away for. Only Comaltepec, however, has thus far made formal changes to its communal statute in this way. As such, this critical adaptation forms one of the most important differences between the two communities, and shows how community-level strategies to manage

[105] Female migrants from Analco are also being incorporated into the *cargo* system. During the evening I spent with Constantino Sosa and his family in Santa Ana, California, I met his sister-in-law who had just arrived in LA after serving an 18-month *cargo* as Secretary of the CBC, a posting she was given while in Oaxaca visiting family. Though not a formal obligation, she accepted, meaning she stayed in the village and delayed her return North.

[106] *Comuneras* have been officially recognised in Analco for nigh on twenty-five years (interview with CBC, December 2009). The more equitable standing enjoyed by women in the village may, in part, be a result of the increasing influence of evangelism, which was introduced to the community in the early 1980s. Of course, the point made on the changing role of gender in community institutions is based as much on my own instincts as the researcher as they are on empirical data. It is an area of research, therefore, that requires a much more careful investigation than has been possible here.

[107] In addition to *cargos*, women in Analco are performing a large number of civic duties – known as *sociales* – which can be just as time-consuming, taking incumbents away from their considerable domestic activities. Women in Analco are keen for these posts/responsibilities to be granted official *cargo* status in recognition of their contribution to village life. These include posts in sports, health, pre-school and secondary school committees.

migration flows and dynamics can vary considerably. It also differentiates between how easily the two study communities can determine migrant *comuneros* as being 'active' or 'non-active', and how easy it is for local authorities to determine whether migrants are maintaining their communal rights in the home village.

7.3.3.1 Obligations of migrant comuneros from Comaltepec

In 2004, the community established two new Articles (Ch 3. Art 14 and Art 15) in its communal statute, in order to set out the rights and obligations of migrant *comuneros* (Text Box 7.1): Article 14 lists the obligations of migrant *comuneros*. First, the *comunero* must explain to the Commission for Communal Property why they are leaving and how long they expect to be away (Part A). Interestingly, no limit is placed on the amount of time the *comunero* can be away before his rights are affected[108]. Second, the migrant *comunero* must comply with the obligations (*cargos*) determined by the assembly (Part D). If they are unable to comply in person, they are obliged to name a substitute to carry out the posting (Part B). Lastly, they must provide financial contributions (for *tequios* and *cargos*) if asked to do so by the General Assembly (Part C). Article 15 states that under communal law, if the obligations set out in Article 14 are met, then the migrant *comunero* and his family maintain the full set of communal rights.

The benefit of this approach is that, through the use of existing social institutions, the community authorities are (potentially) able to influence migration flows, including the possible length of time that members remain absent. Firstly, it encourages would-be migrants to stop and think before leaving, knowing that if they stay away for an extended period of time, then they will have to have to send regular financial contributions to maintain their rights. In this way, the institutional adaptation lends support to a temporary or circular form of migration. Secondly, by obliging migrant *comuneros* to carry out *cargos* they are named for (either personally or by paying for a substitute[109]), the burden on resident active *comuneros* can be reduced. Thirdly, the obligation made of migrant *comuneros* to contribute financially *in lieu* of carrying out *tequios*, provides resources to contract out some (municipal) work rather than depending wholly on

[108] Some communities in northern Oaxaca, with Santa Cruz Tepetutla in the Chinantla sub-region coming to mind, have been strict in stipulating the length of time (two years in the case of Santa Cruz) that migrants can remain absent from the home village before forfeiting communal rights (Salvador Anta, personal communication).
[109] The cost of paying a substitute to carry out a cargo varies from $120 - $180 pesos a day depending upon the position. This would equate to about $4500 pesos a month for a top-level *cargo* such as municipal agent.

(unpaid) collective workdays. The charge in 2008 stood at $150 pesos (US$13) per day of *tequio*.

Text Box 7.1: 2004 Revisions to Communal Statute, Comaltepec

Chapter 3 – Regarding Migrant *Comuneros*

Art 14. Obligations of the migrant *comunero* are the following:

a) Notify the CBC as to the motive of their absence and the period for which they will be away

b) Designate the person to comply with obligations determined by the assembly

c) Provide financial contributions as determined by the general assembly of *comuneros*

d) Comply with the *cargos* assigned by the assembly even if absent

Art 15. Rights of the migrant *comunero* are the following:

a) Incorporate at any moment into the activities of the community

b) Enjoy, together with their wife and offspring, the services and resources that the community possesses.

7.3.3.2 Obligations of migrant comuneros from Analco

While Comaltepec has made changes to its communal statute to formalise the rights and obligations of migrant *comuneros*, no such legislative changes have yet been made in Analco. This is despite the fact that, as a smaller community, Analco can be considered more vulnerable to the effects of population loss than Comaltepec. Although migrants from Analco are 'morally' obligated to maintain links with the home community, they are (as yet) not obligated by written law to comply with *tequios* or *cargos*. Unlike Comaltepec, where registers are kept of monies sent by migrants for each day of *tequio* they miss, collective workdays in Analco are wholly dependent on the pool of 'active' resident *comuneros*, and migrants are not asked to contribute. The situation with *cargos* is a little different. While individual migrant *comuneros* are rarely named nor legally obligated to return to Analco to carry out *cargos*, they are asked to make a monthly payment. In 2008, these contributions amounted to US$25 a month or US$300 a year

per *comunero*. This money is used to finance a number of local initiatives[110] and a register is kept of those who contribute.

In contrast to Comaltepec, the lack of formal obligations means it is not clear whether migrant *comuneros* from Analco will lose their rights if they fail to meet communal and municipal expectations. Without making changes to the communal statute, there is no way to legally take rights away from migrants who do not 'voluntarily' contribute. In accordance with most people that I spoke to, any migrant *comunero* who wants to return to live in the village can do so without too much of a problem, providing that: (i) they contribute to monies sent by their hometown association; and, (ii) they pay their dues (rent and basic urban services) to the municipal and communal authorities for homes maintained in the village. In recent years, some migrant *comuneros* have been asked to come back to carry out *cargos*, or given such a position to fulfil when back in the village visiting. However, because they are morally rather than legally obligated to comply, a failure to meet such expectations makes their reintegration back into the community difficult rather than impossible.

This situation is likely to change in the near future. On my return to the community in December 2009, I learnt that the authorities had convened the General Assembly of *Comuneros* an unprecedented eleven times during the year to discuss proposals to update the communal statute. Their intention was to modify existing and develop new Articles and Clauses to cover multiple aspects of contemporary village life, including the definition of migrant rights and obligations. These proposed obligations constituted a step closer to the 'monetarisation' of the *usos y costumbres* system, and follows the trend set by other communities in the region, including Comaltepec. More on this process is discussed in Chapter 8. However, in the context of this chapter, the requisite changes to the statute had not been approved by the Assembly as of December 2009, let alone ratified in the National Agrarian Register (RAN)[111]. As such, non-resident *comuneros* were still only morally obliged to participate in community institutions – such that in the absence of formal obligations, the potential for migrants to lessen the burden on resident *comuneros* was curtailed.

[110] These range from the converting some *cargos* into paid positions (*mayores*) to infrastructure improvements.
[111] A final proposal was drawn up in November 2009, which was to be voted on in early 2010. The community is receiving technical support from a local NGO (ERA, A.C.) for the RAN application. These applications can take a long time (many months) to be processed and until the RAN have approved the changes and officially recognised the new statute, it is not a legal document and *comuneros* are not bound to it. The new Statute finally came into force during the summer of 2010.

7.3.4 Adolescent male migrants

> My sons left when they were young and single so they are not recognised as *comuneros* and thus not obligated to carry out *tequios* or *cargos.*
>
> Juventino Vargas Muñía, 50, *comunero* of La Esperanza

Upon reaching 18 years of age, all men in Comaltepec and Analco traditionally assume status as *comuneros* and are asked to comply with *cargos* and *tequios* and to participate in community decision-making. Only those continuing with their studies are temporarily excused compliance with these obligations. One of the key problems facing the community, albeit one that has yet to elicit a response at the community-level, is that increasing numbers of young people are leaving their village (primarily for the US) soon after finishing school at 16 or 17 years of age. This phenomenon is closely tied to the establishment of strong migrant networks between the home and migrant communities, since many youngsters from Comaltepec or Analco arrive in Los Angeles or Las Vegas to be welcomed by a relation, who provides a place to stay and help with finding work. What this means for the home community is that in addition to losing more of their young people, and thus contributing to an already 'aging' population, many teenagers leave before they have been named *comuneros* and thus obligated under customary laws to contribute to local governance arrangements. In this way, they are only 'morally' obligated to contribute monies for *tequios* or to the community more generally, while they cannot be considered to carry out future *cargos*. Given that they do not own a home in the village, nor have a wife, husband or children to support in Oaxaca, there is little incentive for them to contribute with any such moral obligation. In the course of the research, I did not find any young male or female migrant who supported the community in this way.

7.4 Hometown Associations as Trans-local Institutions

7.4.1 Migrant Diasporas

Migrants from both communities tend to head to a handful of national and international destinations (Tables 7.2 and 7.3). An extreme example involves migrants from Comaltepec, the majority of who settle in the Los Angeles Metropolitan Area, southern California, setting up home in just a few neighbourhoods located to the west and south of the downtown area. Since the 1980s and 1990s, the number of migrants in LA has risen steadily. By 2008, it was suggested

that as many *Comaltepecanos*[112] were living in LA (estimates range from between 700 and 900) as were resident in the head village in Oaxaca (823 inhabitants). Migrants from Comaltepec have also settled in urban centres in Mexico, but in lower numbers and without forming an obvious migrant community in any one city.

Table 7.2: Principal destinations of migrants from Comaltepec

Destination	**No. of migrants**[113]	**No. of *comuneros***
Los Angeles	800	210
Other US Destinations	50	<15
Mexican destinations	200	45

Table 7.3: Principal destinations of migrants from Analco

Destination	**No. of migrants**	**No. of *comuneros***
Mexico City	300	90
Oaxaca City	150	30
Loma Bonita, Veracruz	40	<15
Other Mexican destinations	60	<20
Los Angeles	150	45
Las Vegas	50	15
Other US destinations	40	<10

In contrast, *Analqueños* have settled in sizeable groups in a small number of Mexican and US destinations. Within the Mexican Republic, it is estimated that 90 *comuneros* live in the Federal District (Mexico City); 30 in Oaxaca City; and around 15 in Loma Bonita (close to Tuxtepec, northern Oaxaca). Outside of Mexico, approximately 70 *comuneros* have migrated to the United States: with around 45 living in the Los Angeles Metropolitan Area; 15 in Las Vegas; and no more than 10 residing in other parts of the U.S, including North Carolina and New York. In Analco, therefore, both national and international migration has been significant. However, while there were many more national migrants in the 1960s and 1970s, international migration has become increasingly common and U.S-based migrants will outnumber Mexico-based migrants overall if recent trends were to continue[114]. On arrival in these urban centres, migrants have formed tight-knit communities, where social ties can be as strong as they are in the home

[112] In this instance, I refer to men, women and children born in Comaltepec, in addition to second and third generation migrants born in the U.S. to parents from the home community in Oaxaca.
[113] This refers to *comuneros*, their wives and children, as well as unmarried male and female migrants.
[114] Not withstanding the current sharp decline (since 2008) in migratory flows to the U.S., driven by a combination of economic recession and increasing security risks in border areas.

village in Oaxaca. Migrants not only support one another in terms of finding work and accommodation, but they also spend much of their free time socialising as a group. The high level of social capital evident in these migrant communities reflect both a desire (or perceived need) to 'stick together' (see Text Box 7.2) and the strength of the bond that many migrants feel towards the home village.

Text Box 7.2: Migrants stick together

Eliseo Luna married a girl who is neither from Comaltepec or the Sierra Norte. This makes him unlike most of his *paisanos* (countrymen) in Los Angeles. Migrant *serranos* (highlanders) in the North tend to stick together and Chinantecos are no exception. This extends to marrying from within the migrant community. I remember Eliseo's wife, Maria, being amazed that people from her husband's village "would arrive to this huge, diverse city where they can meet people from all over the world and always end up with someone from the same village!" She felt that this was an opportunity lost for *Comaltepecanos* to be exposed to new ideas and perspectives. Yet this is just one view, and from somebody who chose a different path. For most newly-arrived migrants, there is great comfort and a sense of familiarity that comes from staying with what you know. It is also reflective of the more insular nature of village life in the mountains that many of these migrants still call 'home'.

This applies to both recently arrived individuals and well-established migrant families. The family of Constantino Sosa, who left for Los Angeles in the early 1980s, provides a nice example of this. While the whole family now holds U.S. citizenship, Constantino explains that "it doesn't matter to us … we have everything [in Los Angeles] here but it is not ours... Analco is everything for us, Analco is first".

7.4.2 Hometown Associations (HTAs)

As a way of supporting the continuity of village traditions and customs, the more proactive members of migrant communities have established *mesas directivas* – more commonly referred to as Hometown Associations (HTAs) – in a number of cities. Santiago Comaltepec, La Esperanza and San Martin Soyolapam all established *mesas directivas* in Los Angeles in the mid 1990s and early 2000s, while migrants from Analco set up a *mesa directiva* in Mexico City in the early 1990s, with similar organisations set up in Oaxaca City, Los Angeles and Las Vegas in subsequent years. These institutions are designed along much the same lines as the traditional

governance system in the home village, with rotational posts based on the customary *cargo* system. All *mesas* have a three-person Board of Directors consisting of a President, Secretary and Treasurer, supported by a small number of assistants (*vocales*) in the larger migrant communities. In these larger organisations, it is also common to find additional committees responsible for organising sporting events (basketball and football), youth (music) bands and celebrating village customs and festivities.

All of the above are non-paid, one-year posts, with each set of incumbents voted in by their peers at annual elections. Although a migrant *comunero* is not obligated to participate if asked to do so, a failure to comply (without good reason) would count against them on return to the home community. Most *mesas* have only been in existence for less than a decade and so most *cargos* have been filled by individuals already active in the local migrant community. In both communities, the authorities are discussing the possibility for positions within the HTA to be recognised as official *cargos* within the *usos y costumbres* system.

7.4.2.1 Analco

In Analco, there are four HTAs (Table 7.4) that each comprise of a *mesa directiva* (President, Secretary and Treasurer) and combination of supplementary committees. Some HTAs are considered stronger than others. Among national migrants, the Mexico City organisation is both the largest (ie. greatest number of members) and best established. For several years it has been registered as a Civil Association in Mexico. It has an office in the city, and also maintains a *casa comunitaria* (community house) where villagers from Analco can stay during visits to the capital. In the U.S, the Los Angeles Association has twice as many members as the Las Vegas Association. However, they are spread out across a huge area and, consequently, the Las Vegas Association is considered by LA-based migrants to be a more cohesive unit since the migrant community involves a small number of families living in much closer proximity to each other, facilitating the organisation of events and meetings[115].

[115] It is interesting that migrants in Los Angeles perceive the Las Vegas HTA to be more united and to meet more regularly than their own group (Constantino Sosa, personal communication). Upon a return trip to Analco in December 2009, I asked a number of Las Vegas-based migrants if this was the case. They could not speak for how their situation compared to the LA experience but told me that despite sending money regularly to the authorities in Analco, they still lived in different parts of the city and rarely organised events or met up as a group.

Table 7.4: *Analqueño* Hometown Associations

Name of Association	**Estimated Membership (2008)**	**Activities**
'*Cultura y Tradicion'*, Oaxaca City	70	Meets every 3 to 4 months. Contributes a team to take part in the annual regional basketball tournament and organizes dances and traditional events. Participates in village fiesta held in December.
'*Tequio y Guelaguetza'* Civil Association, Mexico City	130	Meets every 2 to 3 months. Founded youth music band (with sons and daughters of migrant *Analqueños*) and organises annual trip to Analco to celebrate home village fiesta[116]. Collects and sends migrants contributions to community. Maintains a record of contributions.
Los Angeles	80	Meets once a month with events organised four to five times a year. Organises a basketball tournament, 'Día de las madres', holds dances and other cultural events. Collects and sends migrants' contributions to community. Maintains a record of contributions.
Las Vegas	40	Meets on monthly basis. Collects and sends migrants' contributions to community. Maintains a record of contributions.

In addition to celebrating the annual village fiesta in December, some HTAs practice a number of the sporting and musical traditions that characterise the home community and region more generally. Clemente Bautista, the coordinator of migrant *Analqueños* that reside in Oaxaca City, explains: *"*We have several projects to promote traditional music and dance and to rescue our indigenous language… in addition to providing material and economic support to the community… we want to do what we can for our *pueblo*". Indeed, HTAs are considered a vital part of efforts to forge and strengthen links between the younger members of migrant families and the home community, especially those born outside. *Analqueños* in Los Angeles have a basketball team, for example, that participates in a tournament each year that mirrors the

[116] While *Comaltepecanos* do celebrate key traditions and customs (carnival, July fiesta) in Los Angeles, this is less evident among migrant *Analqueños* in their places of residence. Rather, and this likely reflects the numbers of migrants living in Mexico City and Oaxaca City, they tend to return *en masse* to Analco in December to celebrate the fiesta of the village patron saint, San Juan. At last year's party (2009) the village population must have swelled to close to 800, with three busloads coming from Mexico City and vehicle license plates from Nevada, California and Mexico City a common sight.

tournament held in Guelatao, northern Oaxaca, during the month of March. Comaltepec also has a team. The LA event brings together 30-40 teams that represent migrant communities from villages across the Sierra Norte. This not only strengthens the links between the migrant and home community, but also maintains a tradition of regional identity and integration. Analco's youth team won the tournament in 2007 and the cup was brought back to the home community in Oaxaca to be proudly displayed in the Municipal Palace.

7.4.2.2 Comaltepec

Comaltepec has established three HTAs in Los Angeles, one for each of the permanently settled villages that make up the home community: Santiago Comaltepec, La Esperanza and San Martin Soyolapam (Table 7.5).

Table 7.5: *Comaltepecano* Hometown Associations

Name of Association	**Estimated Membership**	**Activities**
'*Comaltepecanos radicados en Los Angeles'*, Santiago Comaltepec	375	Meets monthly. Maintains home village traditions. February carnival, July fiesta. Other events organised, including dances and basketball tournaments. Established youth and adult basketball teams, and youth music band that plays weekly in Los Angeles area.
La Esperanza-Los Angeles	75	Meets monthly. May fiesta, Dances. Youth basketball team
Soyolapam-Los Angeles	-	Currently inactive (2008-present) due to too few members.

They are organised along the same lines as the Associations of Analco migrants, with *mesas directivas*, and other committees that look after sporting and cultural events. *Cargos* run for 12 months (January to December) on a rotational basis. Incumbents range in age from young men (20 years of age) through to older *comuneros* in their late fifties. The *mesa directiva* set up by migrants from San Martin Soyolapam is not currently in operation; the small number of members spread out across a city that sprawls as much as Los Angeles makes it very difficult for the *mesa* to function properly. Unfortunately, each village is responsible for setting up its own *mesa* and so migrants from Soyolapam are currently unable to either of the communities' other two HTAs.

By far the largest and most active Association belongs to the head village of Santiago Comaltepec. It consists of a 6-person *mesa directiva* (President, Secretary, Treasurer, and three assistants or *vocales*), a 3-person *Club Deportivo*, and a 3-person *Comité de Festejos*. As well as organising social events, key village customs are practised such as the February Carnival and the July fiesta that celebrates the community patron saint, the Apostle James.

Plates 7.2 and 7.3: Onlookers enjoy the '*Banda Juvenil* Santiago Comaltepec' play at Plaza Mexico, City of Downey, California.
Photo: Jim Robson

A youth band (*banda juvenil*) was set up in 2006 by Felipe Lopez and Rolando Hernandez, two migrants with young families in Los Angeles. Like many such initiatives, the band serves two main purposes:

1. To get children of migrants involved in a worthwhile activity that keeps them away from less productive past-times; and,

2. To help maintain an important custom of the home community and forge stronger links with the home community.

At the time of my visit in August 2008, the band played on Sunday afternoons at an Oaxacan restaurant in Plaza Mexico, City of Downey (Plates 7.2 and 7.3). They also play at weddings and other social events, including the July fiesta and Carnival. They were hoping to raise enough money (US$40,000) to take the whole band to Oaxaca to play with the youth band in the head village sometime during 2009 or 2010.

7.5 HTAs and Migrant Investments

Arguably, the establishment of Hometown Associations (HTAs) constitute the most important institutional development to emerge from communities' experience with out-migration. Although they began life as bodies concerned with the wellbeing of migrants residing in the city where they were established, over the past few years they have been integrated into the institutional framework of the home community. In addition to strengthening the ties that migrant communities are able to forge with their home villages, these Associations have become a conduit by which the needs of both parties can be effectively communicated. The existence of a *mesa directiva*, for example, means that the authorities in the sending community can get in touch more easily with individual migrant *comuneros* (and their families) with regards their *cargo* and *tequio* obligations. These links that connect village authorities in Oaxaca with migrant communities in Mexico and the U.S., and which formalise the two-way flow of (social, cultural and financial) capital, are such that HTAs can be considered as examples of new 'trans-local' community institutions.

One can hypothesise that if communities are able to access a percentage of migrant earnings, then such capital could be used to support development projects locally. In this way, remittances provide a means by which migrants can compensate communities for their absence. For the past few years, the village authorities in both communities have beguin to use HTAs in Mexico and the U.S. as the platform for organising community-level migrant investments – such that HTAs now serve a dual role:

1. To maintain a strong and united migrant community; and,
2. To encourage migrants to contribute resources to the home community.

In both communities, the processes by which monies are requested and received are similar. The municipal or communal authority in Oaxaca sends an official request to the *mesa directiva* of each HTA when funding is required. The authorities may also approach incumbents of the various *mesas* at holiday times (Christmas, village fiesta), when many migrants are back in Oaxaca visiting family. The HTA, in discussion with its members, decides how much can be provided. The response is normally positive but it is the *mesa* and not the village authorities who decide the amount to be sent. When money has been requested, the *mesa* will ask for contributions from its active members, but also hold social events (dances etc.) at which raffles

will be organised and food and drink sold to generate money to supplement individual member contributions.

Some HTAs are better placed to help than others. In Oaxaca City, for example, while active in promoting cultural events and frequent visitors to the home community, the HTA of Analqueños is less able to make financial contributions because of the low salaries of its members. In contrast, the community's Mexico City Association is a much stronger organisation, with as many as 200 members (*comuneros*, their wives and children). Many member families have been living in the capital for decades, and a number run their own businesses. Collectively, they are able to raise more money than their counterparts in Oaxaca, and thus the village authorities target this Association for support more frequently. Generally, though, it is migrants in the U.S. who enjoy the greatest earning power and thus it is the U.S.-based HTAs that are approached most often. Table 7.6 provides a summary of the village-level investments to have involved migrant contributions.

The findings are consistent between the two communities. In all cases, migrants have sent money to help finance their annual village fiestas and other customary events, and contributed to church-related construction or refurbishment work. There have also been investments in civic services (schools, medical), although this has been more evident in Analco than in Comaltepec. Typical contributions range from $10,000 to $20,000 pesos (combined from all *mesas* approached for support). Sometimes it can be more. In 2008, a particularly important contribution helped finance the installation of a new drainage system in Analco. Most of the labour costs were absorbed through the use of *tequio*, but to help cover other costs, each of the four HTAs was asked to contribute. As of September 2008, the Los Angeles *conjunto* had raised $25,000 pesos, with another $30,000 pesos provided by migrants in Las Vegas, Mexico City and Oaxaca City. For many (smaller) community-level projects, however, just one or two HTAs may become involved.

Table 7.6: Migrant investments in village-level infrastructure, customs and initiatives

AREA OF INVESTMENT	**Santiago Comaltepec**	**La Esperanza**	**San Martin Soyolapam**	**Analco**
Village Fiestas	Yes	Yes (for the May 2008 village party, migrants in Los Angeles sent $10,000 pesos)	Yes	Yes
Church	Yes (refurbishment)	Yes (helped pay for construction of new church)	Yes ($85,000 pesos towards church construction)	Yes (refurbishment)
Schools	No	Yes (computers for *tele-secundaria* and construction of *albergue*)	No	Yes (computers)
Health Services	No	No	No	Yes (ambulance costs, new oxygen tank)
Forestry Activities	No	No	No	Yes ($16,000 pesos to erect fencing between Analco and Jaltianguis
Forestry Enterprise	No	No	No	No
Community Service (*tequio/cargo*)	Yes (*tequios*)	Yes (*tequios*)	Yes (*tequios*)	Yes (Monthly contributions and financing of two *cargos* (2007-2008))
Other (specify)	When a migrant dies in the U.S, the *mesa* pays for the body to be flown back to the home village for burial.	Yes (some public works such as village drainage system)		Yes ($55,000 pesos raised to part finance major new village drainage system)

In both communities, the level and type of migrant investment are tied to two main factors: (i) the amount of money that can be raised by the *mesas directivas*; and, (ii) the sense of importance that migrants attach to each investment opportunity. Apart from obligatory community service, interviews with migrant leaders and village authorities have shown that of greatest relevance to migrant *comuneros* and their families are (in **descending order** of importance):

1. Village fiestas
2. Religious infrastructure and ceremonies
3. Infrastructure improvements in the village
4. School and health services
5. Land-based activities

The most important investments are related to the maintenance of community customs and traditions[117]. These tend to receive support from migrants each and every year. Less frequent support is given to infrastructure improvements in the villages, such as drainage or school equipment. To date, neither community has requested money from a Hometown Association for specific forest management or conservation-related activities. Indeed, the authorities have only occasionally tried to access migrant funds for a land-based project or initiative. The most obvious case concerned $16,000 pesos provided by Analco's Los Angeles Association to erect a boundary fence between the community and the communal lands of neighbouring Jaltianguis, and the monthly *tequio* contributions from migrant *Comaltepecanos*, some of which are destined for financing forest-based work.

Plate 7.4: New church in San Martin Soyolapam, with construction part-financed by migrant contributions.

Photo: Jim Robson

7.6 Compliance with Migrant Obligations and HTAs

So far, this chapter has given an idea of the degree to which sending communities have come to depend on migration – with an increasing amount of off-farm work tied to migrant-funded projects. Key to this development has been the establishment of HTAs, which have evolved into transnational institutions to facilitate the transfer of financial and cultural resources

[117] As an interesting aside, there is a conflict between catholic and evangelist *Analqueño* migrants in LA that plays out when the HTA looks to raise money and organise social events. As Constantino Sosa explains, "There is always a problem giving money for village fiestas, while no money can be sent for religious purposes, including work on the catholic temple".

from the migrant to home community. However, in order to understand the longer-term potential of this development, it is important to analyse the level of migrants' compliance with community obligations and wider participation in the activities of the HTAs. As discussed previously, each community has its own set of parametres by which the active or non-active status of migrant *comuneros* is defined. In general terms, however, both communities measure the degree of activity as a migrant's participation in community institutions, whether through formal or moral forms of compliance. Table 7.7 shows the number of migrant (non-resident) *comuneros* who, in the first half of 2008, were maintaining an active status in the home community. Data are based on interviews with the municipal and communal authorities in both communities (and their villages), a review of the registers showing individual migrant contributions, and findings from the household survey.

Table 7.7: Numbers of active and non-active *comuneros*

Village / COMMUNITY	Non-resident *comuneros*	Semi-active	%	Non-active	%
Comaltepec	215	140	65	75	35
La Esperanza	55	41	74	14	26
San Martin Soyolapam	29	17	59	12	43
COMALTEPEC	299	198	66	101	34
ANALCO	240	122	51	118	49

In the community of Comaltepec, 66% of migrant *comuneros* are maintaining communal rights. This ranges from 74% of migrant *comuneros* from La Esperanza to 59% in the case of San Martin Soyolapam – attributable to the social capital that exists among migrants and between the migrant and home communities, and an indication of how formal obligations can facilitate increased participation among migrant rights-holders. This large pool of active migrant *comuneros* represents an important source of potential funding for village-level investments. An important caveat is that the authorities in Comaltepec will consider a migrant *comunero* to be 'active' if he contributes regularly to *tequios*. Since migrant obligations were only brought into force in 2004, most of those considered active have yet to be named for a *cargo*. Such postings constitute a greater commitment than (financing) *tequios* and can be the deciding factor between continued compliance and the forfeit of communal rights. From interviews conducted in Los Angeles, it is apparent that migrants see a big difference between contributing US$12 for

missing the occasional *tequio*, and having to return home to carry out a *cargo*, or pay a substitute that will cost from US$10 to US$14 per day over an 18-month period. This can amount to US$6,500 for a top-level *cargo*, such as president of a municipal agency, and just under US$5,000 for a low-level *cargo* such as *topil*.

In Analco, 240 *comuneros* (or 70% of the total number of recognised *comuneros*[118]) reside outside of the traditional community territory. Of these, 122 (or 51%) are sending monthly contributions, therefore considered active and maintaining rights within the community. In comparison to Comaltepec, this figure is considerably lower[119], and likely due to several factors. First, while the establishment of fewer migrant obligations should make compliance more straightforward and appealing, a less coherent approach can instil the sense among migrants that they can maintain rights without participating fully in community obligations. Second, a higher proportion of migrants from Analco reside in Mexico rather than the U.S. Some have taken their families with them, leading to fewer incentives to maintain rights in the home village because of weakened ties. At the same time, as undocumented workers, the more precarious existence enjoyed by migrants in the U.S. encourages a higher proportion to maintain healthy links with the home community. Last of all, migrants from Analco are more widely dispersed around the U.S, with populations in Los Angeles, Las Vegas, New York and North Carolina, among other destinations. In contrast, nearly all U.S.-bound migrants from Comaltepec reside in the Los Angeles Metropolitan Area, which makes individual migrants easier to track down, and can strengthen the sense of belonging and duty that the migrant *comunero* feels towards the home community.

Levels of participation in HTAs are pretty consistent among migrants from both communities (Tables 7.8 and 7.9). In four of the six associations currently active, around half (45-50%) of migrant families are regularly involved in activities.

[118] Although *comuneros* recognised by the communal authorities in Analco number close to 350, many have left the community or passed away, and so those registered in the RAN (National Agrarian Register) number fewer than two hundred. At different times since the 1960s, the village authorities have submitted paperwork to the federal government to update their status. However, the application (*tramite*) process is notoriously slow, and the last round of applicants submitted to the Procuraduria Agraria in mid-2008 were still waiting at the end of 2009.

[119] Interestingly, it is also considerably lower than the estimate of Luis Sosa Alvarez, a native of Analco who published a book about the community in 1999. In it, he wrote that "of migrants, 90% conserve their identity with respect to their community or origin and are recognised as active members who collaborate with the municipality… they are very few that break ties with the village" (Sosa Alvarez 1999).

Table 7.8: Percentage of *Analqueño* migrant families participating in HTAs

Hometown Association	Estimated level of participation (% of migrant families)
Oaxaca City	50%
Mexico City	45%
Las Vegas	80%
Los Angeles	40%

Table 7.9: Percentage of *Comaltepecano* migrant families participating in HTAs

Hometown Association	Estimated level of participation (% of migrant families)
Los Angeles (Santiago Comaltepec)	45%
Los Angeles (La Esperanza)	65%
Los Angeles (San Martin Soyolapam)	-

The one exception concerns *Analqueño* migrants based in Las Vegas, where approximately four-fifths participate in HA initiatives and contribute to the community coffers. This may be because the majority of migrants in Las Vegas come from a small number of extended families, and so there is greater social pressure for all to cooperate with the home community. In Los Angeles, in contrast, the social cohesion of Analco's migrant community is complicated by local geography, which makes the organisation of meetings and fundraising events more difficult. As Constantino Sosa explained: "It is a challenge to keep the *mesa* going since there are fewer *Analqueños* here than in Mexico City and we are spread out across the city." He estimated that there were three hundred *Analqueños* in Los Angeles, including *comuneros*, their wives and children, and of these no more than 40% regularly participated in the *mesa* and attended locally organised events. This is less of a problem for migrants from Santiago Comaltepec, who form a very large group and are congregated in a handful of neighbourhoods.

7.7 Obstacles to Participation in HTAs and Compliance with Migrant Obligations

When interviewed, the communal and municipal authorities in both communities were of the opinion that there needed to be a stronger call or invitation to *paisanos* in U.S. and Mexican cities to recognise their commitment to the home village. Specifically, this meant that migrant *comuneros* were expected to continue to comply with *cargos* and *tequios* (either personally or financially), as well as provide greater support to the home community through contributions to

help fund new village-level projects and improvements to existing infrastructure. This forms the central tenet of the 'migration as opportunity' approach as reported in the literature (VanWey et al. 2005; Adger 2003; Cohen 2005).

However, the level of compliance with migrant obligations and participation in HTAs is complicated and tricky to analyse. On the one hand, the existing level of cooperation is hugely impressive and testament to the social capital and cohesion that exist among migrants in Los Angeles, Las Vegas and Mexico City (among other places), and also between migrants and their home villages in Oaxaca. This study shows that a sizeable number of migrants do retain family ties and an emotional attachment to the home community, its lands and its customs. These are the individuals who come back for community celebrations (or practice these customs with *paisanos* in migrant destinations) and to remember their deceased relatives. They may return if called to serve a *cargo*, interrupting careers in the wider world, or ensure that a substitute can be found if unable to comply in person. On the other hand, the success of such an approach is based on two variables, both of which are subject to change over time. These are:

1. The number of migrants (with strong links to the home village) who are willing to contribute financially to the home community on a regular basis; and,
2. The number of migrants with enough disposable income to contribute the funding required.

While study data suggest that at least half of all absent *comuneros* from Analco and Comaltepec are maintaining their active status, interviews with migrants in Los Angeles and Mexico City show that a significant (and growing) number are questioning their continued participation in these commons institutions:

> There are not enough people to comply with the *cargos*… many of the migrants do not want to cooperate and there is no way to force them… there is no law… the youngsters who leave, well they do not have family [dependents] or a house in the village so they have far less incentive.
>
> Constantino Sosa, former president of HTA of *Analqueños* in LA

> Many people who leave forget about their obligations [to the community] and many think that 'they cannot make me comply because I no longer use the services provided by the village'… and they forget about their moral obligations.
>
> Municipal President, Analco

One *Comaltepecano* and long-term resident of Los Angeles told me that the *cargo* and *tequio* systems are "no longer relevant in today's world", adding that "a lot of the guys in Los Angeles continue to comply with *cargos* out of good faith but have no intention of going back to Comaltepec". As their own material needs increase, some migrants will stop cooperating, leading to a reduction in the pool of active migrant *comuneros* that the home community can access. In both La Esperanza and San Martin Soyolapam, the authorities reported that among the *comuneros* who have left since the year 2000, very few have so far cooperated with their obligations and paid for *tequios*.

Compliance with communal obligations is dependent upon three main factors that can (and do) alter over time: (i) changing migrant profiles; (ii) a shift in migration patterns; and, (iii) new attitudes among second and third generation migrants. I now look at each of these in turn.

7.6.2.1 Changing migrant profiles

The *comuneros* that comply with their obligations most readily are those with a family, a house, and/or land in the home village, and therefore plan to return at some stage. They have a strong set of incentives, therefore, to meet obligations and maintain full communal rights. Data from the household survey, however, show that this group of 'classic' temporary migrants is now outnumbered by the combined forces of two emergent groups: (i) migrants with families in the U.S.; and, (ii) single male and female migrants without dependents in the home village (Table 7.10). These groups have fewer incentives to comply with community obligations and/or contribute the level of financial support requested by the village authorities.

Table 7.10: Estimated numbers of U.S-based migrants with dependents in home village

Community	Male migrants with family (dependents) in home village	Other categories
Santiago Comaltepec	14%	86%
Analco	24%	76%

Many migrants who left as single men and women have since married and now find that they have little spare cash to send to the home community. Chapter 5 showed that household-level remittances have already fallen because of this. While many are willing to contribute (via the HTA) to help fund festivities in the home village, they are less inclined and less able to send money for other forms of investment. For example, migrant contributions have been used in

Analco to turn some *cargos* into paid positions. During the period 2007-2008, the two remaining *mayores* in the village were maintained thanks to contributions from migrants in Las Vegas. A question mark, however, hangs over how sustainable this form of financing can be over the long term. This would be dependent upon a set of factors over which the home community has little control, namely the financial wellbeing of its non-resident members. As Neudalit Sosa Lopez, a LA-based *Analqueño* explains: "The majority of migrants are now '*haciendo la vida aca*' (living their life here) and do not envisage going back to Analco" – a sentiment easily applied to migrant communities in other Mexican and U.S. cities. The likely consequence is that the number of migrants sending financial contributions to the home village is set to fall rather than increase.

7.6.2.2 Shift in migration patterns

Closely tied to the changing migrant profile is the shift towards permanent or semi-permanent migration in recent years.[120] These two categories include migrants who do not plan on returning to live in the home village during their productive lifetimes. Other 'permanent' migrants in the U.S. may return to Mexico in the future, but do not expect to settle back in the home village. Likewise, there are migrants who will 'retire' to the community when they reach old age. In doing so, they are no longer able to fully participate in community institutions or productive land-based activities. Through interviews with communal authorities and migrant leaders in Mexico and the U.S, it is possible to estimate the number of non-resident *comuneros* considered to be permanent or semi-permanent migrants (Table 7.11).

Table 7.11: Estimated numbers of permanent migrant *comuneros*

Village / COMMUNITY	Resident in U.S.	Considered Permanent	%	Resident in Mexico	Considered Permanent	%
Santiago Comaltepec	163	50	31	52	40	77
La Esperanza	40	25	63	15	8	53
Soyolapam	18	12	67	11	9	82
COMALTEPEC	221	87	39	78	57	73
ANALCO	80	15-40	19-50	160	140	94

[120] I use 'semi-permanent' to refer to those migrants in the U.S. who are undocumented workers and thus always at risk of being deported back to Mexico. If this happens, they may be forced to return to the home village.

The data presented in this table take into account the numbers of *comuneros* who are complying with their obligations and/or maintaining houses in the home village. The findings are fairly consistent between the two communities. Firstly, both show that the level of 'permanency' is highest among migrants in Mexican urban centres – perhaps unsurprising given that, as legal citizens, they are able to settle down and work without the threat of deportation. Consequently, the majority of *comuneros* who left for Mexican destinations have been there for many years, with a significant number having since married or taken their families with them. Consequently, their material ties to the home village are much reduced.

With regards to migrants residing in the U.S, the numbers considered permanent or semi-permanent are significantly lower, although numbers appear to be rising. For Analco migrants, the communal authorities estimate that only 15% are considered fully permanent migrants. This figure, however, is based on those who have attained papers and legal residency status in the U.S. In contrast, migrant leaders in Los Angeles and Las Vegas paint quite a different picture by estimating that as many as 40% of current migrants do not expect to return to live in the home village. For the community of Comaltepec, the figure is lower at 39%, although it is above 60% for migrants from the two smaller villages of La Esperanza and San Martin Soyolapam.

Returning to Chapter 5, the household surveys showed that many *comuneros* have been living in the U.S. for ten, fifteen or twenty years (and sometimes even longer). While some migrants took their families north, many others have met their partners in the U.S. and since started a family. To reinforce this point, almost three-quarters of U.S.-based *comuneros* from Comaltepec have sons and daughters living there with them. While some of these children are from the home village, the majority were born in *el Norte*, and thus able to claim U.S. citizenship and enter the school system[121]. The personal circumstances and interests of many of these migrants have therefore changed upon starting a family – encouraging longer (and indefinite) stays. This has gone hand in hand with the tightening up of immigration and border enforcement policies designed to stem the flow of undocumented workers between the two countries. Under these conditions, circular migration is only really feasible for migrants who have 'papers' or attained legal status in the U.S, a standing enjoyed by fewer than a sixth of migrant *Analqueños* and *Comaltepecanos*.

[121] U.S. courts have determined that public schools, through to high school level, must accept all children regardless of immigration status. Migrants' children, however, are more restricted when entering post-secondary education, since their access to financial aid is generally limited.

7.6.2.3 Attitudes among second and third generation of migrants

> My generation of migrants, who were born and raised in Analco, we still maintain pretty strong links with the community, both through the *mesa directiva* but also because of family we still have in the village… many are building houses with the idea of retiring to Analco. The problem will come with the second generation of migrants… my children, for example, and then their children as the third generation. That is where the challenge lies. How do we get these younger generations involved with the life of a village in Oaxaca where many were not born, and which few have visited.
>
> Neudalit Sosa Lopez, *comunero* of Analco and resident of Los Angeles

A final obstacle concerns the attitudes of second and third generation migrants, which can differ markedly from those of their parents or grandparents who were born and raised in the home community. This is one of the factors that will determine the future vulnerability of affected communities, and the degree to which current institutional adaptations (including HTAs) are likely to be a success over the medium- to long-term. The sense of belonging that first generation migrants feel towards a 'home' village that may be hundreds or thousands of miles away from their current place of residence can extend to their children – many of whom were born outside of Oaxaca. Indeed, some children of migrants in both the U.S. and Mexico are actively involved in community-related activities. These range from playing in the youth music band to participating in local basketball tournaments against other 'village' teams from the Sierra Norte region. Interviews I conducted in Los Angeles bear witness to this sense of belonging. An example is Constantino Sosa's son who upon announcing his engagement, told his father "I want to get married in my pueblo [Analco]… it is where I come from" – this despite the fact that he was born in the U.S. and had only visited Analco a handful of times. Likewise, Irwin and Zoila, the U.S-born children of Eliseo Luna, both told me of the strong connection they felt toward Comaltepec, which influences how they identify themselves in cultural terms.

However, it is unclear how many second and third generation migrants fall into a similar category. Migrant children with particularly strong feelings towards the 'home' community were often the sons and daughters of documented (legal) migrant workers (who can take their family back to Oaxaca on a fairly regular basis), and, as mentioned, this group accounts for a small minority of migrant children in the U.S. Even then, it is not certain that children such as

Constantino's or Eliseo's would be willing to make productive investments or support the continuity of key governance arrangements back in Oaxaca. This doubt of mine became more pronounced in Analco in December 2009, when I had the opportunity to meet a number of youngsters visiting with their families from Mexico City, Los Angeles and Las Vegas. Having spoken at length about a great number of topics (life aspirations, study, work, village life), it seemed clear that although they appreciated the 'cultural' connection to their parents' home village in Oaxaca, the tie rarely extended beyond the occasional opportunity to visit relatives during the holidays. Most of these migrant children saw themselves as 'Mexican American' rather than '*Comaltepecano*' or '*Analqueño*', and having grown up in California or Mexico City, they were quick to note that their futures lay in an American or Mexican city rather than a highland village in Oaxaca.

7.8 Summary

Returning to Jared Diamond's roadmap, we can see that through individual and collective perceptions, both study communities have developed adaptive strategies in response to the dwindling pool of communal labour in their villages. Migrant obligations are centred on the '*monetarisation'* of the *cargo* and *tequio* systems, whether through formal (wriiten or legislated) compliance with *cargos* and *tequios* (in the case of Comaltepec) or informal (not legislated) monthly cash contributions (in the case of Analco). At the same time, the establishment of Hometown Associations (HTAs) has facilitated the transfer of financial and cultural resources from migrant to home communities. These institutions, and the array of activities that they involve, reflect the number of migrants residing in a small number of destination cities, the length of time that many stay at these destinations, and the strength of the material and non-material ties that they maintain with the home village. The forging of such strong translocal links between the sending and migrant communities is made possible by the way migrants live their lives. The high degree of social cohesion that exists among these migrant communities has been crucial for maintaining a mass of active *comuneros*, with social pressure from peers encouraging individual migrants to contribute to the home village both financially and culturally.

Despite impressive levels of social capital and social organisation, however, a number of obstacles have emerged. Specifically, the institutional adaptations of sending communities, and the potential of HTAs to expedite migrant investments in the home community, are being

undermined by two principal changes: (i) the changing nature of migrant lifestyles; and, (ii) the switch from temporary, circular migration to a more permanent form. This is particularly acute among U.S.-based migrants, where new personal situations and family commitments can quickly alter one's status from 'active' to 'non-active' – further undermined by changes to immigration and border policy that encourage undocumented migrant workers to stay longer in the North. As their absence is prolonged, many migrants will have to reconsider the benefit of maintaining communal rights in the home village. Such trends (many of which are captured in Text Box 7.3 on the following page) question the future ability of sending communities to manage the timing and flow of migration, and to use migration as an opportunity to increase levels of indigenous investment in local productive activities (designed to stimulate community economy). The difficulties they face set to deepen as communities become more dependent on second and third generation migrants with little or no material ties to life in rural Oaxaca.

Text Box 7.3 - *"It's tough for us and tough for those left behind"*

One Saturday afternoon, in the backyard of a migrant's home in the City of Downey, I chatted with Tomas and Carlos (real names withheld), two *comuneros* from San Martin Soyolapam who provided some fascinating insights into migrant perceptions of the home village and why some choose to maintain communal rights and others do not.

Tomas is 30 years old and has been living in Los Angeles for 10 years. He is married to a girl from Soyolapam whom he met in LA, and they have five children together. He does not contribute to *cargos* or *tequios* in Soyolapam, since he no longer has a house in the village. He has no real incentive to maintain his rights, and with such a large family has no money to spare to send to the village or community authorities. As he explains, the demands placed on those in the community have led some migrants to question the system and think twice before returning: "It is difficult to re-accept the principles of the village when it basically says that the good of the community comes before you, isn't it?"

Carlos is 34 years old. He arrived in 2005, and is living in Los Angeles with his wife and two children. He has been able to build a house in Soyolapam with the money he has earned in Los Angeles. Although he hopes to move back to the village at some point, he does not know when that might be, especially since his children are still in school. He sends money for *tequios* to maintain his status as a *comunero*, and he recently learnt (August 2008) that he had been named for a *cargo* in the village (municipal secretary). He does not know what to do. He cannot go back yet and will have to see if he can raise enough money to pay for a substitute. That would be a major drain on his finances given that the position lasts for a year. He does not know if he would lose his rights if he fails to comply. He would face certain consequences from the community, and the fact that he has a house in the village would come into play.

Both men tell me that the situation in Soyolapam is difficult. For many years it was just a *ranchería*, but in the mid-1990s it became a municipal agency and meant that local men had to be responsible for a whole set of additional *cargos*. This leaves a heavy burden on the twenty or so *comuneros* remaining in the village. However, most of the *paisanos* in L.A. feel that it is unrealistic to expect migrants to fund *cargos* and *tequios* over the long-term. They understand the community needs help but at the same time they have their own lives to lead and responsibilities to their families. They both feel that the system needs to be modified so that it is less burdensome to both resident and non-resident *comuneros* – neither was clear, however, as to what those modifications would or should entail.

They both see the availability of work as key to their continued presence in Los Angeles. If they can work they will stay, at least for as long as their children are in school. After that they may return to Mexico, although Tomas and his wife would settle in Oaxaca City. Both say it is difficult to envisage making a life for themselves in Soyolapam because of the lack of economic opportunities. Carlos's family used to grow coffee but the market collapsed and they could no longer afford to continue. Other than that, the options are limited they tell me, since corn is for subsistence only and there is little money in livestock. These are the reasons they left and since the situation has yet to improve, there seems little point in going back. They estimate that around two-thirds of San Martin Soyolapam migrants currently resident in Los Angeles plan to return to Mexico at some point, but only half of these are likely to re-settle in the home village.

CHAPTER 8 – CONTINUITY AND CHANGE IN COMMONS GOVERNANCE: CHALLENGES, OPPORTUNITIES AND SCENARIOS

> Hundreds of millions of people all over the world have abandoned their rural village homes in pursuit of cash incomes and a piece of the global action, crumbs from the great commodity cornucopia that is the modern world. In Mexico, this process has sucked some 20 million ex-*campesinos* into Mexico City and other urban centres and enticed as many as 10 million more to the U.S. as undocumented workers. Some Oaxacan villages… have been reduced to a shell by the loss of the majority of their able-bodied male (and increasingly female) population… [a response] to the global market's demand for cheap labour. Some would say "good riddance" to the narrow confines of the hardscrabble subsistence lives of Mexico's rural villages. Yet one needn't be a romantic blinded by nostalgia to recognize what may be lost in this great transformation.
>
> Eugene Hunn (2008:236)

> Migration has helped to make the village more stable but it has not improved it … it helps with public works but there is nobody to do *cargos,* work in the fields or maintain the houses.
>
> Apolinar Manzano Santiago, 78, citizen of Analco

> Life is different now… I feel that this village is going to find itself all alone … everybody is dying and the houses are becoming derelict, all the fruit trees are going to die because there is nobody to look after them.
>
> Samuel Sosa Bautista, 78, *comunero* of Analco

8.1 Introduction

With elevated out-migration extending into a fourth decade in the Sierra Norte, the demographic impacts have intensified, while the cultural gap between rural and urban societies has narrowed. This study concerns how communities in northern Oaxaca are striving to find a balance between individual advancement and collective responsibility, and between maintaining traditional customs and practices while taking up economic opportunities for themselves and their families. The interviews and testimonies featured in this study have focused on a range of interactions between communities and their landscapes of practice (that incorporate institutions, customs and productive activities), and the multiple changes facing the commons collective. Can the people of Analco and Comaltepec "have their cake and eat it too" (Hunn 2008:238) – to hold

fast to traditional lands, ways of life and knowledge while carefully embracing the wider world? Like any form of social organisation, commons regimes are not static entities, but subject to degrees of change through adaptations and modifications to underlying institutions and practices. Over periods of time, some customs and institutions persist, while others fall by the wayside and new arrangements emerge. Along this evolving continuum, is there a point at which discontinuities supersede continuities and regimes undergo transformation into some kind of alternate state?

Building upon the findings presented in Chapters 5, 6 and 7, the objective of this chapter is to assess community vulnerability to change, as driven by migratory patterns that have shifted over time. Section 8.2 begins by identifying three of the principal challenges facing long-standing commons regimes in northern Oaxaca, and delves into the divergent perspectives offered by the rational choice framework and the so-called 'social practice' school of thought (based on ideas of moral economy and institutional 'embeddedness'). Section 8.3 builds on this foundation to contemplate how, in a collective sense, changes observed among the two study communities represent a transformation, rather than a diversification of local ways of life. Section 8.4 looks at the scenarios[122] facing the study communities, their territorial resources and the region more generally. This is based on what we know about the exogenous drivers that have played, and continue to play, a powerful indirect role in the decision of people to leave their villages, the institutional responses and adaptations made so far, and the opportunities that present themselves within a contemporary trans-local setting. Section 8.5 provides a closing summary.

8.2 Continuity and Change: Lessons for the Commons

Conventional commons thinking has focused on how groups of appropriators devise institutions (rules-in-use) to regulate and conserve their shared (natural) resources, with collective action a requirement to formulate, implement and enforce these rules. This has enabled scholars to identify a set of resource and resource user attributes associated with successful commons management systems (Ostrom 1990; Baland and Platteau 1996; Agrawal 2002). Yet, these attributes typically deal with resources, bounded territories and communities that are

[122] At no point does this study undertake what is known as 'scenario planning', which has emerged in recent years as a powerful policy tool. Rather, I use the term 'scenario' in a fairly loose manner to conceive of pictures of the future, and point to what we might expect to see in fifteen to twenty years time if current trends continue.

'local' in nature. As this study has shown, commons regimes are complex social-ecological systems – characterised by nonlinearity, uncertainty, emergence and multiple levels. Despite claims that commons theory is sufficiently robust to enable prediction at the local level (Berkes 2009), its ability to predict how a regime may respond to endogenous and exogenous drivers of change is less clear (Baker 2005). In particular, theory based around collective action has been criticised for its de-contextualised understanding of common property relations (Johnson 2004), with the causal importance of market forces, population pressures and the state largely absent from the literature (Agrawal 2002). This section focuses on what I consider to be three of the most important challenges facing commons regimes because of the demographic and cultural changes driven by long-term out-migration. These are: (i) the *deterritorialisation* of traditional community spaces and identities; (ii) the appropriate adaptation of institutional arrangements; and, (iii) reduced resource practice and declining territorial mobility.

8.2.1 De-territorialisation of community

Commons scholarship has often taken 'community' as a given, and rarely has our (collective) understanding of what we mean by the word 'community' become the focus for research. Rather, the attention of scholars is normally taken up by resource type or the institutional arrangements that guide the management, use and conservation of that resource. Yet, in the context of Oaxaca's forest commons, the cumulative effect of long-term and elevated out-migration encourages a rethink with regards to 'community' and what we consider the term to mean. While avoiding the assumption that communities are small spatial units whose members are economically, politically, and socially homogenous, the commons literature still generally refers to a group of resource users situated in a bounded and easily identifiable territorial space. However, as Berkes (2009:263) explains, "resource boundaries rarely match social boundaries" and "drivers originating at other levels of social and political organization have major impacts on what happens at the community level". What this study shows is just how dynamic commons regimes can be; in this case, subject to expanded geographical scales as community membership spreads out to cover multiple localities, some of which lie outside the traditional communal territory. In consequence, "as citizens reside in ever more dispersed networks, [community] governance is becoming increasingly de-territorialised" (Fox and River-Salgado 2004:454).

In northern Oaxaca, as migration increases and becomes less temporary or cyclical in nature, the demographic centre of gravity is shifting away from bounded communities and into

the populations of trans-local communities. The emergence of *de facto* de-territorialised[123] communities has some profound implications for commons regimes whose systems of governance were designed for operation at the local level. Two contrary trends are evolving. On the one hand, new residence patterns are straining municipal and communal governance, to the point where a major concern locally is the future well-being of municipalities and their agencies as viable self-governing entities. On the other hand, while communities are weakened by migratory dispersion, they are now able to "tap and accumulate greater financial resources from citizens living and working temporarily or permanently in the north [or urban Mexico]" (Fox and River-Salgado 2004:456).

The process of de-territorialisation is such that it encourages a re-evaluation of the excludable and subtractable nature of common-pool resources. For example, the meaning of 'who is included and who is not' and 'who is *still* eligible to derive benefits and based on what criteria' requires some new thinking. This comes to light most clearly in the case of Analco, where the community, after much delay and uncertainty[124], finally sat down in 2009 to discuss proposals for drafting a new and comprehensive communal statute. The existing version, which came into force in 1995, had long been considered inadequate for addressing many of today's needs and interests. Over the course of eleven communal assemblies, the community discussed an exhaustive list of issues; indeed, while the 1995 Statute contained eight Chapters and sixty-five Articles, the proposed Statute I reviewed in December 2009 (and which came into force mid-2010) stood at one hundred and twenty-six Articles, almost double the previous number. One of the main reasons why discussions were so complex is because community membership, through geographical and cultural dispersion, has become ever more heterogeneous, with sizeable groups of rights-holders now residing outside the home village – in Oaxaca City, Mexico City, Los Angeles and Las Vegas. Of all the issues facing the community, the question

[123] Of course, there is a literature that frames the establishment of trans-local communities as a form of 're-territorialisation', whereby social and cultural networks structure the life of migrants at different levels, and the sense of multiple territories emerge. However, I believe that de-territorialisation is the more accurate conceptualisation given the context of shifting migratory patterns and the breakdown in local economy based on the primary sector.

[124] There had been previous attempts to get this process started. As recently as December 2007, the village authorities met with heads of the HTAs from Mexico City, Las Vegas and Los Angeles to discuss various issues concerning migrants and their responsibilities to the community. They were unable to agree upon a strategy to pressure their members into doing more – while the authorities argued that more help was needed in terms of migrant contributions, the HTAs argued that the numbers of those willing to help were falling and there were limits to how much assistance could be provided.

of migrant obligations is among the most conflictive. While home residents have felt for some time that 'free-riding' migrants should be legally coerced into complying with *cargos* and *tequios*, [125] the response of non-resident *comuneros* and their families has been split. Migrants in Oaxaca City were the most in line with the feelings of the home community; the most accepting of the need to establish institutional and financial obligations among migrant members. Their proposal suggested that all Mexico-based *comuneros* should come to Analco to help with the most important and demanding *tequios* (maintenance of forest roads, for example), in addition to paying for any *cargo* they could not perform in person. Oaxaca City-based migrants were even willing to pool resources if any of their group found themselves in such a position. Such concessions have been less forthcoming from the much larger and more powerful Mexico City contingent. There are as many migrant *comuneros* in Mexico City as resident *comuneros* in Analco – this group is very well organised, with a long history and many families now established in the city. Over time, and as their numbers have increased, their power base has grown, giving them more say in community affairs.

As fast maturing migrant communities, Comaltepec and Analco have moved from the migration phase through the settlement phase to the beginnings of the consolidation phase (after Smith 2006), thus supporting trans-local life in several ways. The above example from Analco points to a number of important consequences of the "deterritorialisation" of community. Firstly, from a membership perspective, multiple migrant communities have led to the emergence of multiple voting blocks. As time passes, and such communities consolidate, migrant *comuneros* can become major players in the community decision-making arena. This is most evident in Analco, largely because the community's most vociferous migrant group is in Mexico City rather than the United States, and thus able to participate regularly in communal assemblies where most decisions are made. Secondly, the Analco case illustrates how the institutional adaptations to out-migration are complicated as migrant voting blocks gain ascendance; such that the sending community may find greater success in placing demands and obligations on migrant members if

[125] The issue that finally convinced the community to create a new communal statute, and determine the legal rights and obligations of migrant *comuneros* and *comuneras,* was the practice of migrants – who were neither living in or cooperating with the community - transferring rights over 'their' *terrenos* to family members. What was essentially a form of 'free-riding' pointed to a common misunderstanding among community members as to the legal ownership of agricultural plots. People talk about being the *dueño* (owner) of their *parcela* or *solar*, when in fact individuals hold 'possession rights' rather than property rights. Many do not realize this, and think "it is *their* piece of land and they are allowed to do what they want with it" (personal communication, Filemon Manzano).

changes to communal statutes are made before migrants have consolidated and formed powerful interest groups within the wider community arena.

In a collective sense, these changes are impacting the very processes of community-making, whereby societal interactions modify and contribute to the creation of particular types of communities and social relations. With the emergence of translocal migrant communities, community-making in Analco and Comaltepec is changing as distributions of social power and privilege move beyond the bounded territorial arena to incorporate migrant diasporas, and a dialectic emerges between resident and non-resident community members. These findings support the view that communities are not static but change over time (Agrawal and Gibson 1999; Baker 2005), and that from a commons perspective, researchers should strive for a thorough understanding of the multiple actors and their diverse interests in using common-pool resources, the processes by which these actors interact with one another, and the institutional arrangements that structure such interaction.

8.2.2 Appropriate adaptation of institutional arrangements

For this study, the main focus of analysis concerned the institutions that define resource-dependent communities, specifically recognizing the ability of institutions to renew and reorganise, learn and adapt, and deal with uncertainty and change (Holling 2001; Berkes et al. 2003). It has been argued that community-based institutions, rather than communities themselves, create the conditions for sustainable commons management (Nayak and Haque 2005). Household-level and community-level data made clear the multiple impacts that out-migration is having on the *cargo* and *tequio* systems – the institutional arrangements that are central to village life in northern Oaxaca, including the administration of communal territorial resources. Chapters 5 and 7 showed that the *cargo* system in particular has been weakened by moderate to severe deficiencies in offices of municipal and communal government. The decision to migrate invariably factors in community obligations, and so the growing demands of the local governance system has affected attitudes among significant numbers of community membership. These demands are themselves directly influencing migration flows to and from the community, and as the labour pool dwindles further, a vicious cycle emerges.

From an institutional perspective, adaptations can include activities that are taken before impacts are observed (anticipatory) or after impacts have been felt (reactive). Both anticipatory and reactive adaptations can be planned – a result of deliberate decision-making – while reactive

adaptations can also occur spontaneously. In both Analco and Comaltepec, the main institutional responses have been reactive and directed, in the main, towards coping rather than any attempt to manage the flow and timing of migration. Chapter 7 suggests that the greatest hope for affected villages lies in the establishment and strengthening of trans-local ties, which can provide important opportunities for the continuity of existing customs and norms, and the emergence of new institutional arrangements. This brings ideas of moral economy (Thompson 1971; Scott 1976) and institutional 'embeddedness' (McCay 2004; Baker 2005; Stevens 1990) to the fore, whereby cultural norms, mores, values and shared histories play a key role in guiding the organisation and decision-making of social collectives. In both Analco and Comaltepec, collective action based on shared communities of origin show that migrants do take their sense of community with them. Migrants have established *mesas directivas* (HTAs) in Los Angeles, Las Vegas, Mexico City and Oaxaca City, and it is through these trans-local institutions that community can be both strengthened at 'home' and recreated among *paisanos* (countrymen) living in far away cities. As Fox (2007:296) puts it, "while 'exit' may sometimes weaken 'voice', at other times they may reinforce each other".

In particular, what I refer to as the '*monetarisation*' of the *cargo* and *tequio* systems – obliging migrants to provide compensation for non-participation – provides an opportunity for non-resident community members to finance the continuity of local customs and ways of life. However, while out-migration was once temporary or circular in nature, over the past fifteen years or so, a form of semi-permanent or permanent migration has come to dominate – coinciding with an increase in migration to the U.S. during the 1990s and early 2000s. In this sense, the delayed decision of *Comaltepecanos* and *Analqueños* (in particular) to make the requisite modifications to their communal statutes may have come too late in the day. To be most effective, changes should be anticipatory rather than reactionary adaptations, and thus implemented from the get go, before numbers of migrants and new migratory patterns undermine the potency of such modifications. This is borne out by findings in the field (Chapter 7); despite the emergence of HTAs that can help maintain and strengthen cultural and productive links between the migrant and home community, an increasing number of migrants participate either intermittently or not at all in these trans-local institutional arrangements.

Indeed, compared to high expectations associated with a more 'romanticised' view of trans-local communities (Cohen 2005, Klooster 2005, VanWey et al. 2005), the levels of actual

participation are modest; consistent with findings for some other Oaxacan and Mexican communities (Fox 2007, Jones 2009). This is a consequence of the changing nature of migrant lifestyles, where personal and family commitments can quickly alter one's status from 'semi-active' to 'non-active'. As heading North becomes more expensive and more difficult (Cornelius and Lewis 2007), migrants without papers (the vast majority) are staying longer in the U.S. and shunning the temporary form of migration so prevalent during the 1980s and early 1990s. For undocumented workers, "once circular migration has become a one-way trip" (Fox 2007:289). These changing realities have seen community membership take on a more complex look, whereby *comuneros* can be placed into four distinct categories according to their level of village and community participation:

1. Resident active *comuneros*
2. Resident retired *comuneros*
3. Non-resident semi-active *comuneros*
4. Non-resident non-active *comuneros*

As recently as the late 1970s, *comuneros* would have consisted of two main categories; **resident 'active'** and **resident 'retired'**. Both groups lived locally in the community, the only difference being that older *comuneros* (those over 50 or 60 years of age) had 'retired' from active service (no longer obligated to comply with *tequios* and *cargos*). They did, however, still participate and vote in communal assemblies and elections. Since then, the cumulative effects of three decades of out-migration have led to the emergence of an increasing number of absent or **'non-resident' *comuneros***. Of these, we can identify two main groups. The first group continues to maintain strong links with the home community – sending money in *lieu* of performing *tequios*, supporting community-level infrastructure investments (via the hometown association), and returning home or finding a substitute to carry out *cargos* that they are named for. These are **'semi-active'**[126] *comuneros*. While they may send their wife to represent them in the communal

[126] It is important to note that the *semi-active* category is not (explicitly) recognised by village authorities in either community. In Comaltepec, and in accordance with recent (2004) modifications to the communal statute, if a migrant *comunero* pays for *tequios* and finds a substitute to carry out any *cargo* that he cannot perform personally, then they are considered 'active' and maintain full *comunero* rights. In Analco, those that make monthly contributions via the hometown association are also considered active *comuneros*[126]. However, my own view is that considering them as 'active' puts them on too equal a footing with resident, active *comuneros*. It fails to distinguish sufficiently between those who are fully active in the home village, and migrant *comuneros* who are unable to personally participate in communal work obligations and decision-making. It also fails to reflect the changing nature

assembly, and maintain full rights by paying substitutes to ensure compliance with their communal obligations, they are not present in person to participate actively in daily village life. At the same time, a growing number of (ex) *comuneros* make up the **non-resident, non-active** group. There are those who have severed all ties with the community, and others who continue to visit family back home but refuse, or are financially unable, to participate in the *tequio* and *cargo* systems. By not participating in customary institutional arrangements, they may have temporarily or permanently forfeited their rights as *comuneros.*

Key to this institutional analysis is an understanding that today's *comuneros* can (and do) move between these categories. For example, some non-resident, semi-active *comuneros* may consequently return to their village and integrate themselves back into community life and a fully 'active' role. Other migrant *comuneros,* meanwhile, may see their personal situations change and no longer have the resources at hand to maintain their semi-active status. The longer they stay away, the less likely they are to return and thus more likely to reconsider their continued participation in community customs. Crucially, this modifies the playing field in terms of the appropriate community responses to demographic change. While the two study communities have taken steps in recent years to legislate and enforce migrants' community membership obligations, in the context of shifting migrant profiles, sending communities may now need to consider additional institutional changes to allow a greater proportion of community membership (both resident and non-resident) to feel enfranchised. Having spoken to numerous migrants resident in Los Angeles, Las Vegas and Mexico City, there are a sizeable number who may not respond positively to attempts to ratchet up obligations or encourage a greater level of financial contributions to fund community-level projects. As discussed in Chapter 5, some leave the village or choose to remain longer in the U.S. or Mexico City because of the burden of the local governance system. As such, any attempt to make the system stricter will fail to appeal to these individuals. In both communities, there is a growing tension between the **investment expectations of the home community** and a **willingness among members of the migrant community to meet those expectations**. In other words, while the home community feels that

---

of the migrant lifestyle (and this applies particularly to those in the U.S.), which is subject to financial instability and changing family commitments that can (and does) quickly alter one's status from 'active' to 'non-active'.

migrant *comuneros* should be asked to contribute more to local needs, many migrants feel that the demands made of them currently are sufficient[127].

In particular, the current institutional framework tends to alienate migrants who want to maintain ties with the community but are unable to comply with *cargo* and *tequio* obligations (whether in person or through payments), either because of personal circumstances or due to holding an ideological aversion to how the current system functions. The story of one migrant *Comaltepecano* I spoke to in Los Angeles provides a perfect example:

> I left Comaltepec when I was 9 years old. I no longer speak Chinanteco but I am proud of my roots and proud to be a Chinantec. I do not keep in touch with the authorities in Comaltepec nor with many of the *paisanos* here in Los Angeles... just my brothers and sisters and the few *paisanos* that I have working for me. I guess it is because I did not spend much of my childhood growing up in Comaltepec and because I married somebody from outside the region. I do not believe in the *cargo* system because it is no longer relevant in today's world. I do not believe in paying money to the community to support others. But I love Comaltepec and have strong feelings towards the place. I take my family most years to visit... [my son] has been back to Comal at least ten times. I have a dream of making enough money to refurbish the village temple, to keep the traditional design... how it was when it was first built... but to do a full refurbishment. I think people need to be honest about their intentions... it is better that people come to LA to improve their situations and then give back to the community in some way but not through *cargos*.

[127] To illustrate this conundrum, Analco's migrant communities consider the US$25 monthly contributions requested from non-resident *comuneros* to be a reasonable amount. The majority of migrant *comuneros* are willing and able to meet this moral obligation. However, in monetary terms, the amount requested hardly equates to the sacrifices made by resident *comuneros* when asked to carry out a *cargo* in person. As Don Nupo explained, for an 18-month period, the *cargo*-holder gives up many days when he could be working in the fields, and has a lot less time to spend with his or her family. As Secretary of the Commission for Communal Property, Nupo spent up to 4 days a week meeting his *cargo* responsibilities. This would equate to US$35 a week working as a *mozo* (contract farm labourer), or US$140 on a monthly basis. Similarly, the municipal authorities in Analco calculated that between the twelve main *cargo*-holders, approximately US$2,500 a month is lost in potential earnings. Compared to these figures, migrants' monthly contributions pale in significance, and have prompted village authorities to consider raising the amount requested. This is a decision that is unlikely to gain the support of many in the migrant community, particularly from those who are trying to meet rising costs (rent, food, transport) in their own places of residence.

Having "gone his own way", many in Comaltepec refer to this migrant as "*bien retirado*" – no longer part of the community. This is indicative of the rather insular nature of Comaltepec, characterised by a "you are with us or against us" attitude, and which translates into the expectation that migrants attend the events organised by *paisanos* in LA and cooperate fully with the home village authorities. The migrant himself believes strongly that he should not have to pay for *cargos*: "Why should I maintain people there... what is the incentive for me to do that?" He feels that the *cargo* system is antiquated and needs updating or scrapping for something else. At the same time he loves Comal and feels a responsibility towards it, and would like to be able to contribute in some way. He is not alone, and there are some in the home village who now appreciate that, as resident numbers continue to fall, the community needs to be more accommodating to those who have left but failed to maintain their *comunero* status. Nestor Hernandez, a member of Comaltepec's *Consejo de Caracterizados*, explained that while the authorities in the smaller villages of La Esperanza and San Martin Soyolapam are pretty knowledgeable about where migrant *comuneros* (and families) are based, in the much larger head village of Santiago Comaltepec, the authorities have lost touch with many (ex) *comuneros*. He argued that it was important that these individuals should not be allowed to become further estranged from the community, and better records were needed to show who has left, when they left, where they are, what they are doing, and what their future plans are.

In terms of community membership, therefore, while setting strict migrant obligations can act as a tool to influence future migration flows, they can be counter-productive when dealing with people who have been away from the village for many years, often having left before such obligations came into force. As migrants tire of the problems and difficulties of city life, the home village may become more attractive, offering plentiful land and natural resources, clean drinking water and unpolluted air, with improving education options for their children. As Hunn (2008:43) has written, "one should not romanticise life in (rural Oaxaca) but one should not demonise it either…. conditions in the ramshackle squatter suburbs of Oaxaca City are far less healthy". In Analco, I met several couples who had returned to the village to raise their children in what they felt was a much more conducive environment than the one they had found in Mexico City, Los Angeles, or Las Vegas. However, as interviews with current migrants in Los Angeles made clear, there are probably as many migrants (if not more) who would consider returning to the home village in the future, but may be barred from doing so by current

community rules, not withstanding their concern over the welcome (or lack of) they are likely to receive.

From a theoretical standpoint, one could convincingly take the stance of a moral economist like Thompson or Scott or a cultural anthropologist like Baker (2005) or Stevens (1990) to argue that the existence of hometown associations, and the flow of capitals (economic, cultural, symbolic) between migrant and home communities, supports a social practice framework (after McCay 2002) for understanding common institutions. Yet, having had the good fortune to undertake this study following a thirty-year period of elevated out-migration – and following subsequent changes in migratory flows and patterns – it is the rational choice framework of conventional commons theory that emerges (in this instance) as a frontrunner for discerning patterns of persistence or change in the face of long-term and ongoing stressors.

Conventional theory dictates that stress arises when members' opportunity costs for participating in the commons regime begins to diversify (Baker 2005:34) – for example, when different households in Analco and Comaltepec participate to varying degrees in a market economy through the provision of migrant wage labour. This study has already shown that, as migration becomes more entrenched, the distribution of dependence on and interest in the collective benefits that the regime provides begins to alter. As Baker (2005:34) argues, under "conditions of rapid political, economic or social change, regimes are better able to persist when the change does not diversify members' opportunity costs or when it affects their interests in the same manner". This is what one would expect in villages where migration has remained largely temporary and circular. Conversely, regimes are less able to persist when contextual changes alter the distribution of interest in regime benefits among members, which is what I argue is beginning to happen in Analco and Comaltepec as more migrants become long-term absentees. Here, thanks to a shift in migration dynamics, an increasingly skewed distribution of incentives to maintain compliance with local customs and institutions has emerged. High incentives among resident members and low incentives among the growing number of non-resident members is creating tensions within the sending community, which can lead to higher rates of long-term absenteeism, increasing conflict between local and non-local members, and rule infractions. The Analco experience – where powerful migrant groups have made recent attempts to adapt community institutions far more complicated than would have been the case ten or fifteen years

ago – suggest that tensions will be exacerbated when they coincide with financial inequalities between community members (both resident and non-resident) and an increasing cultural divide.

8.2.3 Reduced resource practice and declining territorial mobility

Conventional models have drawn a linear and deterministic relationship between the environment and migration: migration to places where there is available land; and, out-migration in response to limited environmental resources in source areas. What these models fail to consider, however, are the varying forms of migration, as well as the multiple social variables that enable a fuller understanding of the effects of migration on the environment through changing land use and resource practices (after Curran 2002). In neither Analco nor Comaltepec has a perception of limited environmental resources been a key factor behind peoples' decision to migrate. Rather, Chapter 6 showed that the shift towards increasingly permanent forms of out-migration is having a major impact on the local landscape, through declining (and changing) resource practices and reduced territorial mobility in response to demographic and cultural change. Specifically:

1. Migration is drawing away labour from farming and forestry and increasing the opportunity cost of farm and forest labour.
2. Migration is making it less necessary to spend the same amount of labour on farm and forest work as other sources of income become available.
3. Management of territorial resources and claims for use-rights is becoming more complicated because of substantial off-farm mobility and the long-term absenteeism of village rights-holders.
4. Long absences from the village are affecting collaborative action and rights in communal territorial use and management.

As the number of land users has decreased, and particularly among the most able-bodied men and women, territorial ties have been weakened in a collective sense. This finding is evident in both communities, yet most apparent in Comaltepec, whose communal lands are far more extensive than Analco's. The resident population of Comaltepec is today found in just a handful of settlements, compared to the ten or so localities that were home to local people in the mid-1980s, when seasonal and permanent *rancherías* were still a feature of the customary land use system (see Martin 1993). If the smallest of the remaining permanent settlements (La Esperanza, San Martin Soyolapam and Metates) continue to lose residents at current rates then the community's ability to manage its communal territory will be severely affected. As the

community's territorial presence diminishes, there are clear implications from a management perspective. In particular, it weakens the base from which the community is able to defend communal rights against a range of outside interests, from drug cultivators to illegal harvesters to the federal government's conservation planners (to name but a few) (see Robson 2007). Across much of Oaxaca, the mountainous terrain and physical nature of local forests makes exclusion difficult and costly, complicated in Analco and Comaltepec by the presence of Federal Highway (No. 175) that passes through the communities' lands.

At the same time, while local peoples' perception of their communal lands has not been overtly affected (Chapters 4 and 6), the evolution and transmission of traditional environmental knowledge (TEK) has been clearly impacted by the fall in numbers of 'knowledge-holders' and resource practice more generally. This complicates monitoring of the forest commons, and can adversely affect the community's ability to take advantage of opportunities presented by emergent 'green' markets, ecotourism, payment for environmental services, and funds for biodiversity conservation initiatives. The set of relations that characterise the learning environments where resource practice takes place, while always in a certain state of flux, have become increasingly prone to reconfiguration as drivers of change impinge upon them. Communities of practice are shifting from those based around farming and the harvesting of forest products to new configurations dominated by off-farm activities locally or urban-based activities that are taking place beyond the traditional bounded territorial space. This, of course, has profound implications for rule-making, since rules for regulating the appropriation of territorial resources become less and less relevant as fewer and fewer people work the land. Analco, once again, provides the example, with the inclusion of new rules in the updated communal statute, restricting access to firewood and NTFPs, in favour of articles and clauses promoting territorial land zoning, strict biodiversity conservation and ecotourism, among other non-traditional activities.

8.3 Towards a Transformation of Local Ways of Life?

Theorists studying globalisation-related interconnections have attempted to understand broader or deeper shifts in social, political, and economic organization; shifts that have been referred to as forms of deep-seated 'transformation' rather than mere (localised) change (Vertovec 2004:971). Indeed, while the nature of rural livelihoods has changed profoundly

(Bebbington and Batterbury 2001), it is not immediately apparent whether customary ways of life are persisting while diversifying or undergoing fundamental transformations as people respond to new pressures and opportunities. Although some authors argue that local production systems are 'disappearing' under the influence of structural adjustment policies and market liberalisation (Bryceson et al. 2000), others suggest that rural economies and livelihoods will persist while becoming less tied to territorial-based resources.

For the purposes of this study, I define the 'transformation' of customary ways of life as a disconnection between people and traditional **resource-based activities**, as well as **community**, through non-participation in locally-devised institutions (rules-in-use) (after Robson and Nayak 2010). In this way, for transformation to take place, there needs to be disconnection between migrants and *both* of these key aspects of traditional commons life. When people migrate, this alters their relationship with the land through the discontinuation of resource practices and associated learning and knowledge (Lave and Wenger 1991; Ingold 2000). However, the degree of disconnection depends on the length of time that migrants are away, and whether family members left behind continue to maintain productive territorial-based activities. Equally, if the migrant maintains his (or her) rights through continued participation in community institutions, then their way of life has been diversified rather than transformed. We can begin to talk about transformation when the migrant stays away for an indefinite period of time, his or her dependents do not work the land, and he or she forgoes, or is unable to maintain rights to that land and its resources.

In Analco and Comaltepec, the transformation of customary ways of life involves a conscious decision-making process, with economic and cultural considerations encouraging people to migrate long-term, rather than over-powering ecological drivers. The issue for these two communities is that the "push" and "pull" factors described in Chapter 5 have not abated, with evidence suggesting that out-migration is now self-sustaining and likely to remain a key livelihood option for local people for the foreseeable future. As recent theoretical and empirical work has shown (Durand and Massey 2004; Portes and DeWind 2007), when social networks are established, migration can develop a momentum of its own that is particularly hard to slow. In many villages, young men and women now *expect* to migrate, and many do not return. This shift in migration dynamics has major implications for life in rural areas, affecting the prospects for future social, political and environmental change. Chapter 7 showed that close to half of current

migrants from Comaltepec and Analco are 'non-active' – because they no longer participate in the (trans-local) institutional arrangements that the home community expects them to. This means that a sizeable number of migrant families have temporarily or permanently forfeited their communal rights, suggesting that few see their long-term future in the home village. Indeed, interviews with *Comaltepecanos* in Los Angeles showed that roughly a third of migrant *comuneros* (and their families) planned to stay in the U.S, a third planned to return to the community and a 'customary' lifestyle, and a third expected to return to Mexico but not to the home village.

While most evident among long-term absentees (and their families), transformations are also starting to emerge among non-migrant resident families who are adopting attitudes and lifestyle choices that take them away from traditional land-based occupations, and potentially lessen overall interest in community ideals. While older members are saddened that village youth and young adults no longer appear content to provide for their families by means of a subsistence-based livelihood, they recognise that this cultural revolution forms part of a larger process, where television, radio, Internet, roads and other aspects of 'development' have served to connect villages with the outside world, and further integration with mainstream society. While over half of Oaxaca's population continues to live in localities with less than 2,500 inhabitants (INEGI 2009) – suggesting a remarkable persistence of 'rurality' (Klooster 2005) – the findings from this study indicate a growing gap between those that live *in* the countryside and those who live *from* the countryside. As we will later explore, rural areas in Oaxaca have increasingly become a target of government welfare policy rather than production support, a shift that has severely weakened the economic base of indigenous communities, leaving many households to depend on a combination of government hand-outs and off-farm employment for their financial well-being (Fox 2007).

8.3.1 Striking a balance between the modern and the traditional

Such discussions bring us back to a central idea concerning the countervailing forces of modernisation and the continuity of customary practices. Modern culture and expectations exert a powerful influence, especially on the young, and in the context of Oaxacan rural communities, this sets up as a clash between Marx's idea of 'primitive communism' (land, labour and community) and the forces of global capitalism (free labour and mobile capital) (after Hunn 2008). The advent of electricity and clean water may have made life easier in northern Oaxaca,

but life is also more costly now – the reduction in the barter system increasing people's dependence on a cash income. As we saw with the debate on migration and development in Chapter 2, the coming together of these two worlds tends to result in a complex web of gains and losses.

As a consequence of changing realities, *campesinos* in the highlands of northern Oaxaca have adapted and moved towards occupations that lie outside the agricultural and forestry sector, as exemplified by the rise in national and, more recently, international migration. While migration may still be seen by some as occurring outside the dominant rural development framework, for *campesino* families, it is very much inside the box, and a central component of a contemporary survival strategy (Fox 2007:329). Under these circumstances, how easy is it for fast-maturing migrant communities like Analco and Comaltepec to strike a balance between traditional livelihood systems and engagement with the market economy? At this point, it is useful to compare the findings from this study with the lessons learnt from research carried out in other highland areas of Oaxaca. When combined, they point to a diversity of experiences. In his brilliant book, *A Zapotec Natural History*, Eugene Hunn argues that the community of San Juan Gbëë in the Sierra Sur (southern highlands) of Oaxaca has been successful in participating in the global economy while also maintaining customs and traditional land-based practices. He refers to San Juan as a "hybrid community", able to mix the traditional with the modern by maintaining a demographic balance through circular migration. This is consistent with findings from an ongoing regional study by Merino and colleagues (2009), which also reported on highland communities from the Sierra Sur, but in this instance concerned the member communities of SICOBI[128] located within the coastal Pacific sub-region.

However, although Hunn (2008) reports that half the people who were living in San Juan in 1980 had left by 1998 – reflecting a migration rate similar to that of Analco and Comaltepec – the major difference is that the vast majority of those leaving San Juan have been working as petty traders and labourers in nearby towns in the valley of Oaxaca or on the Pacific Coast. As such, the exodus is still local and often temporary, and migrants "return regularly to San Juan to enjoy *fiestas* or to help in the fields" (Hunn 2008:24). A number of these communities in the south thus tend to have a much larger proportion of internal migrants, many of whom partake in seasonal or circular migration to regional centres in Oaxaca, Puebla and Guerrero. In the case of

[128] *Sistema Comunitario para la Biodiversidad* (SICOBI) or Community Biodiversity Conservation System.

the SICOBI communities, migrants have only begun to head North in the past 5-10 years, and their numbers are still too low and too dispersed for strong migrant networks to become established (personal communication, Marco Antonio Gonzalez) – a dynamic that allows migrants to more easily maintain a productive and cultural presence in the home community. These are the same dynamics that underpinned Dan Klooster's (2005) and Jeffrey Cohen's (2004, 2005) argument that migration provides a real opportunity for communities to subsidise their economies while maintaining long-standing cultural practices and customs.

In summary, therefore, we can point to a relationship between community and migration that involves a diversity of experiences, both among communities from the same region and across regions within the same state. I would argue that both Analco and Comaltepec – with migrant communities that are as large as their 'home' populations and with many long-term absentees from daily village life – are finding it harder to maintain the balance to which Hunn (2008) refers. In both cases, while Mexican cities provided the initial destination, the U.S has driven out-migration rates to new levels over the past 25 years, while subsequent changes to U.S border and immigration policy have encouraged more permanent forms of migration to emerge. With far fewer migrants partaking in temporary or circular movements, it is a lot more difficult for sending communities to maintain forms of subsistence production while engaging with market opportunities. More work is clearly needed to understand the diversity of migration dynamics at play in Oaxaca. This study suggests that a majority of migrants from the northern highlands head to the U.S and now spend increasing lengths of time away, while in the southern highlands, a greater proportion of migrants enjoy shorter stays in urban centres in adjacent regions and states. Different experiences are also likely evident among the Mixtecs and Triquis of Oaxaca's southwest, who have tended to leave their villages to work as agricultural labourers in the U.S. and northern Mexico, rather than become urban dwellers (personal communication, Dan Klooster). Likewise, there will be differences to explore between *ejidos* and indigenous *comunidades* as sending communities.

Such differences may act as determining factors in local capacities to find a successful balance between tradition and modernity. Within this context, the following section turns to possible futures facing the study communities and the region more generally.

8.4 What Does the Future Hold?

> [The community] has a perilous future on the fringe of the global urban web. One cannot save a human culture the way one can save an endangered species. Only the people of the culture can save it, and then only if they are provided a space of their own and only if they want it badly enough to take advantage of that space.
>
> Eugene Hunn (2008:28)

When one thinks about out-migration, it brings home the realisation that change is always around the corner, and a necessary fact of life. When we talk about out-migration, it can be perceived as an important opportunity for individuals and families to improve their 'lot'. Yet there are always trade-offs to any decision in life, and so with migration, one must consider what is lost and what is gained by a community when large numbers of its members choose to reside elsewhere. As Chapter 5 illustrated, the response to such a question depends largely upon whose perspective is being considered: that of the individual migrant; of his or her family; or of the community as a whole. The gains and losses will be quite different for each party.

The local governance system in northern Oaxaca resembles what Eric Wolf (1955) called a "closed corporate peasant community system", where authority and honour are derived from participating in the rotating system of civic-religious-political office holding in which village rights-holders must take their turn at leadership and community posts of responsibility. While we now know that many aspects of this age-old system can travel with migrants, other rural traditions and customs are very much rooted at home – often *in* and *on* the land. They are thus harder to maintain without a productive presence in the traditional community arena. The remainder of this chapter looks at some of the likely scenarios confronting Analco, Comaltepec and similar *campesino* communities in the northern highlands[129]. It does so through an exploration of: (i) market- and policy-related drivers of change; (ii) opportunities for developing community economy; and, (iii) future local governance in a trans-local context.

[129] A note about scenarios based on migration flows: the decision to migrate often reflects short-term changes in economic, social, or political factors that are difficult to predict. Since no single compelling theory of migration exists, projections are generally based on past trends and current policies, which may come to lose relevance in the future.

8.4.1 External Drivers: Neo-liberalism, NAFTA, rural development policies

> [Migrants] form part of a *de facto* border exchange, one in which the US exports cheap corn to Mexico and imports Mexican corn farmers to labour in California and elsewhere…. Mexico's three million peasants were simply outgunned by 75,000 farmers in Iowa who – with the help of ample rain, state-of-the technology, and millions of dollars in government subsidies – could produce twice as much corn at half the price.
>
> Melinda Burns, Santa Barbara News-Press (in Stephen 2006:123)

> An unhappy pile-up of circumstances – globalization of markets, economic policies that work against small landholders and social neglect – has made it so difficult for rural farmers to survive that many are leaving their villages for good.
>
> Charles Mann (2004:5)

In the context of complex social-ecological systems, a driver is any factor that changes an aspect of an ecosystem (MEA 2005). There are two types of classification that work in tandem: direct/indirect drivers and endogenous/exogenous drivers. A direct driver unequivocally influences ecosystem processes (with an indirect driver operating more diffusely), while the presence of an endogenous or exogenous driver is dependent upon whether local decision-makers have a degree of control over that driver. In northern Oaxaca, there is a complex mix of endogenous and exogenous drivers at play, acting in both direct and indirect fashions (Table 8.1).

The endogenous/exogenous classification is perhaps the most important to look at, since it gives an idea of the drivers that the community may enjoy a degree of control over. While out-migration (through demographic and cultural change) is an indirect and endogenous driver of change in rural Oaxaca, it itself is responding to larger forces impacting upon Mexico and Latin America more generally (Wiest 1983; Loker 1999; Otero 2004). Indeed, it is the power and influence of these external forces and factors that Armando Bartra – the Mexican rural development strategist – makes reference to with his call for "the right to not (have to) migrate" (in Fox 2007:328). This 'right to not migrate' recognises that although migration is still an 'option' for people, it is a choice made within a public policy context that strongly encourages some livelihood strategies over others.

Table 8.1: External drivers impacting rural communities in northern Oaxaca

Driver Classifications	**Direct**	**Indirect**
Endogenous	Land use and land cover change	Demographic: population size, age-sex structure, spatial distribution Cultural: individual /household choice to participate in collective action, consumption patterns Combined they drive territorial labour deficits
Exogenous	Extreme weather events	- Neoliberal economic reforms - U.S. immigration policy - State and federal rural development initiatives - Agrarian reforms

Any researcher working at the community level needs to have an understanding of the role played by these exogenous drivers in shaping local processes. This section runs through what I consider to be the most important exogenous processes to have impacted highland communities in the Sierra Norte over the past twenty-five years or so – acting solely or in a combined fashion to encourage local people to leave their villages and a customary lifestyle to seek their fortune in the city. I have placed these drivers into two broad categories. The first concerns the rise of neo-liberalism and the consequences for *campesino* communities of Mexico's decision to join the North American Free Trade Agreement (NAFTA). As Mutersbaugh (2004:7) makes clear, "any migration-induced difficulties [facing communities] are made doubly problematic by, and perhaps pale in comparison to, the neoliberal-induced attacks on the legal and institutional basis of common property". The second concerns rural development policies over the past two decades, which have seen the Mexican government provide greater support for social welfare and poverty alleviation, at the expense of productive and technical support for farmers. These new welfare programs have gone hand in hand with moves to improve education services in rural areas, in what is arguably a government-sponsored national-level strategy to encourage young people to move to the cities and leave behind a subsistence-based livelihood.

8.4.1.1 Economic liberalisation and NAFTA

The mid-1970s in Mexico (as in much of the world) marked the beginning of what is now called economic restructuring or economic globalisation (Stephen 2006:124) – shorthand for the deepening of the integration of national economies. By then, Mexico's political economy of import substitution industrialisation (ISI) had lost much of its allure, with President Echeverria's (1970-1976) nationalisations, spending, and populist rhetoric "deeply alienat[ing] Mexico's private sector" (Massey et al. 2002:75). By the early 1980s, the country was suffering from a deep economic crisis that was tied to a collapse in global oil prices, increases in high-interest international borrowing, runaway inflation, and accusations of government corruption and accountability (Cockcroft 1998:271). In 1982, Mexico announced that it could not meet its debt payments, and the *peso* underwent a complete devaluation. In return for a US$10 billion dollar bailout, Mexico was asked to change its economic model, ending import substitution and protectionism. President Miguel de la Madrid (1982-1988) lowered tariffs, abandoned quotas, eased state regulations, and limited wage increases, before securing Mexico's entry into GATT (General Agreement on Tariffs and Trade), "which in both real and symbolic terms inaugurated the neoliberal era in Mexican society" (Massey *et al*. 2002:78).

The agricultural policy that accompanied economic restructuring focused on pushing subsistence farmers out of what was seen as unproductive activities. The neoliberal model reduced government support for *campesino* agriculture in order to encourage farmers to migrate to high-wage regions. It was envisaged that salaries would rise in areas of *campesino* production, as those seeking employment migrated elsewhere, while migrant remittances would flow back into rural areas to provide them with productive capital. So while residents of Analco and Comaltepec continued to enjoy access to plots of communal land where they could plant enough corn and beans to feed their families, the mid-1980s heralded an era of falling Mexican corn prices, the gradual withdrawal of government price support[130], and increased labour recruitment

[130] The Mexican government has long intervened in consumer food markets with a variety of direct and indirect policy instruments, including a gradual shift from generalised to targeted subsidies. The first significant targeted rural consumer program focused on remote, low-income areas, creating thousands of community-managed local stores that were supplied by the retail distribution branch of the government food company (CONASUPO). Founded in 1965, CONASUPO provided supports for eleven staple crops, maize among them. It bought those crops at guaranteed prices, which aided low-income farmers, and then sold them at subsidised prices in CONASUPO stores to low-income consumers. At its peak in 1981, CONASUPO bought two-thirds of the national harvest. In the early 1990s, price supports programs were slowly eliminated, such that small farmers lost their principal market within a few short years (Mann 2004:15).

of workers in to the United States. By 1991, Mexican agriculture contributed only about 7 percent of GDP (Otero 1999:46).

The policy-related changes affecting rural farming communities in Mexico and Oaxaca simply accelerated at an unprecedented rate when U.S-Mexico-U.S trade barriers and tariffs were lowered through the 1994 ratification of the North American Free Trade Agreement (NAFTA). This required the Mexican government to further reduce price supports for domestic farmers and to lower import restrictions, broadening the asymmetries between the two countries. The impact on *campesino* families was swift and striking. From 1994 through 2002, US corn imports tripled in comparison with pre-NAFTA levels (Fanjul and Fraser 2003:16). By 2001, real corn prices had fallen more than 70% from 1994 levels, meaning that corn farmers and their families had to live on less than one-third of the income they earned in 1995 (Fanjul and Fraser 2003:17). For farmers in Analco and Comaltepec, the real costs of producing corn in a subsistence-based village became too high for most to continue farming – particularly after CONASUPO subsidiaries and price supports were phased out during the early- to mid-1990s[131]. Things worsened with the rise of *Maseca*, a Mexican food-products conglomerate that sells dried maize flour directly to consumers, sourcing at the lowest possible prices from giant agrobusiness concerns in Mexico and the United States. The influx of cheap corn has seen prices, in real terms, fall by 75% since 1990. In Analco and Comaltepec, a kilo of non-local maize was sold for a peso less than locally harvested kernals in 2008 and 2009. The communities' corn farmers, however, were not alone in feeling the impacts of market fluctuations. On the humid side of the Sierra, the dynamics of the global coffee market shifted in the 1990s to undermine the stability for those at the bottom of the supply chain (Petchers and Harris 2008) – the small-scale family farmers and workers that sustained the economies of La Esperanza, Rancho Trucha, and other *rancherías* located in Comaltepec's cloud forest. While some Oaxacan producers (such as

[131] While local wages have remained low, the cost of basic essentials has risen. In 1980, one metric ton of corn harvested in Mexico could purchase 6.1 baskets of basic goods. By 2000, a similar harvest could only purchase 2.4 baskets of basic goods (White, Salas, and Gummage 2003:24). A basket of basic goods (or *canasta basica*) refers to the eighty essential goods and services (food, clothing, health, public transportation, school expenses, etc.) that the Mexican Central Bank (Banco de Mexico) stipulates that the average Mexican citizen depends on. In Analco and Comaltepec, the cost of goods such as cooking oil, sugar and salt has increased considerably in the last few years. The cost of a litre of cooking oil, for example, rose from $12 pesos to $20 pesos a litre between 2007 and 2008.

CEPCO (*Coordinadora Estatal de Productores de Café de Oaxaca*) (http://www.cepco.org.mx)) have been able to buck the trend, many have not[132].

Economic globalisation not only affected the kind of work and opportunities available in rural Oaxaca, but also resulted in new labour markets for people willing to chance their luck in the United States. As Smith (2006) argued, "Mexicans' loss of faith in Mexico's economy coincided with US employers' identification of Mexicans as plentiful and diligent workers". As we saw in Chapter 5 and Chapter 6, during the 1980s, many among the first waves of migrants would return to their home village for part of the year, or every other year, and were thus able to maintain crops of corn and beans in local fields. By the mid to late-1990s, however, this pattern had changed dramatically as migration became less circular and people began to settle in the North. While a changing economic and policy environment in Mexico was pushing rural people to look for off-farm employment, demand in the U.S. for a whole range of services was increasing. As Pierrette Hondagneu-Sotelo explains (in Stephen 2006:134), cities like Los Angeles were "home to many people with highly paid jobs… relying on various kinds of daily servicing that low-wage workers provide". For the masses of affluent professionals and corporate managers, hiring Latino immigrant workers had "almost become a social obligation".

Fox (2007:288) reported that the Mexican government expected the share of the country's economically active population in agriculture to drop from 26% to 16% during the 1990s, thanks to post-NAFTA agricultural and rural development policy strategies. This is exactly what happened, with White, Salas, and Gammage (2003:18) estimating that over one million corn producers stopped producing corn between 1991 and 2000. As Stephen (2006:129) explains, "those who had previously earned a living in small-scale or subsistence agriculture… had to find additional sources of income to survive in the 1990s and beyond". Since NAFTA, estimated annual Mexican migration levels to the U.S. rose by 63%, from 329,000 people in

[132] It has been argued that farmers in the developing world need to be empowered to earn a livelihood in an economically viable, efficient and environmentally sustainable way. However, for coffee, corn or any other commodity, more equitable trade mechanisms currently depend on there being a pool of wealthy people who can buy 'certified' products at a premium. Despite best efforts, the reality (for rural Mexican producers) is that fair-trade has only made marginal differences to those involved – and fair-trade farmers constitute just a tiny proportion of the market overall for any given product. One could question whether fair-trade is about expanding the market for fair-trade products or improving the lot of the world's poorest people. My reading of the situation is that the two are not necessarily linked in the way that we often think they are.

1992 to over 530,000 in 2000 (Fox 2007:289). Bacon (2008) has called these migrants, or "displaced people", NAFTA's most important product.

8.4.1.2 Mexican rural development

The sharp increase in out-migration from northern Oaxaca during the 1990s and early 2000s was not simply a continuation of long-term structural trends in national and regional economic systems. It was aided by the specific policy choices of the Mexican government. In particular, rural development policies since the 1980s have brought with them a complex set of changes to previously isolated mountain villages – initiatives designed to complement neoliberal economic reforms. These policies have seen public investment in the agricultural sector reduce dramatically, with agrarian policies shifted to trade liberalisation of agricultural products, reduction of credit, promotion of private enterprise in the agricultural sector, and scaling down of public institutions (including agricultural credit, extension, insurance, inputs, transport, storage and marketing). One obvious example concerns the 1992 revisions to Article 27 of the Mexican constitution, allowing for the privatisation of communal owned land – under the objective of stimulating private investment in rural areas[133]. Farmer support has been limited, mainly restricted to PROCAMPO[134] (*Programa de Apoyos Directos al Campo* or Program of Direct Support Payments for the Countryside) that was established to help offset domestic grower's losses from cheap corn imports. However, PROCAMPO has hardly made an impact in Analco or Comaltepec, with many interviewees complaining about the convoluted nature of the application process, which demands a considerable time commitment along with documentation (RFC, CURP) and proof of clear ownership title that many *campesinos* do not hold.

Rather than productive support, government policies for rural areas now focus on large-scale antipoverty programs. The most prominent is 'Oportunidades', which began in 1997 as PROGRESA and is now Mexico's "flagship welfare program", designed "to break the cycle of poverty by offering material incentives to mothers to encourage them to keep their children in school and to follow basic preventative health measures" (Fox 2007:19). 'Oportunidades' has become a widely hailed international model for what are now called 'conditional cash transfer'

[133] This is seen by some as a form of land redistribution to develop and entrench capitalism in Mexico (Otero 1999).
[134] In late 1993, the federal government created PROCAMPO as a system of direct cash payments to maize, bean, wheat, rice, soya, cotton and sorghum producers. Eligible farmers are paid according to the amount of land they have planted for subsistence crops – from between $1,160 and $1,300 pesos per hectare, for a maximum of five hectares (http://www.aserca.gob.mx/artman/publish/article_183.asp).

programs, and its coverage was quickly expanded to reach five million families by 2005 (Stephen 2006:27), or one quarter of the entire national population. In January 2010, *Oportunidades* provided financial support to approximately 250 individuals in Comaltepec and approximately 85 individuals in Analco, with monthly income ranging from $550 pesos to over $3,000 pesos per recipient. Together with migrant remittances, these monies represent a significant proportion of the monthly cash income for an increasing number of families in both study communities.

At the heart of the *Oportunidades* program is the requirement for children to remain in school if their families are to continue receiving financial support. Many proponents of rural development in Mexico argue that improved schooling is key so that future generations can rise above the poverty and alleged ignorance of their parents' lives. Education has certainly become a powerful driver of change among highland villages in Oaxaca. There is little doubt that the level of schooling now offered to children in both Analco and Comaltepec ranks among the most important developments either community has experienced. If one looks at the educational attainment of those over 55 years of age, the vast majority were only able to attend primary school before leaving to work in the fields or help their parents with other productive activities. Since the early 1980s, children in both communities have enjoyed access to secondary schools, with a preparatory college (CECYTE) opening in Santiago Comaltepec and a similar level of schooling available to *Analqueños* in nearby Ixtlan de Juárez, Capulalpam and Xaicui. The proximity of preparatory schools and technical colleges enables local youth to continue with their studies until the age of 18, at which point they may decide to carry on to higher education institutions (polytechnic, university) in a larger urban centre (Oaxaca City, Puebla, Mexico City). Given the choice, few young people considered staying in the village into their late teens or early twenties. With a more comprehensive education, younger generations tend to be less enamoured than their parents were by a life based around farming or forestry. In both Analco and Comaltepec, most 15-17 year olds that I interviewed expected to continue their studies at a regional technical college or university, or migrate to the U.S. or Mexican city and look for work there.

There is another side to this trend, however, that requires comment. As Hunn (2008:29) points out, "must they [the youth] choose between the supposed drudgery of life in the community and the 'freedom and promise' of a highly overrated future beyond the town?" In

both study communities, young men and women are plumping for life choices different to those of their parents, but who can say which of them has chosen the better path. I spoke to the parents of children who have left the village to pursue university and college education in Oaxaca City and further afield, and it is rarely an easy ride. Some struggle to find work with their new degrees and end up heading to 'El Norte' where their formal education counts for nothing. A few do well, but many who do get work are paid so poorly that they are left no better off in the city than they were in the home village[135]. Despite a diversity of experiences, there are enough losers to make one question the collective benefits of the schooling currently provided to rural Oaxacans – especially since the brightest young people will most certainly leave for challenges not easily available to them in a small, relatively isolated, rural village. Experiences in Analco and Comaltepec show that some in their twenties and thirties do return, but there is a limit to how many can find innovative ways to apply newly learned technical expertise in their home villages.

8.4.1.3 Summary

Local people as decision-makers are agents of change, whose behaviour can lead to new ways in which endogenous drivers can impact key aspects of the social-ecological system. Local people, however, are also responsive to a variety of external (exogenous) forces, which operate across a variety of spatial and temporal scales and are arguably as important as out-migration itself. In the context of northern Oaxaca, it becomes critical to understand these drivers, their interactions, and the consequences for commons regimes and community well-being, while it is the distinction between exogenous and endogenous drivers that help determine who should take action in response to change. The difficulty with exogenous drivers, of course, is that the responsibility or ability to respond effectively seldom rests with the people who are most affected.

[135] Don Rafael has two daughters who left Comaltepec for Oaxaca in 2002; one to study tourism and the other biology. Both have now graduated but have struggled to find work. His biologist daughter is still looking, while the other daughter is now working in a hotel in Oaxaca but on very low wages. Neither has enough money of their own to live in the city and still depend on their parents for financial support. Another *Comaltepecano*, Juan, is an agronomist and secured a teaching position at a university close to Oaxaca City. However, with a wife and three small children, his salary is not enough to cover living expenses. He now sees no alternative but to migrate north. He would prefer to go to Canada and take the family with him, but is unlikely to qualify for a work visa. As such, he is resigned to heading to Los Angeles or another U.S. city as an undocumented wage labourer, leaving his family behind in Oaxaca. Wiest (2010) found a similar predicament among Mexican migrants working in Anchorage, Alaska.

8.4.2 Contemporary opportunities for developing community economy

While the powerful nature of external drivers can serve to undermine multiple aspects of traditional village life, there are also opportunities to develop and improve community economy and strengthen senses of community wellbeing. In particular, logic contends that trans-localism provides an excellent opportunity for a portion of remittances – the vast majority of which currently stay with migrants' families – to be diverted into more productive investments at the community level. Indeed, collective experiences with migration have been key in getting communal and municipal authorities to think about what can be done to keep so many of their people from leaving. In Comaltepec, in particular, there is a feeling that greater benefits could be provided by the community's extensive and diverse forest lands – requiring a move away from subsistence practices to more commercially orientated activities. As the municipal president stated during an April 2008 interview: "We need to generate more options so that our people return or stay here … we have productive lands but we need to use them better". There was talk locally of forming small collectives (work groups), whereby productive operations could be scaled up to take advantage of local and regional market opportunities. Projects discussed range from poultry farms to establishing a tourist restaurant at a well-known look-out (El Mirador) located just below the community's highest peaks. Of course, this is still some way off, and would require a considerable shift in thinking to legislate for the private or private-communal partnerships that such ventures may require.

These, I would argue, are exactly the kind of projects (forming part of a portfolio of employment opportunities) that could successfully entice more young people to stay in their villages. In Analco, the community has already started an ecotourism venture and is in the preliminary stages of establishing a community forest enterprise (CFE) to take advantage of its small pine forest. Comaltepec has had a CFE in operation since the early 1990s. Given the value afforded their forestlands by a range of regional, national and international actors (Chapter 4), there are openings for owner communities to expand activities to tap into a range of 'green' markets. This is a path that many in the region seem intent to head down, Analco and Comaltepec among them, and has been facilitated by state and federal support for a range of conservation-driven projects. Thanks to the extensive nature of Mexico's communal land tenure systems, with few public lands remaining on which to establish new protected areas (PAs) (Robson 2007; Bray et al. 2008), the federal government is beginning to view local people as *de*

facto "stewards of biodiversity", who are expected to play a greater role in conservation through programs directed at sustainable forestry, ecotourism and the protection of environmental services such as carbon, water and wildlife. Comaltepec, for example, has already taken advantage of CONAFOR's payment for hydrological services scheme, while Analco hopes to join a similar scheme soon[136]. Interviews with some of the key government officials working in the community-based sector highlight how a number of migrants return to Oaxaca with a strong conservationist vision and concrete plans to promote related projects in their home communities (Ariel Arias[137] and Salvador Anta, personal communications).

At the level of the commons collective, the commercial potential of territorial resources is most clearly realised is through the establishment of community-based enterprises (CBEs). As Berkes and Davidson-Hunt (2010:1) note, "community-based enterprises are of interest […] because they offer a means to study how local institutions respond to opportunities, develop networks, new skills and knowledge". They see CBEs as examples of commons institutions that have evolved to take advantage of globalisation and benefit from engagement with external markets. Indeed, there is now a growing literature on the potential of CBEs and other forms of social entrepreneurship to improve community well-being (Peredo and Chrisman 2006; Zahra et al. 2009). In the most successful cases, Mexican CFEs have provided significant new employment within communities, with profits used to invest in further developing the enterprise as well as build community assets and fulfil functions left unattended by state and federal governments. In this way, CFEs have helped to change the stereotypical view of common property regimes as forming part of subsistence economies (Bray and Merino 2004; Bray 2006), with the most active considered viable alternatives to out-migration through the creation of local jobs competitive with the opportunities offered by Mexican and U.S cities. David Bray (personal communication, 2010) suggests that the success of the community's forestry operations is one probable reason why the number of resident *comuneros* in Ixtlan de Juárez remains high.

[136] It is worth noting that, to date, there has been a lack of economic and social benefits flowing back to member households from community involvement in PES schemes (personal communications from the Ex-President of the CBC in Comaltepec and staff at UZACHI) and forest certification (personal communications from Eusebio Roldan and Israel Hernandez at UZACHI). Similarly, it is unclear how Analco's ecotourism venture will fare in the face of stiff competition – given that northern Oaxaca is now awash with community-based ecotourism enterprises that seem to offer the same service and type of activities.

[137] Ariel Arias, coordinator of COINBIO in Oaxaca, believes this ethic is informed by their experiences living in far away cities, which makes them appreciate what their home village can offer.

At the same time, it is the success of a small number of CFEs that serves to highlight the problems faced by many communities in the region. While Bray and colleagues have been vociferous in championing the virtues of Mexico and Oaxaca's community forest sector (Bray et al. 2003; Bray et al. 2005; Bray 2010), I would argue there are specific reasons why prominent CFEs like San Juan Nuevo Parangaricutiro in the State of Michoacán (Orozco and Davidson-Hunt 2010), or Ixtlan de Juárez and San Pedro del Alto in Oaxaca (Bray 2010; Garibay 2007) have established themselves and been able to prosper; location, degree of marginalisation, population size, and, (pine) forest extension all being important determining factors. A question mark thus remains as to how successful CFEs can be in smaller and more isolated communities (such as Analco and Comaltepec), which are arguably more characteristic of forest regions in central and southern Mexico.

In Oaxaca, communities with CFEs are in the minority, with most still carrying out extractions under conditions of '*rentismo*', with little or no community involvement. As Merino (2004) explains, such operations tend to have a heavy impact on the forest, few social benefits, and lead to frequent conflicts within the community. If we think about 'access' from a commons perspective, most people consider access to the physical resource (i.e., forest) and the degree of freedom handed to local users to harvest the products that these resources provide. Yet 'access' concerns something far more significant in Oaxaca, where communities have enjoyed full property rights over their communal forests and fields since twentieth century agrarian reform. In Oaxaca, therefore, access really concerns the ability of the region's indigenous communities to gain a foothold in the marketplace and develop the technical know-how to accrue benefits from the appropriation of these resources. Their lack of market integration, however, is compounded by a debilitating policy environment that sees CONAFOR (National Forestry Commission), for example, receive very little of the federal budget earmarked for SEMARNAT (Ministry of Environment and Natural Resources) and then funnel the majority of what it does get into international and national reforestation initiatives rather than community-based programs.

In addition, even if such obstacles were overcome, CBEs require serious investment to reach commercialisation. Communities like Analco and Comaltepec increasingly view migrants as a source for raising a sizeable portion of that start-up capital. The hope is that such contributions could then be supplemented by government support, such as that offered by the

federal government's '*Tres por Uno*' program[138]. However, while the use of migrant resources to stimulate community economy is testament to the high level of social capital and social organisation that exists among absentee groups, Chapter 7 showed that most such investments at a community-level have so far been limited to urban service improvements and village and religious festivals. There seems to be reluctance among migrants from both communities to finance more productive initiatives. At the same time, average household remittances have been falling. This is not only because of recent economic difficulties in the U.S, but also due to the shift in migration dynamics towards more permanent forms, with a trend towards declining rather than increasing participation in trans-local community institutions. Given the current socio-economic climate, it would appear that Analco, Comaltepec and similar communities in northern Oaxaca will have to rely less on migrant contributions than initially hoped for.

8.4.3 Commons governance in a trans-local context

A key focus of this study has concerned the interaction between migration and institutions of local governance. In the study region, municipal and communal governments, functioning under the *usos y costumbres* system, are generally much smaller in scale and more politically autonomous than in other parts of Mexico. Indeed, the vast majority of Oaxaca's 572 municipalities are governed by community assemblies rather than Western-style voting for political parties. Unlike *ejido* land-holdings, the status of *usos y costumbres* allows governance over the entire municipality, legally functioning as an autonomous space where indigenous communities write their own laws (Walker and Walker 2008). It is a system that carries with it notions of common indigenous history, social organisation based on kinship ties, community service and political participation based on one's standing in the community (Oaxaca State Legislature LVI 1998). Yet, as Kearney and Besserer (2004:451) note, "the distinctive features of indigenous civic governance in Oaxaca have developed over many centuries in what, until fairly recently, were relatively local communities". Since the participatory institutions underpinning local governance are organised around rotating unpaid service commitments, high

[138] *Tres por uno* (3x1) is a program run by the Ministry of Social Development (SEDESOL) (http://www.sedesol.gob.mx/index/index.php?sec=14), which provides funds for Mexican migrant groups outside the country to support their efforts in financing social development and infrastructure projects in their communities of origin. For every peso raised by participating migrant groups, each level of government in Mexico (Municipal, State and Federal) will provide matching funds.

out-migration rates have made it increasingly difficult to fill many of the jobs needed for the system to function properly. The consequences are clear:

> What is at stake here is the viability of an ancient, time-tested form of essentially democratic community governance… there is much reason to be concerned about the vitality of communities to staff offices and deliver basic services, maintain and improve infrastructure, maintain law and order, and preserve communal ceremonial and religious life and identities.
>
> Kearney and Besserer (2004:453-457)

Given current trends and projections, the well-being of rural Oaxacan communities is thus at risk, in addition to the "greater extended transnational communities and organizations that are based [upon] them" (Kearney and Besserer 2004:451).

From one perspective, the local governance system in northern Oaxaca has shown remarkable resilience in its ability to continue functioning for multiple decades in spite of debilitating demographic pressures. The *cargo* and *tequio* systems are still in operation in both study communities, evidence of the robustness of local governance and the level of social capital and organization inherent among groups of both resident and non-resident community members. The legitimacy of local commons institutions and practices is enhanced through what Douglas (1986:50) calls "naturalising analogies", or behavioural conventions that have a "parallel cognitive convention to sustain" them within the broader social structure. In other words, an institution that persists under stress is naturalised by incorporating into it parallel structures of interaction from the larger historically and socially constituted setting. In the case of Analco and Comaltepec, this is evidenced by the fact that numerous citizens residing in the North have been willing to return to the home village to serve a *cargo*, at considerable expense and hardship for their families. Such "regime institutionalisation" – the extent to which a commons regime incorporates and reproduces social practices and relations embodied in the broader social and cultural context – can help buffer the impacts of shocks and stressors (Baker 2005:48-49). This is directly related to cultural persistence (Zucker 1991), where a "strong" institutional environment may reduce the amount of organisational structure required, because "cultural controls" can substitute for "structural controls" (Scott 1991:181).

Yet despite this, emergent and influential subordinate groups can contest the prevailing social order through a process of reconfiguration. This seems to be true under current conditions

of demographic, social and economic change in Analco and Comaltepec, where shifts in migration patterns and migrant profiles are challenging the ability of sending villages to maintain effective governance. This points to the important temporal nature of out-migration, which not only pertains to the duration for which a driver operates, but also the speed at which that driver can change. Crucially, these changes are nonlinear, with an abrupt change not always possible to anticipate. In neither community, have the pressures associated with a changing migration dynamic been sufficiently alleviated by the diverse responses to demographic and cultural change. Chapter 7 and Sub-Section 8.2.2 both point to deficiencies in the adaptations to have emerged thus far – having failed to significantly slow migration rates or affect the length of time that migrants remain absent. Anticipatory, planned institutional adaptations tend to incur both lower long-term costs and are more effective than reactive adaptations. Although Analco and Comaltepec have now made changes to their communal statutes to hopefully render greater control over migrants and perhaps influence future migratory flows, the delay in implementing such strategies attests to their reactionary nature – a response to the pressures that the *usos y costumbres* system has found itself under. As Mary Douglas (1986) would likely argue, any such increase in rule formalisation may actually signify a loss of organisational legitimacy from challenges to dominant patterns of cultural hegemony in northern Oaxaca.

The fact that out-migration rates have remained high (with increases in some cases) suggests that the institutional capacity of sending communities to manage migrant flows is limited, and other strategies are thus needed to encourage community members from leaving. Yet, having now 'played their hand' through changes to their communal statutes, communities have few institutional options to fall back on. There are additional changes that could delay or mitigate further impacts – for communities to revert back to the original three-year term of office, for example. Such strategies, however, are unlikely to work in the long-term if the degree of burden placed on remaining residents continues to be so high. The one concrete opportunity concerns an expanded role for women, both within offices of government, decision-making processes and village life more generally. Although community citizenship rights are traditionally limited to residing adult males, some communities, such as Analco, have become more flexible about the terms of membership in an effort to reconcile both local leadership and government needs. This makes perfect sense as many home (sending) communities have become rendered majority-female. Encouraged by deliberate empowerment strategies, women in Analco

have seen both their direct participation and representation in both civic and *cargo* responsibility systems increase. This has included having the right to be elected to community leadership positions.

However, while this is a highly significant development, it is not one that is found uniformly across the region. Velasquez (2004:484) has shown that some kinds of female participation in the local public sphere can have contradictory implications, as in the frequent case when a woman participates indirectly, in the place of her absent husband, "constituting a kind of second-class citizenship as well as additional work obligations". This appears to be the situation in Comaltepec, where women have yet to enjoy the same status in local government as their counterparts in Analco. Thus, from a long-term point of view, Oaxaca's indigenous communities are in the midst of an uneven transition that remains little understood. As Velasquez (2004) goes on to establish, while the current pattern of varied but limited female access to the local public sphere is quite different from the complete exclusion of women two decades ago, it is still far from a system in which women have full rights to citizenship in local community governance.

8.4.4 Governance and natural resource scenarios[139]

Despite institutional adaptations and the promise offered by the feminisation of local governance, the fact remains that the *usos y costumbres* governance system in both study communities finds itself under great strain. Two key trends make it unlikely that the situation will change over the short to medium term:

1. The establishment of strong migrant networks, together with the ongoing influence of external drivers, mean that out-migration from both communities is likely to continue.

2. The majority of future migrants are unlikely to find themselves in a position to provide more than limited financial assistance to the community, with declining rather than increasing participation in *cargo* and *tequio* obligations.

Of the two study communities, the considerably smaller Analco is at the greatest disadvantage. Although the community's resident population appears to have stabilised at around 400, the *usos y costumbres* system is still considered too great a burden by many local residents, and unlikely to persist without further changes. With a *comunero: cargo* ratio approaching 1.5, a

[139] Following the lead of Peterson et al. (2003), a scenario in this context is an account of a plausible future.

number in the community belive that a critical threshold has been reached. The following quote points to the fear of local people:

> Our great worry is that we will become a municipal agency and I think to avoid that we will need greater support from those outside.
>
> Constantino Juanito Garcia, 22, *comunero* of Analco

This would constitute both a massive practical and symbolic blow to community ideals and identity. Not only would Analco become subservient to others with regard municipal affairs, but the special closeness that has customarily formed between civil government and the local population would be diluted. With a possible trend towards fewer, larger municipalities in Oaxaca, the important synergy that exists between communal and municipal governance through *mini-municipalismo* (with municipalities constituting just one or two localities) would gradually weaken. Comaltepec appears to be at less immediate risk thanks to a larger pool of resident labour and because the community has benefited from acting sooner to manage the flow of migrants through the establishment of legally-binding migrant obligations. Yet even here, we can see the impact of migration on territorial mobility and the abandonment of seasonal *rancherias* and smaller permanent settlements. This is already affecting their ability to govern a geographically extensive and ecologically diverse forest commons. Barring a mass return of non-resident community members, the most vulnerable villages (San Martin Soyolapam, for example) are approaching a situation similar to Analco where local governance may be forced to undergo fundamental change.

In their struggle to maintain a sense of continuity, the two communities can expect to receive limited assistance from government. As Comaltepec's Municipal President explained: "[The state] is happy for '*usos y costumbres*' to continue because it implies a lower cost for them... it's not in their interest to change the system". As such, most help will have to come from within the trans-local community arena. Yet, increasing the obligations of migrant members implies a long and complicated negotiation – a balancing act between what the community needs and what migrants are willing to provide. In addition, even if migrants are coerced into financing a greater number of government posts, and are able to do so over the long-term, the ongoing '*monetarisation*' of *cargos* and *tequios* could come to impact so many areas of local governance that the very ideals of civic reciprocity and service that have traditionally underpinned this

system would become eroded[140]. If such a trend continues, there would necessarily come a point when the system would have flipped into an alternate state, since the very foundations upon which the original concept was based no longer applied.

It is difficult to know exactly how things may pan out, with much dependent upon how migration evolves in accordance to unfolding events and policies in both sending and receiving regions – allowing for a degree of uncertainty that invites speculation[141]. However, what *can* be said based upon a general overview of the current situation is that, given existing trends, patterns of governance in the short- to medium-term appear to represent "a new moment in the history of Oaxacan communities", whereby local citizenship and administration is becoming "increasingly dependent on the service of return migrants and the [support] of immigrants living in the north" (Kearney and Besserer 2004:454). This is the case for both Analco and Comaltepec, where migrants are becoming ever more powerful actors in the trans-local arena. In extreme cases, there have even been reports of village governance being displaced abroad. Robert Smith, for example, describes a Mixtec community in Puebla that is effectively governed by town authorities living in New York (in Kearney and Besserer 2004:454). This may seem an improbable scenario for either study community, but we are certainly seeing a shift in that direction as the demographic centre of gravity moves away from bounded communities into the widely dispersed populations of trans-local communities. It should be noted that although Analco and Comaltepec have lost local residents, their actual overall membership is increasing when the total number of citizens who live outside of their territorial boundaries are taken into account.

In addition to commons governance scenarios, Chapter 6 focused on the clear changes

[140] A number of government and non-government organisations (CONAFOR, Rainforest Alliance, among others) have argued for a *gerencia* model to be adopted for the running of community-based enterprises, whereby full-time paid administrators are employed by the community rather than reliance on the traditional *cargo* system that is increasingly viewed as too inefficient and ineffective for such contemporary ventures.

[141] One can speculate, for example, about how food shortages or changes to government subsidy schemes in the U.S. or Mexico could increase the market price for agricultural products, and encourage villagers to move back into farming and rejuvenate the countryside. Similarly, it is not so far-fetched (despite the current political climate) to envisage immigration reform in the U.S. that leads to an amnesty for undocumented workers (*a la* 1986) or which creates "a *bracero*-like work permit so that those without papers would be legalised and have the ability to come and go, but without hope of citizenship" (personal communication, Dan Klooster). Conversely, policy could go the other way to successfully expel those migrants without papers from the U.S. labour market. What impact would the mass return of people have on villages that doubled their resident populations 'overnight'? As a way of understanding how such external factors impinge upon migrants and non-migrants alike, it is worth referring back to Figures 2.1 and 2.2 in Chapter 2 for a visual reminder of how migration streams do develop as a co-production of social change in a translocal context.

taking place to territorial land use and resource practice, and the implications for local forest landscapes and associated biodiversity. When thinking about the ramifications of such changes for Analco, Comaltepec, and the Sierra Norte more generally, useful pointers can be drawn from experiences in other parts of the world. One example comes from the Surses Valley region in Switzerland, where an EU *BioScene* research project entitled "Scenarios for reconciling biodiversity conservation with declining agricultural use in the mountains of Europe" developed three scenarios for the year 2030. Two of these are particularly pertinent to the study presented here:

- *Agricultural Liberalisation (LIB):* It is assumed that financial support to both agriculture and conservation is cancelled. Agricultural markets are completely liberalized and environmental regulations in agriculture are abolished. Consequently, most farms in the Surses are given up, and most of the land is left unused and eventually turns into forest.

- *Biodiversity Enhancement (BIO):* It is assumed that all support for agricultural production is replaced by biodiversity payments. The main aim of mountain agriculture is to promote the biodiversity of open land. The landscape is more structured, with smaller units, and part of the land is managed by conservation organisations.

Despite the obvious contextual differences between Switzerland and Mexico, we can see that elements of both the LIB and BIO scenarios are emerging in northern Oaxaca, where biodiversity and conservation payments have replaced financial support for agriculture in the region's high value forest landscapes. Indeed, when current calls for resource conservation and sustainability combine with the withdrawal of government support for *campesino* production, the future looks bleak indeed for the continuity of many customary land-based activities.

How will researchers be describing Analco or Comaltepec in fifteen or twenty years' time? While there has been a gradual shift in residency patterns towards urban areas, the large rural population in Oaxaca ensures that significant numbers of people will continue to be based in the countryside for decades to come. However, this looks set to be a countryside where agriculture and other land-based activities no longer hold a position of predominance, with a majority of residents living *on* rather than *from* the land – increasingly reliant on welfare payments from government and household- and community-level investments from non-resident members. Neither Analco or Comaltepec is quite there yet, but to paraphrase a colleague, Francisco Chapela, who has worked in the region for nigh on thirty years, 'if they [local people] are not farming or working the land, then what kind of rural community are they?' I fear that an

over-reliance on PES schemes, or any other conservation-driven initiative that rewards communities for swapping from extractive to non-intrusive activities, will only lead to rural areas that are increasingly devoid of ruralness or rurality. Without wanting to come across as a romanticist, if people in these villages are not working the land in productive terms, then – given the limited employment opportunities in the region – what does this do to their own sense of worth (as individuals), and what does it mean for the relevancy of the commons collective?

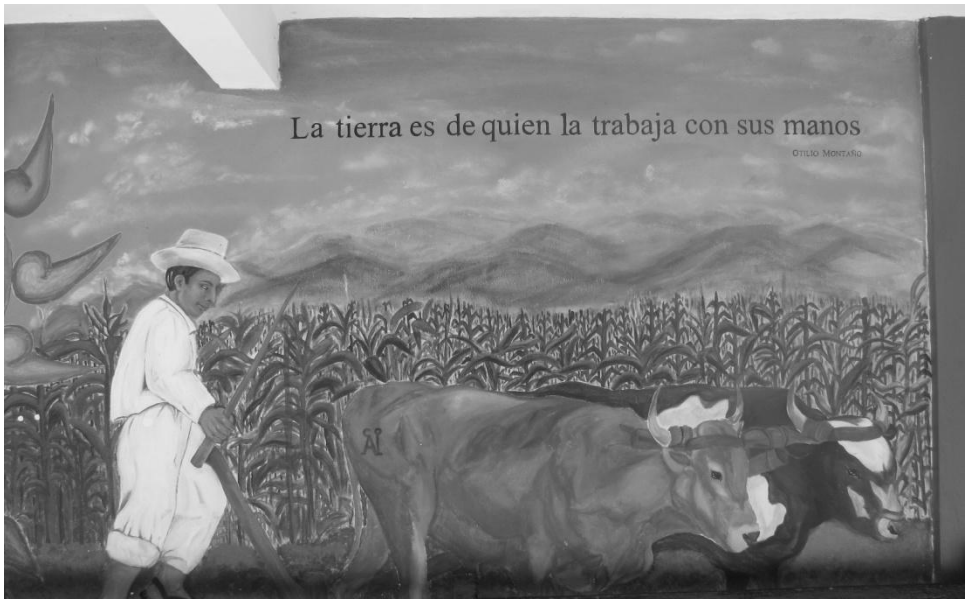


Plate 8.1: "*The land belongs to those who work with their hands*", Mural on wall of Analco's Municipal Palace.

Photo: Jim Robson

Under such a scenario, the environmental implications may be both profound and unexpected. From a biodiversity conservation perspective, one could assume that we are seeing a classic win-win situation, as farming gives way to forest resurgence. As Chapter 6 explained, however, while changes in land use are leading to significant increases in forest area, the biodiversity impacts are less clear, with a foreseeable decline in both the spatial heterogeneity of forest vegetation and levels of beta-diversity along altitudinal gradients. With out-migration and cultural change robbing rural communities of farmers, foresters and other resource users – all key components of the multifunctional, cultural landscapes that have come to define this part of the world – I would argue that maintaining the region's high environmental variability will

become an even greater challenge. Indeed, current government policy[142] appears flawed in ignoring the reality that community territories in northern Oaxaca are managed as larger land use and production systems, where low-disturbance mixed cropping systems and home gardens play a key role in maintaining high levels of agro- and wild-biodiversity. In other words, the way in which local land users operate is instrumental in creating a highly-beneficial mix of primary forest, secondary forest and open areas. The presumption, therefore, that rural to urban migration necessarily stimulates ecosystem recovery and improves watershed and biodiversity protection (Grau and Aide 2007) – a supposed win-win scenario for conservation – needs to be questioned rather than accepted wholesale.

8.5 Summary

It was Karl Polanyi (1886-1964) who introduced the notion of 'embeddedness' to the social sciences, whereby human institutions are so constrained by ongoing social relations that to construe them as independent would be deemed wholly inappropriate (see *The Great Transformation: The Political and Economic Origins of Our Time* (2001) for more on this). Similarly, this study has shown that the social relations that define commons regimes in northern Oaxaca are being constantly reproduced and contested. Here, the future of long-standing governance and institutional systems finds itself intertwined with the activities and expectations of individual community members – expectations that are increasingly tied to the influence of a globalising world and all its attendant processes and pressures.

On the one hand, migrant participation in hometown associations and other trans-local institutional arrangements provides clear evidence that contemporary commons regimes act as vehicles for the symbolic production of locality (after Baker 2005). The fact that many absentees remain committed to their home village is proof that commons regimes hold symbolic and cultural meanings and are not just a function of rational calculations. On the other hand, migrants are individuals and thus prone to individualistic behaviour that may conflict with any moral obligations they feel towards the collective. This study shows that a sizeable number of migrants have isolated themselves from local customs, with a trend towards declining participation in

[142] As Eakin (2005) reports, current agricultural policy in Mexico is directed towards market-oriented production and thus excludes the farming practices of smallholders who combine strategies rather than produce exclusively for the market. Likewise, systematic conservation planning in Mexico continues to be based around a perceived need to establish more formal protected areas (whether they be administered by municipal, state or federal governments) (see Robson 2007 for more on this).

adapted customary institutions. Indeed, sending communities, impacted by demographic and cultural change, are showing signs of losing critical points of control over matters of governance and community identity. The impact of increasing off-farm employment on local forest commons appears to be multi-fold: decreased participation in collective work activities; increased inequality; and, a decline in the authority of traditional community decision-making spaces and their ability to enforce customary rules. This study has shown that when households begin to participate in the market economy, community members' opportunity costs for participating in the commons regime diversify, and this can alter the distribution of dependence on and interest in the benefits that the regime provides.

Ostrom (2005) refers to 'rapid exogenous changes' or new threats that may unravel systems that have survived for multiple generations. She suggests that as time progresses and problems become more complex, the probability increases that society will eventually fail to cope with shocks and long-term stresses. The faster that key variables change, and the more variables that change at the same time, the more demanding is the problem of adaptation to new circumstances. She argues that research needs to move beyond the earlier foundation that focuses on just the resource users, to better understand the incongruence between individual and collective rationality, and the "problem of the maintenance of cooperation". The findings from this study cast doubts over how readily rural governance structures in Oaxaca – previously held up as examples of polycentric institutional arrangements (Alcorn and Toledo 1998) – provide the necessary framework for adaptive governance systems under new and changing circumstances (Ostrom 2001a; Folke et al 2005). In the context of Oaxaca, the emergence of trans-local communities with institutional arrangements that interact across organisational scales may have increased the diversity of response options to deal with uncertainty and change, but that does not necessarily mean that such responses are either appropriate or will prove successful.

CHAPTER 9 – CONCLUSIONS AND RECOMMENDATIONS

9.1 Summary of Findings

Over fifty years ago, Eric Wolf argued that *campesino* communities in Mexico formed part of larger, complex societies, and should not be viewed as self-contained and integrated systems in their own right. Rather, Wolf felt it more appropriate to view them as the local termini of a web of group relations that extend through intermediate levels from the level of the community to that of the nation-state and beyond (Wolf 1957). Consequently, he argued that sociocultural traits could not be understood correctly unless the impact of more general forces (power relations, international trade, world markets) were taken into consideration (Wolf 1982). The accuracy of Wolf's thesis is supported by the findings of the study presented here (Table 9.1), as social relations have expanded to cover ever-increasing geographical and cultural boundaries.

As large numbers of people leave their home villages, responding in part to external policy, social and economic drivers, a number of important demographic and cultural processes have emerged to change how communities are structured and how they function. In the study region in the State of Oaxaca, commons (or common property) regimes are organised around *cargos* as rotating, unpaid service commitments, which are a requirement for community membership. High rates of out-migration make it difficult to fill civic and communal posts, placing these institutions under great stress, and posing a serious question mark as to the viability of the customary governance system. A dwindling pool of well-qualified *comuneros*, a reduction in the number of *cargos* being carried out, and the switch from a 36-month to 18-month period of office has adversely affected the quality of communal and civic administration. The most severely affected communities run the risk of losing their status as municipalities. At the same time, labour deficits (exacerbated by long-term absence) are driving fundamental changes in land use practice, with farming and domestic forest use giving way to a range of non-extractive activities. This has significant implications for biological diversity, ecosystem services, and ultimately the well-being of sending communities (Figure 9.1). As their territorial presence declines, communities will find it increasingly difficult to govern their communal lands effectively.

Table 9.1: Study findings by research objective

Research Objective	**Main Findings**
1. To carry out a socio-demographic and socio-economic analysis of the study communities to determine the nature of exposure to out-migration at multiple levels.	Elevated out-migration is entering its fourth decade and now directly affects a majority of households in the two study communities, resulting in intra-family labour deficits and increasing reliance on off-farm activities. Migration dynamics have changed over time, with a shift from temporary to more permanent forms. This is particularly the case for migration to the U.S, which accounts for the majority of new migrants.
2. To document, at multiple levels, the impact that out-migration is having on the study communities' social organization and institutional arrangements, and to examine their response to such change.	Both study communities are suffering from a shortfall in resident labour. This is most acute in Analco and the smaller localities of Comaltepec. These smaller resident populations are struggling to meet civic and communal responsibilities. Institutional responses have largely been coping mechanisms, 'forced' upon the community by demographic changes, with little impact in the way of managing the flow and timing of migration.
3. To investigate the implications of demographic and cultural change on the continuity of local resource and conservation practices.	Migration has facilitated a shift from on-farm to off-farm activities. This is driving an overall decline in resource practice, crop diversity and changes to local landscapes through modifications to the ratio between forest and non-forest patches. A decline in resource practices is impacting species heterogeneity along environmental gradients.
4. To investigate the longer-term adaptive strategies being developed by the study communities to deal with current and projected out-migration, and safeguard local forest commons.	The introduction of legal obligations (in Comaltepec) for migrant *comuneros* and the establishment of hometown associations have helped to mitigate the impact of population loss on the *cargo* and *tequio* systems and opened up avenues for investment in the home community. However, the delay in establishing these obligations and the shift from temporary to permanent migration is undermining the effectiveness of both these strategies.

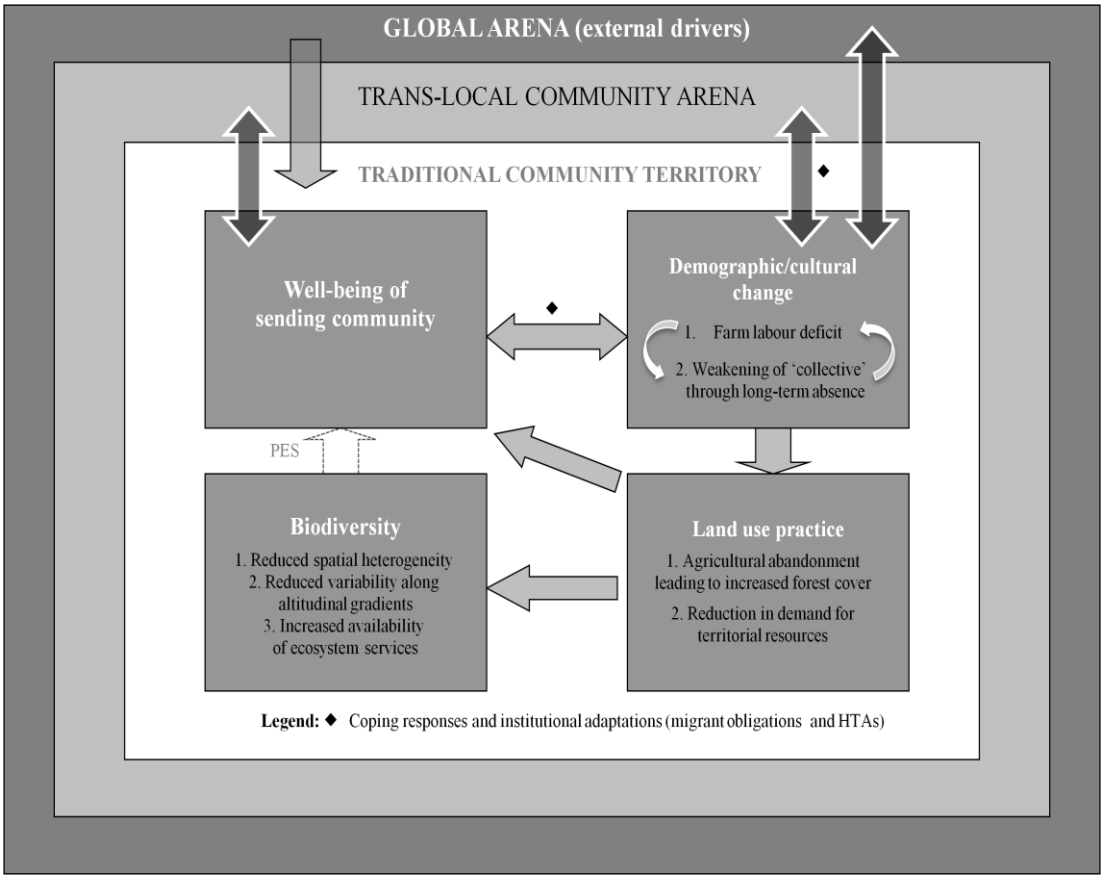


Figure 9.1: Framework conceptualising the main findings of the study

If current trends are set to continue, affected communities must decide whether customary systems are still relevant in a contemporary setting and worth preserving. Analco and Comaltepec may need to better adapt existing institutions and develop new arrangements to reflect their standing as deterritorialised regimes where identity, economy, customs and norms are now stretched across geographical scales. Without hard and fast rules concerning the residence pattern and occupations of migrant *comuneros*, the ability of communities to deal with commons-related problems will be reduced. To date, communities have attempted to exert a degree of influence over migrant decision-making, as well as access migrant earnings, through specifying the legal rights and obligations of non-resident *comuneros*. These adaptations, however, are most effective when migrants partake in a temporary or circular form of migration, with strong incentives to maintain their communal rights back home. The recent shift towards tentatively permanent migration – driven by the increased costs of border crossing and an ongoing decline in the economic viability of traditional agriculture – has seen new categories of

migrants emerge, not all of whom share the same sense of commitment and duty to the 'home' village, and thus a reduced incentive to comply with community obligations. They may be willing to contribute funds to help finance customary fiestas and ceremonies, but are less inclined (and less able) to send money for other productive activities or invest in the strengthening of existent institutional arrangements.

9.2 Contributions of the Thesis

9.2.1 Commons

From a theoretical perspective, the findings from this study highlight the tension that can arise between two alternate (although not mutually exclusive) frameworks for explaining the persistence of long-standing common institutions in the face of internal and external stressors. On the one hand, the establishment of Hometown Associations (HTAs) supports the moral economy argument that migrants continue to adhere to a communalist ideology, thus explaining their compliance with communal obligations and an apparent strengthening of 'community'. Oaxacan commons are considered inseparable from the collective labour relations and ideologies that bind communities together, and as Mutersbaugh (2004:6) notes, these regimes have shown a "marvelous ability to reconfigure to meet new challenges". Indeed, he adds that such a "communalist social dialectic" has served as the lynchpin of cultural survival for Mexican indigenous communities since the time of the *conquistadores*.

On the other hand, these commons are under threat as youth and unmarried adults migrate, and long-term absentees become more established in their cities of residence. Indeed, this research points to a limit in the capacity of migrants to invest capital (human, financial, cultural, or symbolic) in the home community, with a *per capita* decline in such investments expected over the long-term. When individual and family needs take precedence, cultural mores are superseded and migrants, acting as rational economic actors, begin to break with community expectations. Migration, therefore, can change the bounded rationality of an individual's cost-benefit decision to invest the time and money needed to participate in commons institutions and maintain community membership. This speaks directly to the totalitarian aspect of traditional Oaxacan commons, with more and more community members beginning to question why they as individuals should continue to owe so much to the collective.

Such lessons allow for a rethink as to the role of traditional resource commons in a world

that is increasingly defined by globalisation-related processes and pressures (Basch et al. 1994; Young et al. 2006). Within contemporary systems, we find that the institutions, capital and values that characterise resource-dependent societies are being reconfigured, while moving away from a 'bounded' community to one that functions across multiple levels (after Berkes 2009). This points to the need to develop a more sophisticated framework that can incorporate the changing set of attributes that characterise commons regimes impacted by long-term out-migration, namely: (i) new forms of community-making; (ii) institutional arrangements that span geographical and cultural boundaries; and, (iii) changing resource practices. Collectively, the change in key commons attributes reflect a transformation in customary ways of life, whereby migrants (and their families) are now becoming disconnected from both resource practices and the institutions of the home (or sending) community. Although Oaxaca has a long tradition of outmigration dating back to the early 1900s, rates have increased so dramatically in recent decades that almost half the state population has become semi-permanent or permanent residents of the Mexico City metropolitan area, the northern states of Mexico, or the United States (Bezaury 2007). The cumulative result of this exodus of working age adults affects the prospects for future social and political change in the countryside.

The long-term implications for affected communities, although possibly severe, remain unclear. Kenneth Wiltshire (2001:8) views transformation as a "radical change, a particularly deep and far-reaching one which within a relatively limited time span modifies the configuration of societies". There remains a doubt, therefore, as to how consistent migration can be considered with *campesinismo*, or whether the majority of Oaxaca's *campesino* communities will disappear under the corrosive influence of globalisation and neoliberalism. As Vertovec (2004:972) argues, migration can be transformative in that it promotes the widening of networks, more and different activities across distances, and speedier communications, all of which can lead to long-lasting, structural changes in local societies.

Some aspects of customary life have been able to persist over time, and through the vagaries of trans-localism may become reinforced and reconstituted. Indeed, rather than change uniformly under capitalist accumulation, important innovations will likely take place in specific places and in response to different drivers and markets. While Analco and Comaltepec are clearly struggling, some communities from the same region that have utlised migration to funnel greater investments into the local economy and introduce some quite radical institutional

adaptations[143]. Yet at the other extreme, there are villages close to Oaxaca City and in the Mixteca region where migration has clearly signified what Otero (1999) refers to as a "Farewell to the Peasantry", by which wage labour has become a "sure sign of proletarianisation and the death of communalism". Such a diversity of experiences acts as a reminder that the study's principal findings come from just two communities, located in a specific region of Oaxaca. It remains to be seen how typical or atypical these experiences are. From a state-wide perspective, we can expect to find that groups residing in different places are facing a range of often distinct collective action dilemmas, while the means by which they respond to such challenges will vary in accordance to the socio-cultural, economic and intellectual resources available to them.

Yet no matter the degree of change or form of response, there will be consequences for long-standing commons regimes whose logic has been (and arguably remains) the maintenance of autonomy through the use of local physical resources[144]. If a 'commons' is understood as a package of physical and cultural resources (along with their institutions) then what will happen to this package under the weight of globalising processes and change? If it is not possible for such a system to persist unaltered in today's world, then what are the alternatives? Will we see the neoliberal privatisation of these customary shared resources, or can another form of commons (a trans-local commons) emerge? Based upon the findings presented in this thesis, some of the resources that make up the commons 'package' will persist, some will go, and some 'new' resources or configurations will emerge as communities and their members continue to adapt to the world around them.

At times, this thesis has painted a sober and sometimes bleak picture – none more so when considering the future of the institutions of collective action that have long underpinned local governance and through which real and perceived autonomy of the commons is manifested. As mentioned previously, it is probable that such institutions will fail or have to undergo transformations to persist – likely involving the further monetarisation (professionalisation) of local governance, a change that would move things a long way from the original ideal or ethic upon which the system was originally founded. Nevertheless, I do not believe that such changes

[143] San Pablo Macuiltianguis (a neighbouring community of Comaltepec), for instance, has not only monetarised their *cargo* system but are now hiring *profesionistas* from Oaxaca City to fill some of these posts. The financing is coming from migrant groups in Los Angeles and community forestry operations (Merino, personal communication).
[144] On this point, it would be wrong to depict Oaxacan commons as culturally self-sufficient or autarkic. Analco and Comaltepec are not relics from some by-gone era, somehow left untouched by the passages of time. Rather, they have evolved over many decades and continued to integrate with a modernising mainstream society in Mexico.

will bring about the 'death' of the commons. Rather, commons will evolve to become distinct from what went before – in terms of how members relate to each other and by which collective action is achieved, but also in terms of how shared territorial resources are perceived and used by community members[145] – an inevitable consequence of people leaving farming and membership expanding to span geographical and cultural divides. From a scholarly perspective, the evolution of these regimes into a diversity of configurations – many of which may be far removed from the 'commons as peasant collective' idea that remains so pervasive in the literature – is such that researchers and academics will need to start to think more about what they imagine and what they understand a commons to be.

9.2.2 Population-environment nexus

This thesis sought to explore a poorly understood aspect of the linkages that exist between population and the environment – the impact of out-migration (population loss) on local natural resources and biodiversity. The study has shown that, in contrast to conventional population-environment thinking, the relationship between migration and the environment is non-linear and non-deterministic. Human interactions with ecological systems have often been described in terms of adverse impacts. Yet the findings from my work has shown that indigenous culture in Oaxaca should not be seen as an environmental constraint but as a means of landscape renewal and source of heterogeneity that generates biodiversity (Chapter 6; Robson and Berkes 2010). As such, landscape in this context reflects the interplay of nature and culture that allows for cultural and biological diversity to flourish.

The research findings presented in Chapter 6 focus on the biodiversity implications of agricultural abandonment and decline in land use practice. In doing so, it forms a critique of forest transition theory (Mather 1990, 1992; Rudel et al. 2007) and conventional conservation thinking, both of which assume that rural to urban migration stimulates ecosystem recovery and aid biodiversity conservation. As described in detail in earlier chapters, the highland regions of Oaxaca are characterised by a mosaic of forest and cropland that exhibits high environmental variability along altitudinal gradients. Here, small-scale resource activities at different elevations

[145] It may be that future commons configurations will see membership benefiting from their physical (natural resources) in an entirely non-extractive way; using their forests to access monies for biodiversity conservation, climate change mitigation and the protection of ecological services.

and eco-zones have been instrumental in creating a low-moderate disturbance regime that has helped to maintain and in some cases enhance local biological diversity.

However, it is important to specify the kind of biodiversity that may benefit from small-scale agropastoral and agroforest use. For example, certain tree species and large mammals dependent on the conditions characterised by a primary forest would not be supported by disturbance, no matter the scale. On the other hand, smaller-scale disturbance will benefit transitional species, successional species and edge-dependent species. This distinction is important to note because it is precisely the point that is ignored by many biodiversity / conservation advocates (Robson 2007; Robson and Berkes 2010; Chapter 6).

9.3 Research and Policy Recommendations

I undertook this study because so little work had been conducted on the consequences of out-migration for environmental management, resource use and rural livelihoods in Oaxaca or other parts of Mexico. To a large degree, this is due to a lack of interdisciplinary integration: environmental impacts, for example, are rarely examined in any depth in the migration literature. Indeed, most work in Latin America oriented at examining land and resource-use dynamics has been more concerned with in-migration and population growth (Carr et al. 2009). This lack of information poses a problem for practitioners, researchers and policy-makers who wish to support rural livelihoods in migrant-sending regions.

While I and others (Merino, Gonzalez and colleagues at GAIA) have started to fill some of these knowledge gaps in the Oaxacan context, in many ways this work serves only to highlight what still needs to be done. In particular, more research is required across diverse geographical and resource contexts to better understand the myriad of challenges that long-standing resource systems will face in the twenty-first century. Such efforts need to be particularly responsive to the social dynamics that underpin these systems, with the adaptive strategies of local people forming a key area for consideration. In terms of future scenarios, consideration should be given to the implications of the socio-political vacuum that could be left if such strategies were to fail.

From a theoretical standpoint, there is an obvious need for commons scholarship to broaden its scope of inquiry; to integrate into its framework processes and influences generally thought to be “exogenous factors”. From a migration perspective, this could include the idea of

how social networks may reproduce salient norms, values, and social relations that contribute to the persistence of a commons regime and cultural reproduction. Baker (2005), for example, talks about networks of exchange between different regimes, such that the focus shifts from an individual regime to a larger regional-scale perspective. It is an approach that shows much promise given the work presented here, which points to community membership that now covers geographical regions and straddles cultural divides.

From an environmental standpoint, of critical importance are longitudinal studies to empirically determine how a changing landscape mosaic, through processes of agricultural abandonment and subsequent forest encroachment, is impacting the biological integrity of high value conservation regions such as the Sierra Norte. Since Alcorn and Toledo (1998), there have been few interdisciplinary studies looking at the biodiversity benefits of Oaxacan agricultural systems, and time is of the essence given the degree and pace of change highlighted here. The kind of work carried out by Newton and colleagues (2007) needs to be replicated elsewhere in the country, but should also look at the wider sustainability implications of the different scenarios that may emerge under continued demographic and cultural change in rural areas. Whether the financial and human resources are available to make this happen is doubtful.

From a policy perspective, the question of how out-migration may impact the cultural and ecological integrity of rural communities is now becoming an issue of concern to organisations and policy-makers supporting rural development and biodiversity conservation (IDRC 2009; Ford Foundation 2008; ODI 2004a). It was never an express goal of mine to develop policy recommendations. Indeed, I have always been rather skeptical about the ability of interdisciplinary research to sway policy at any level, and I do not expect this study to have a great deal of impact in this regard. Nevertheless, the current trends in Oaxacan *municipios* show that policy developments in Mexican society and constitutional law will have to be cleverly designed to promote the right kind of articulation between federal government and local municipal powers and autonomy. The recent "*Tres por Uno*" (see footnote 137) program is one initiative, although, to date, it has had little impact among northern Oaxacan communities. More promising would be something along the lines of the "*Peso por Servicio*" program suggested by Federico Besserer and Michael Kearney (2004), which aims to help defray the personal costs of Oaxacan migrants who return to fulfill government service. It will be interesting to see if the federal government promotes such an initiative as the most vulnerable municipalities find

themselves unable to cope with a critically low *comunero: cargo* ratio.

One thing is certain, however: migration is profoundly affecting the form and functioning of local governance. Policy thus needs to contribute to the successful adaptation of community systems to the realities of those trends (deterritorialisation, translocalism, and globalisation) that are reshaping them. Clearly, U.S. immigration policy has a huge role to play. Some form of legalisation, either through an Amnesty for current undocumented workers or the establishment of temporary work permits, is needed to facilitate the ability of Mexican migrants to cross the border. This is a potential development that in itself would greatly support the institutional adaptations of sending communities, which have been largely based around strengthening translocal links to ensure the two-way flow of capital between migrants and their home villages.

Finally, and this is equally important for both researchers and policy-makers, there needs to be greater appreciation of the significance of the shift from temporary to more permanent forms of migration. Rural development proponents, in particular, need to avoid the assumption that migration is simply a diversified livelihood strategy (IDRC 2009; ODI 2004b) to obtain cash income, and can be achieved without suppressing local productive practices or dissolving traditional customs. This is not the case for an increasing number of Mexican rural communities, which are undergoing fundamental changes in the way they use and govern their communal resources. While it is true that the increased capabilities of migrants could make them better able to defend their communal property and institutions, such an argument is highly contingent and dependent upon local histories, cultures and geographies, in addition to variation in migration processes and flows. It should be noted that many of the ways in which out-migration is touted to stimulate community economy (see Cohen 2005; VanWey et al. 2005; Waterbury 1999) had yet to emerge in the villages featured in this study.

9.4 Closing Remark

As Clarke (2000) notes, Oaxaca is a special place in Mexico, where biological and cultural diversity constitutes a form of wealth that contrasts with the conditions of economic poverty and marginality that affect much of its population. The State's inhabitants have resided, historically-speaking, in nucleated settlements, largely isolated from one another and the outside world by high mountain ranges and deep valleys. Whereas the impenetrability of the terrain may have reduced the exposure of Oaxaca's indigenous communities to the processes of

hispanización, they have not been spared the globalised forces of capitalism (Clarke 2000). Some Westerners visiting today might still envisage Oaxaca as colonial, traditional, rustic, pre-industrial, yet on closer scrutiny, change – whether superficial or more fundamental – is occurring everywhere. As the state's highland communities awaited the completion of paved roads and highways, older residents knew that access to markets and improved health and education facilities would come at a price. While the true nature of this 'price' is still to be determined, much will depend upon the attitudes and desires of the grandchildren (both resident and non-resident) of those older community members, and their disposition to fight to maintain the customs of local governance and social organisation that have been so integral to life in this this part of the world for centuries.

LITERATURE CITED

Acheson, J.M. 2006. Institutional failure in resource management. *Annual Review of Anthropology* 35:117-134.

Adams, J.R.H. and J. Page. 2005. Do international migration and remittances reduce poverty in developing countries? *World Development* 33:16-45

Adger, N.W., N. Brooks and G. Bentham. 2004. *New Indicators of Vulnerability and Adaptive Capacity.* Tyndall Centre Technical Report Number 7. 2004.

Adger, N.W. 2006. Vulnerability. *Global Environmental Change* 16:268-281

Adger, N.W., P. Mick Kelly, A. Winkels, L.Q. Huy and C. Locke. 2002. Migration, remittances, livelihood trajectories, and social resilience. *Ambio* 31(4): 358-366.

Aguilar-Stoen, M., S.R. Moe and S.L. Camargo-Ricalde. 2008. Home gardens sustain crop diversity and improve farm resilience in Candelaria Loxicha, Oaxaca, Mexico. *Human Ecology* 37(1): 55-77

Agrawal, A. 2001. Common property institutions and sustainable governance of resources. *World Development* 29(10):1649-1672.

Agrawal, A. 2002. Common resources and institutional sustainability. In: Ostrom, E., T. Dietz, N. Dolšak, P. C. Stern, S. Stonich and E.U. Weber (eds), *The Drama of the Commons*. National Research Council. Washington, D.C: National Academy Press.

Agrawal, A. 2005. *Environmentality: Technologies of Government and the Making of Subjects*. New Delhi: Oxford University Press.

Alatorre, G. 2000. *La construcción de una cultura gerencial democrática en las empresas forestales comunitarias.* Mexico City: Casa Juan Pablos.

Alcamo, J. 2008. Introduction: The case for scenarios of the environment. In: Alcamo, J. (ed), *Environmental Futures: The Practice of Environmental Scenario Analysis*. Amsterdam: Elsevier.

Alcorn, J. and V. Toledo. 1998. Resilient resource management in Mexico's forest ecosystems: The contribution of property rights. In: Berkes, F. and C. Folke (eds), *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge, UK: Cambridge University Press.

American Apparel. 2008. *Legalize LA: An American Apparel Project*. Los Angeles, CA.

Anderies, J.M., M.A. Janssen and E. Ostrom. 2004. A framework to analyze the robustness of social-ecological systems from an institutional perspective. *Ecology and Society* 9(1): 18. www.ecologyandsociety.org/vol9/iss1/art18

Anderson, J.L. 1989. *Comaltepec Chinantec Syntax: Studies in Chinantec Languages 3*. Arlington, TX: Summer Institute of Linguistics / University of Texas.

Anta Fonseca, S., A. Plancarte Barrera and J. Barrera Teran. 2000. *Conservación y manejo comunitario de los recursos forestales en Oaxaca*. SEMARNAP: Delegación Oaxaca.

Antinori, C. 2005. Vertical integration in the community forestry enterprises of Oaxaca. In: Bray, D., L. Merino Perez and D. Barry (eds), *The Community Forests of Mexico: Managing for Sustainable Landscapes*. Austin, TX: University of Texas Press. 390pp

Arango, J. 2000. Explaining migration: A critical review. *International Social Science Journal* 165.

Bacon, D. 2006. *Communities without Borders: Images and Voices from the World of Migration*. Ithaca, New York: Cornell University Press.

Bacon, D. 2008. *Illegal People: How Globalization Creates Migration and Criminalizes Immigrants*. Beacon Press. 261pp

Baker, J.M. 2005. *The Kuhls of Kangra: Community-managed Irrigation in the Western Himalaya*. Seattle and London: University of Washington Press.

Baland, J.M. and J.P. Platteau. 1996. *Halting Degradation of Natural Resources: Is there a Role for Rural Communities.* Oxford, UK: Clarendon Press.

Bandiera, F.P., C. Martorell, J.A. Meave and J. Caballero. 2005. Floristic heterogeneity in rustic coffee plantations, and its role in the conservation of plant diversity: A case study of the Chinantec region of Oaxaca, Mexico. *Biodiversity and Conservation* 14(5): 1225–1240

Barabas, A.M., M. A. Bartolomé and B. Maldonado (eds). 2003. *Los pueblos indígenas de Oaxaca: Atlas etnográfico*. CONACULTA / INAH.

Basch, L., N. Glick-Schiller and C. Blanc-Szanton. 1994. *Nations Unbound: Transnational Projects, Postcolonial Predicaments, and Deterritorialized Nation States*. Sydney, Australia: Gordon & Beach.

Bauböck, R. 2003. Towards a political economy of migrant transnationalism. *International Migration Review* 37 (3):700-23.

Bates, P., M. Chiba, S. Kube and D. Nakashima. 2009. *Learning and Knowing in Indigenous Societies Today*. Paris: UNESCO.

Bebbington, A. 1990. Farmer knowledge, institutional resources and sustainable agricultural strategies: A case study from the eastern slopes of the Peruvian Andes. *Bulletin of Latin American Research*, 9(2):203-228.

Bebbington, A. and S.P.J. Batterbury. 2001. Transnational livelihoods and landscapes: Political ecologies of globalization. *Ecumene*, 8(4):369-380.

Bebbington, A., L. Hinojosa-Valencia, D. Muñoz and R.E. Rojas Lizarazú. 2007. Livelihoods and resource accessing in the Andes: *desencuentros* in theory and practice. In: Gough, I. and McGregor, J.A. (eds), *Wellbeing in Developing Countries: From Theory to Research*. Cambridge, UK: Cambridge University Press

Berg, B.L. 2007. Focus group interviewing. In: *Qualitative Research Methods in the Social Sciences*. Boston, MA: Pearson/Allyn & Bacon.

Berkes, F. 2003. Cross-scale institutional linkages: Perspectives from the bottom up. In: Ostrom, E., T. Dietz, N. Dolšak, P. C. Stern, S. Stonich and E.U. Weber (eds), *The Drama of the Commons*. National Research Council. Washington, D.C: National Academy Press.

Berkes, F. 2004. Rethinking community-based conservation. *Conservation Biology* 18: 621-630.

Berkes, F. 2006. From community-based resource management to complex systems: the scale issue and marine commons. *Ecology and Society* 11(1): 45. Online at: http://www.ecologyandsociety.org/vol11/iss1/art45/

Berkes, F. 2008. *Sacred Ecology* (Second edition). New York and London: Routledge.

Berkes, F. 2009. Revising the commons paradigm. *Journal of Natural Resources Policy Research*, 1(3), 261-264.

Berkes, F. and C. Folke (eds). 1998. *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*. Cambridge, UK: Cambridge University Press.

Berkes, F., J. Colding and C. Folke (eds). 2003. *Navigating Social-ecological Systems: Building Resilience for Complexity and Change*. Cambridge, UK: Cambridge University Press.

Berkes, F. and I.J. Davidson-Hunt. 2006. Biodiversity, traditional management systems and cultural landscapes: Examples from the Boreal forest of Canada. *International Social Science Journal* 187:35-47.

Berkes, F. and I.J. Davidson-Hunt. 2010. Innovating through commons use: community-based enterprises. *International Journal of the Commons* 4(1):1-7.

Bernard, H.R. 2002. *Research Methods in Anthropology: Qualitative and Quantitative Approaches* (third edition). Lanham, MD: Altamira Press.

Bezaury, J.A. 2007. Organized coffee producers: Mitigating negative impacts of outmigration in Oaxaca, Mexico. *Mountain Research & Development* 27(2): 109–113.

Bhagwat, S.A., C.G. Kushalappa, P.H. Williams and N.D. Brown. 2005. The role of informal protected areas in maintaining biodiversity in the Western Ghats of India. *Ecology and Society* 10(1): http://www.ecologyandsociety.org/vol10/iss1/art8

Binford, L. 2003. Migrant remittances and (under)development in Mexico. *Critique of Anthropology* 23(3): 305-336.

Blauert, J. and S. Zadek (eds). 1998. *Mediating Sustainability: Growing Policy from the Grassroots*. Connecticut, U.S: Kumarian Press.

Boege, E. 2008. *El patrimonio biocultural de los pueblos indígenas de México: hacia la conservación in situ de la biodiversidad y agrodiversidad en los territorios indígenas*. Instituto Nacional de Antropología e Historia (INAH) / Comisión Nacional para el Desarrollo de los Pueblos Indígenas (CDI). Mexico City: Mexico.

Borgerhoff Mulder, M. and P. Coppolillo. 2005. *Conservation: Linking Ecology, Economics and Culture*. Princeton, New Jersey: Princeton University Press.

Brandt, J. and H. Vejre (eds). 2004. *Multi-functional Landscapes Volume 1: Theory, Values and History*. WIT Press.

Bray, D. 2006. Can common property regimes alleviate poverty's markets and their absence in the common property literature. In: Merino Perez, L. and J. Robson (eds), *Managing the Commons: Markets, Commodity Chains and Certification*. Instituto Nacional de Ecología, Mexico City.

Bray, D. 2010. The community as entrepreneurial firm: Common property capitalism in Mexican forest communities creates jobs, competes in global markets, and conserves biodiversity. *Americas Quarterly*, February 15, 2010.

Bray, D., L. Merino Perez, P. Negreros-Castillo, G. Segura-Warnholtz, J.M. Torres-Rojo and H.F.M. Vester. 2003. Mexico's community-managed forests as a global model for sustainable landscapes. *Conservation Biology* 17(3): 672-677.

Bray, D. and L. Merino Perez. 2004. *La experiencia de las comunidades forestales en México: Veinticinco años de silvicultura y construcción de empresas forestales comunitarias*. Mexico City: Instituto Nacional de Ecología.

Bray, D., L. Merino Perez and D. Barry (eds). 2005. *The Community Forests of Mexico: Managing for Sustainable Landscapes*. University of Texas Press. 390pp.

Bray, D., E. Duran, S. Anta Fonseca, G.J. Martin, and F. Mondragón. 2008. A new conservation and development frontier: Community protected areas in Oaxaca, Mexico. *Current Conservation* 2(2): 7–9.

Brettell, C.B. and J.F. Hollifield (eds). 2008. *Migration Theory: Talking Across Disciplines*. Routledge: U.S.

Bryceson, D.F., C. Kay and J. Mooji (eds). 2000. *Disappearing Peasantries? Rural Labour in Africa, Asia and Latin America*. London, UK: Intermediate Technology Publications.

Brooks, N. 2003. *Vulnerability, Risk and Adaptation: A Conceptual Framework*. Tyndall Centre for Climate Change Research, Working Paper 38.

Burger, J., E. Ostrom, R. Norgaard and D. Policansky (eds). 2001. *Protecting the Commons: A Framework for Resource Management in the Americas*. Washington, D.C: Island Press.

Cancian, F. 1965. *Economics and Prestige in a Maya Community: The Religious Cargo System in Zinacantan.* San Francisco: Stanford University Press.

Carr, D.L., A.C. Lopez and R.E. Bilsborrow. 2009. The population, agriculture, and environment nexus in Latin America: country-level evidence from the latter half of the twentieth century. *Population and Environment* 30(6):222-246

Carlsson, L. 2000. Policy networks as collective action. *Policy Studies Journal*, 28, 502-520.

Castillo, R. F. and A. del Blanco-Macías. 2007. Secondary succession under a slash-and-burn regime in a tropical montane cloud forest: soil and vegetation characteristics. Newton, A. C. (ed). 2007. *Biodiversity Loss and Conservation in Fragmented Forest Landscapes: The Forests of Montane Mexico and Temperate South America.* CABI, Wallingford, Oxford, UK.

Castillo, A. and V.M. Toledo. 2000. Applying ecology to the Third World: The case of Mexico. *BioScience* 50(1): 66–76.

CCMSS. 2002. *Community Forests of Mexico: Achievements and Challenges*. Consejo Civil Mexicano para la Silvicultura Sostenible (CCMSS). Mexico City, Mexico.

CDI-UNDP. 2004. *Los pueblos indígenas de México: Pueblos indígenas del México Contemporáneo*. Comisión Nacional para el Desarrollo de los Pueblos Indígenas (CDI) / UNDP. Mexico City, Mexico.

CDI-UNDP. 2006. *Regiones indígenas de México*. Comisión Nacional para el Desarrollo de los Pueblos Indígenas (CDI) / UNDP. Mexico City, Mexico.

Comisión Nacional para el Desarrollo de los Pueblos Indígenas (CDI). Centro de Información. Consulted July 15th, 2007 at: http://www.cdi.gob.mx/index.php?id_seccion=92

Ceballos, G., J. Arroyo-Cabrales and R.A. Medillin. 2002. The mammals of Mexico: Composition, distribution and conservation status. Occasional Papers, *Museum of Texas Tech University* 218: 1-27

Challenger, A. 1998. *Utilización y conservación de los ecosistemas terrestres de México: Pasado, presente y futuro*. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Instituto de Biología, Universidad Nacional Autónoma de México, and Sierra Madre. Mexico, D.F. 847pp.

Chapela, F. 2005. Indigenous community forest management in the Sierra Juarez, Oaxaca. In: Barton Bray, D., L. Merino Perez and D. Barry (eds), *The Community Forests of Mexico: Managing for Sustainable Landscapes*. Austin, TX: University of Texas Press.

CIA. 2009. *The World Factbook: Mexico-People*. Central Intelligence Agency. Consulted January 29, 2010 at: https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html#People

Clarke, C. 2000. *Class, Ethnicity, and Community in Southern Mexico: Oaxaca's Peasantries*. Oxford, UK: Oxford University Press.

Cockcroft, J. 1998. *Mexico's Hope: An Encounter with Politics and History*. New York: Monthly Review Press.

Cohen, J.H. 2004a. *The Culture of Migration in Southern Mexico*. Austin, TX: University of Texas Press.

Cohen, J.H. 2004b. Community, economy and social change in Oaxaca, Mexico: Rural life and cooperative logic in the global economy. In: Otero, G. (ed), *Mexico in Transition: Neoliberal Globalism, the State and Civil Society*. London: Zed Books.

Cohen, J.H. 2005. Remittance outcomes and migration: Theoretical contests, real opportunities. *Studies in Comparative International Development* 40(1): 88-112.

Cohen, J.H., R. Jones and D. Conway. 2005. Why remittances shouldn't be blamed for rural underdevelopment in Mexico: A collective response to Leigh Binford. *Critique of Anthropology* 25(1): 87-96.

CONABIO-CONANP-TNC-PRONATURA-FCF/UANL. (2007). *Análisis de vacíos y omisiones en conservación de la biodiversidad terrestre de México: espacios y especies*. Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, Comisión Nacional de Áreas Naturales Protegidas, The

Nature Conservancy-Programa México, Pronatura, A.C., Facultad de Ciencias Forestales de la Universidad Autónoma de Nuevo León, México. Mexico City, Mexico.

Conservation International. 2007. *Madrean Pine-Oak Woodlands*: *Biodiversity Hotspots*. Conservation International, Washington, D.C. Consulted July 15th, 2007 at: http://www.biodiversityhotspots.org/xp/Hotspots/pine_oak/

Corbett, J., M.A. Musalem Merhy, O. Rios Vazquez and H.A. Vazquez Hernandez (eds). 1992. *Migracion y etnicidad en Oaxaca*. Publications in Anthropology No. 43. Nashville, Tennesse: Vanderbilt University.

Cornelius, W.A. and J.M. Lewis. 2007. *Impacts of Border Enforcement on Mexican Migration: The View From Sending Communities*. Lynne Rienner Publishers.

Creswell, J. W. 2009. *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. Thousand Oaks, CA: Sage Publication.

Curran, S. 2002. Migration, social capital, and the environment: Considering migrant selectivity and networks in relation to coastal ecosystems. In: Lutz, W., A. Prskawetz and W.C. Sanderson (eds), *Population and Environment: Methods of Analysis*. Population Council, New York.

Curran, S. 2004. What types of social capital are we talking about? *IASC Commons Digest* No. 69, June 2004.

Curran, S. and E. Rivero-Fuentes. 2003. Engendering migrant networks: The case of Mexican migration. *Demography* 40(2): 289-307.

Cutter, S.L., B.J. Boruff and W.L. Shirley. 2003. Social vulnerability to environmental hazards. *Social Science Quarterly* 84(2):242-261.

Dauvergne, C. 2008. *Making People Illegal: What Globalization means for Migration and Law*. Cambridge, UK: Cambridge University Press.

Davidson-Hunt, I.J. 2006. Adaptive learning networks: Developing resource management knowledge through social learning forums. *Human Ecology*, 34(4): 593-614.

Davidson-Hunt, I.J. and F. Berkes. 2003. Learning as you journey: *Anishnaabe* perception of social-ecological environments and adaptive learning. *Ecology and Society* 8(1): 5. Online at: http://www.ecologyandsociety.org/vol8/iss1/art5/

Davidson-Hunt, I.J. and R.M. O'Flaherty. 2007. Researchers, indigenous people, and place-based learning communities. *Society and Natural Resources* 20: 291–305.

Davis, B., G. Stecklov, and P. Winters. 2002. Domestic and international migration from rural Mexico: Disaggregating the effects of network structures and composition. *Population Studies* 56(3) 291-309.

De la Mora, G. 2003. *El manejo comunitario de los recursos naturales como estrategia de conservación: estudio de caso de la comunidad de Santiago Comaltepec, Sierra Norte de Oaxaca*. Unpublished Master's thesis. Mexico City, Mexico: Instituto Mora.

DeWalt, K.M. and B.R. DeWalt. 2002. What is participant observation? In: DeWalt, K.M. and B.R. DeWalt, *Participant Observation: A Guide for Fieldworkers*. Altamira Press, Walnut Creek, CA.

Diamond, J.M. 2005. *Collapse: How Societies Choose to Fail or Succeed*. New York: Viking Books.

Diemont, S.A.W. et al. 2006. Lacandon Maya Forest Management: Restoration of Soil Fertility Using Native Tree Species. *Ecological Engineering* 28(3): 205-212.

Douglas, M. 1986. *How Institutions Think*. Syracuse N.Y.: Syracuse University Press.

Durand, L. and R. Landa. 2004. Demographic change and commons management: A focus on migration. *IASC Commons Digest* No. 69, June 2004.

Durand, J. and D.S. Massey (eds). 2004. *Crossing the Border: Research from the Mexican Migration Project*. New York: Russell Sage Foundation.

Eakin, H. 2005. Institutional change, climate risk, and rural vulnerability: Cases from Central Mexico. *World Development* 33(11): 1923-1938.

Economist. 2009. *Renewing America*. The Economist, January 17, 2009.

Echeverría, C., L. Cayuela, R.H. Manson, D.A. Coomes, A. Lara, J.M Rey-Benayas and A.C. Newton. 2007. Spatial and temporal patterns of forest loss and fragmentation in Mexico and Chile. In: Newton, A. C. (ed). 2007. *Biodiversity Loss and Conservation in Fragmented Forest Landscapes: The Forests of Montane Mexico and Temperate South America.* Wallingford, Oxford, UK: CABI.

Ellen, R., P. Parkes and A. Bicker (eds). 2000. *Indigenous Environmental Knowledge and its Transformations: Critical Anthropological Perspectives*. Amsterdam: Harwood Academic Publishers.

Escobar, A. 1995. *Encountering Development: The Making and Unmaking of the Third World*. Princeton, NJ: Princeton University Press.

Escobar, A. 2001. Culture sits in places: reflections on globalism and subaltern strategies of localization. *Political Geography* 20: 139-174.

Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. *Annual Review of Ecology Evolution and Systematics* 34: 487–515.

Fajnzlber, P. and J. Humberto Lopez (eds). 2008. *Remittances and Development: Lessons from Latin America*. The World Bank, Washington, D.C.

Fanjul, G. and A. Fraser. 2003. Dumping without borders: How U.S agricultural policies are destroying the livelihoods of Mexican corn farmers. *Oxfam Briefing Paper* 50. Washington, D.C.: Oxfam international.

Fisher, J.F. 1990. *Sherpas: Reflections on Change in Himalayan Nepal*. Berkeley: University of California Press.

FLACSO. 2007. *Analisis del uso y manejo de los recursos naturales en el Municipio de San Juan Evanelista Analco*. Internal community document. Oaxaca, Mexico.

Folke, C. 2006. Resilience: The emergence of a perspective for social-ecological systems analysis. *Global Environmental Change* 16: 253-267.

Folke, C., T. Hahn, P. Olsson, and J. Norberg. 2005. Adaptive governance of social-ecological systems. *Annual Review of Environmental Resources* 30: 441-473.

Forman, R.T.T. 1995. *Land Mosaics: The Ecology of Landscapes and Regions*. Cambridge, UK: Cambridge University Press.

Fox, J. and River-Salgado, G. 2004. *Indigenous Mexican Migrants in the United States*. Center for U.S.-Mexican Studies; Center for Comparative Immigration Studies.

Fox, J. 2007. *Accountability Politics: Power and Voice in Rural Mexico.* Oxford Studies in Democratization. Oxford University Press.

Frizzi, M. 2000. The indigenous population of Oaxaca from the sixteenth century to the present. In: Adams R.E.W. and M.J. MacLeod (eds.), *The Cambridge History of the Native Peoples of the Americas, Volume II, Mesoamerica, Part 2*. Cambridge, UK: Cambridge University Press.

García-Mendoza, A.J., M. De Jesús Ordóñez and M. Briones-Salas (eds). 2004. *Biodiversidad de Oaxaca*. Mexico City, Mexico: Instituto de Biología de la UNAM, Fondo Oaxaqueño para la Conservación de la Naturaleza, and the World Wildlife Fund.

Garibay, C. 2007. *El dilema corporativo del comunalismo forestal*. CIESAS No. 23.

Gibson, C., M. McKean and E. Ostrom (eds). 2000. *People and forests: Communities, institutions and governance*. Cambridge, Mass: MIT Press.

Giddens, A. 1991. *The Consequences of Modernity.* San Francisco: Stanford University Press.

Giraudo, A.R., S.D. Matteucci, J. Alonso, J. Herrera and R.R. Abramson. 2008. Comparing bird

assemblages in large and small fragments of the Atlantic Forest hotspots. *Biodiversity and Conservation* 17(5):1251-1265.

Gliessman, S.R., D. Goomand and J.A. Fox (eds). 2008. *Confronting the Coffee Crisis: Fair Trade, Sustainable Livelihoods and Ecosystems in Mexico and Central America*. MIT Press. Cambridge.

Glick Schiller, N. and P. Levitt .2006. *Haven't we heard this somewhere before? A reply to Waldinger and Fitzgerald*. Woodrow Wilson School of Public and International Affairs, Center for Migration and Development, Princeton University.

Goldman, M. 1998. Inventing the commons: Theories and practices of the Commons' professional. In: Goldman, M. (ed), *Privatizing Nature: Political Struggles for the Global Commons.* New Jersey: Rutgers University Press.

Gomez-Mendoza, L., E. Vega-Pena, M.I. Ramirez, J.L. Palacio-Prieto and L. Galicia. 2006. Projecting land-use change processes in the Sierra Norte of Oaxaca, Mexico. *Applied Geography* 26: 276-290.

Gonzalez, R.J. 2001. *Zapotec Science: Farming and Food in the Northern Sierra of Oaxaca*. Austin, Texas: University of Texas Press.

Gordon, H.S. 1954. The economic theory of a common-property resource: The fishery. *Journal of Political Economy* 62(2): 124-142.

Grau, H.R. and T.M. Aide. 2007. Are rural–urban migration and sustainable development compatible in mountain systems? *Mountain Research & Development* 27(2): 119-123.

Gray, C.L. 2009. Rural out-migration and smallholder agriculture in the southern Ecuadorian Andes. *Population and Environment* 30: 193-217.

Grieshop, J.I. 2006. The *envios* of San Pablo Huitepec, Oaxaca: Food, home, and transnationalism. *Human Organization*, Winter 2006.

Grimes, K.M. 1998. *Crossing Borders: Changing Social Identities in Southern Mexico*. Tucson, Az: University of Arizona Press.

Guba, E.G. and Y.S. Lincoln. 2005. Paradigmatic controversies, contradictions, and emerging confluences. In: Denzin, N.K. and Y.S. Lincoln (eds), *The Sage Handbook of Qualitative Research* (Third Edition). Thousand Oaks, CA; Sage Publications.

Gunderson, L.S. and C.S. Holling (eds). 2001. *Panarchy: Understanding Transformations in Human and Natural Systems*. Washington, D.C.: Island Press.

Gutzwiller, K.J. 2002. Conservation in human-dominated landscapes. In: Gutzwiller, K.J. (ed), *Applying Landscape Ecology in Biological Conservation*. Springer Books.

Hammersley, M. and P. Atkinson. 2005. What is ethnography? In: *Ethnography: Principles and Practice*. Routledge Publications, London.

Hardin, G. 1968. The tragedy of the commons. *Science* 162:1243-1248.

Harvey, D. 1996. *Justice, Nature and the Geography of Difference*. Oxford, UK: Blackwell Books.

Harvey, D. 1989. *The Condition of Postmodernity*. Oxford, UK: Blackwell.

Heckler, S. 2009. Introduction. In: Heckler, S. (ed), *Landscape, Process and Power: Reevaluating Traditional Environmental Knowledge*. Berghahn Books. New York.

Heckenberger, M.J, A. Kuikuro, U. Tabata Kuikuro, J.C. Russell, M. Schmidt, C. Fausto and B. Franchetto. 2003. Amazonia 1492: Pristine forest or cultural parkland? *Science* 301(5640): 1710-1714.

Holling, C.S. 1973. Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics* 4: 2-23.

Holling, C.S. 2001. Understanding the complexity of economic, ecological and social systems. *Ecosystems* 4: 390-405.

Hunn, E.S. 2008. *A Zapotec Natural History*. Tucson, AZ: University of Arizona Press.

Hutton, J., W.M. Adams and J.C. Murombedzi. 2005. Back to the barriers? Changing narratives in biodiversity conservation. *Forum for Development Studies*, 2: 341–370.

IDRC. 2010. RPE Research Topic: Migration, Rural Poverty and Natural Resources Management. Checked on January 28, 2010, at: http://www.crdi.ca/rpe/ev-128590-201-1-DO_TOPIC.html

Illoldi-Rangel, P., T. Fuller, M. Linaje, V. Sanchez-Cordero, and S. Sarkar. 2006. *Identifying Conservation Priority Areas for Endemic Mammals in Oaxaca, Mexico*. Unpublished manuscript, Instituto de Biologia, UNAM. Mexico City, Mexico.

Instituto Nacional para el Federalismo y el Desarrollo Municipal (INAFED). 2007. *Enciclopedia de los Municipios de México*: *Estado de Oaxaca.* Government of Mexico. Mexico City. Consulted July 15th, 2007 at: http://www.e-local.gob.mx/work/templates/enciclo/oaxaca/

Instituto Nacional de Estadística Geografía e Informática (INEGI). Centro de Información. Consulted July 15th, 2007 at: http://www.inegi.gob.mx/lib/informacion.asp?c=11&s=prod_serv

INEGI. 2004. *Indicadores sociodemográficos de México 1930-2000*. Instituto Nacional de Geografía e Informática (INEGI). Centro de Información. Mexico City , Mexico

INEGI. 2009. *Perspectiva estadística: Oaxaca*. Instituto Nacional de Geografía e Informática (INEGI). Centro de Información. Oaxaca City, Mexico

INI. 2002. *Atlas Agrario del Estado de Oaxaca*. Gobierno del Estado de Oaxaca/Secretaria de Asuntos Indígenas/Secretaria de la Reforma Agraria/Instituto Nacional Indigenista. Oaxaca, Mexico.

Ingold, T. 2000. *The Perception of the Environment: Essays in Livelihood, Dwelling and Skill*. London, UK: Routledge.

Jokisch, B.D. 2002. Migration and agricultural change: The case of smallholder agriculture in highland Ecuador. *Human Ecology* 30(4): 523-550.

Jones, R.C. 2009. Migration permanence and village decline in Zacatecas: When you can't go home again. *The Professional Geographer* 61(3): 382-399.

Kaimowitz, D. and D. Sheil. 2007. Conserving what and for whom? Why conservation should help meet basic human needs in the tropics. *Biotropica* 39(5): 567–574.

Katz, E. 2003. The changing role of women in the rural economy. In: *Agriculture and Rural Development, Latin America and the Caribbean*. FAO, Current and Emerging Issues for Economic Analysis and Policy Research (CUREMIS II)

Kearney, M. 1991. Borders and boundaries of state and self at the end of empire. *Journal of Historical Sociology* 4(1): 52-74.

Kearney, M. 1995. The local and the global: The anthropology of globalization and transnationalism. *Annual Review of Anthropology* 24: 547-565.

Kearney, M. 1996. *Reconceptualizing the Peasantry: Anthropology in Global Perspective*. Boulder, CO: Westview Press.

Kearney, M. 2004. *Changing Fields of Anthropology: From Local to Global*. Maryland VA: Rowman & Littlefield Publishers.

Kearney, M. and F. Besserer. 2004. Oaxacan municipal governance in transnational context. In: Fox, J. and G. River-Salgado (eds), *Indigenous Mexican Migrants in the United States*. Center for U.S.-Mexican Studies; Center for Comparative Immigration Studies.

Keohane, R. and J. Nye. 1973. *Transnational Relations and World Politics*. Harvard University Press

Keohane, R. O. and E. Ostrom (eds). 1995. *Local Commons and Global Interdependence: Heterogeneity and Cooperation in Two Domains*. Sage Publications, London.

Klooster, D. 2003. *Campesinos* and Mexican forest policy during the twentieth century. *Latin American Research Review* 37(2): 221-235.

Klooster, D. 2003. Forest transitions in Mexico: institutions and forests in a globalized countryside.

Professional Geography 55: 227–237.

Klooster, D. 2004. Local commons with global implications in a footloose world. *IASC Commons Digest* No. 69, June 2004.

Klooster, D. 2005. Producing social nature in the Mexican countryside. *Cultural Geographies*, 12: 321-344.

Kull, C., C.K. Ibrahim and T.C. Meredith. 2007. Tropical forest transitions and globalization: Neo-liberalism, migration, tourism, and international conservation agendas. *Society & Natural Resources* 20:723-737.

Lara, Y. 2007. *Plan de manejo de la biodiversidad: Comunidad de San Juan Evangelista Analco, Oaxaca*. Prepared by CERTIFOR / ERA, A.C. for internal community use.

Lara, Y. and F. Manzano. 2005. *Ordenamiento comunitario del territorio: Comunidad de San Juan Evangelista Analco*. Prepared by ERA, A.C. for internal community use.

Lazos Chavero, E. 2004. Ties woven to defend the original territory. *IASC Commons Digest* No. 69, June 2004.

Leakey, R.R.B. 1999. Agroforestry for biodiversity in farming systems. In: Collins, W.W. and C.Q. Qualset (eds), *Biodiversity in Agroecosystems*, New York: CRC Press.

Levitt, P. 2001. *Transnational villagers*. Berkeley: University of California Press.

Levitt, P. 2004. *Transnational Migrants: When "Home" means more than one country*. Migration Fundamentals Feature. Migration Information Source: Fresh Thought, Authoritative Data, Global Reach. Accessed online at: http://www.migrationinformation.org/Feature/display.cfm?id=261

Lewis, A. 1954. Economic development with unlimited supplies of labour. *Manchester School* 22 (May): 139–191.

Lave, J. and E. Wenger. 1991. *Situated Learning. Legitimate Peripheral Participation*, Cambridge: University of Cambridge Press.

Lester, M.P. 2006. Promises of 'El Norte'. *A Common Place* 12(6): 4-10.

López-Barrera, F., J.J. Armesto, G. Williams-Linera, C. Smith-Ramírez and R.H. Manson. 2007. Fragmentation and edge effects on plant-animal interactions, ecological processes and biodiversity. In: Newton, A. C. (ed). 2007. *Biodiversity Loss and Conservation in Fragmented Forest Landscapes: The Forests of Montane Mexico and Temperate South America*. CABI, Wallingford, Oxford, UK.

López López, W. 2005. La etnobotánica de la comunidad de Santiago Comaltepec. Unpublished report. Community library of Santiago Comaltepec.

Loker, W.M. (ed). 1999. *Globalization and the Rural Poor in Latin America*. Boulder, CO: Lynne Rienner Publishers.

MacArthur, R.H. and E.O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton University Press. Princeton, NJ.

MacKendrick and Parkins. 2005. *Social Dimensions of Community Vulnerability to Mountain Pine Beetle*. Canadian Forest Service Working Paper.

Mann, C.C. 2004. *Diversity on the Farm: How traditional crops around the world help to feed us all, and why we should reward the people who grow them*. New York: Ford Foundation.

Margules, C. R. and Pressey, R. L. 2000. Systematic conservation planning. *Nature*, 405: 243–253.

Martin, G.J. 1993. Ecological classification amongst the Chinantec and Mixe of Oaxaca, Mexico. *Etnoecologia*, 1: 17–33.

Martin, G.J. 1995. *Ethnoecology: A Methods Manual*. People and Plants Conservation Manuals: Volume 1. London, UK: Chapman and Hall.

Martin, P. 1998. Migration and development in Mexico. *Social Sciences Quarterly* 79(1):26-32.

Martinez, A.L., J.L. Busquets, A.D. Warren and I.V. Fernandez. 2004. Lepidopteros: papilionoideos and hesperioidios. In: García-Mendoza, A.J., M. De Jesús Ordóñez and M. Briones-Salas (eds). 2004. *Biodiversidad de Oaxaca*. Mexico City, Mexico: Instituto de Biología de la UNAM, Fondo Oaxaqueño para la Conservación de la Naturaleza, and the World Wildlife Fund.

Martínez Romero, A.E. 2005. *Las tendencias migratorias y la de los comuneros del impacto de la migración en la organización tradicional, relacionada con el manejo forestal comunitario en el Distrito de Ixtlan, Oaxaca*. Master's thesis, Facultad Latinoamericana de Ciencias Sociales (FLACSO), Mexico City, Mexico.

Massey, D.S. 1987. Understanding Mexican migration to the United States. American *Journal of Sociology* 92: 1372-1403.

Massey, D.S. 1990. Social structure, household strategies, and the cumulative causation of migration. *Population Index* 56: 3-26.

Massey, D.S. and F. Garcia Espana. 1987. The social process of migration. *Science* 237: 733-38.

Massey, D., R. Alarcon, J. Durand, and H. Gonzalez. 1987. *Return to Aztlan: The Social Process of International Migration from Western Mexico*. Berkeley, CA: University of California Press.

Massey, D.S. and K.E. Espinoza. 1997. What's driving Mexico-U.S migration? A theoretical, empirical and policy analysis. *American Journal of Sociology* 102(4): 939-99.

Massey, D.S., J. Arango, G. Hugo, A. Kouaouci, A. Pellegrino and J.E. Taylor. 1998. *Worlds in Motion: Understanding International Migration at the End of the Millennium*. Oxford, UK: Oxford University Press.

Massey, D.S., J. Durand and N.J. Malone. 2002. *Beyond Smoke and Mirrors: Mexican Immigration in an Era of Economic Integration*. New York: Russell Sage Foundation.

Massey, D.S. and C. Capoferro. 2007. Measuring undocumented migration. In: Portes, A. and J. DeWind (eds), *Rethinking Migration: New Theoretical and Empirical Perspectives*. New York: Berghahn Books.

Massey, D.S., W.G. Axinn and D.J. Ghimire. 2010. Environmental change and out-migration: evidence from Nepal. *Population and Environment*. Online first, August 2, 2010.

Mather, A. 1990. *Global Forest Resources*. London, UK: Bellhaven Press.

Mather, A. 1992. The forest transition. *Area* 24: 367–379

McCay, B.J., and J.M. Acheson (eds). 1987. *The Question of the Commons: The Culture and Ecology of Communal Resources*. Tucson, AZ: University of Arizona Press.

McCay, B.J. 2002. Emergence of institutions for the commons: Contexts, situations, and events. In: Ostrom, E., T. Dietz, N. Dolšak, P. C. Stern, S. Stonich and E.U. Weber (eds), *The Drama of the Commons*. National Research Council. Washington, D.C.: National Academy Press.

McKean, M. 2000. Common property: What it is, what is it good for, and what makes it work? In: Gibson, C.C., M.A. McKean, and E. Ostrom (eds), *People and Forests: Communities, Institutions and Governance*. Cambridge, MA: MIT Press.

McNeely, J.A. and S.J. Scherr. 2003. *Ecoagriculture: Strategies to Feed the World and Save Wild Biodiversity*. Washington, D.C.: Island Press.

Meave, J.A., A. Rincon and M.A. Romero-Romero. 2006. Oak forests of the hyper-humid region of La Chinantla, northern Oaxaca Range, Mexico Jorge A. Meave, Armando Rincon and Marco A. Romero-Romero. In: Kappelle, M. (ed), *Ecology and Conservation of Neotropical Montane Oak Forests*. Springer Books.

Meinzen-Dick, R.S. and R. Pradhan. 2001. Implications of legal pluralism for natural resource management. *IDS Bulletin*, Vol. 32(4): 10–17.

Meinzen-Dick, R.S., E. Mwangi and S. Dohrn. 2006. *Securing the commons*. CAPRi Policy Brief Number 4 - May 2006. Washington, D.C.: United Nations Food and Agriculture Organization.

Merino Pérez, L. 2003. *Conservación comunitaria en la parte alta de la Sierra Norte de Juárez*. Unpublished manuscipt. Instituto de Investigaciones Sociales de la UNAM, Mexico City.

Merino Pérez, L. 2004. *Conservación o deterioro*. Mexico City: Instituto Nacional de Ecología.

Merino Pérez, L. and G. Segura-Warnholtz. 2005. Forest and conservation policies and their impact on forest communities in Mexico', in: D. Barton Bray, L. Merino Pérez and D. Barry (eds), *The Community Forests of Mexico: Managing for Sustainable Landscapes*. Austin, TX: University of Texas Press, p.390.

Merino Pérez, L et al. 2009. *Reflexiones y perspectivas comunitarias de los impactos del proceso de migraciòn en comunidades forestales de Mèxico*. Draft Interim Report for Ford Foundation funded Research Project.

Meyerson, F. AB., L. Merino Pérez and J. Durand. 2007. Migration and environment in the context of globalization. *Frontiers in Ecology* 5(4): 182-190.

Miles, L., A.C. Newton, C. Alvarez-Aquino, J.J. Armesto, R.F. Castillo, L. del Cayuela, C. Echeverría, M. González-Espinosa, A. Lara, F. López-Barrera, R.H. Manson, G. Montoya-Gómez, M.A. Muñiz-Castro, M.C. Núñez-Ávila, R.A. Pedraza, J.M. Rey-Benayas, A.E. Rovere, N. Rüger, C. Smith-Ramírez, C. Souto and G. Williams-Linera. 2007. Future scenarios for tropical montane and south temperate forest biodiversity in Latin America. In: Newton, A. C. (ed). 2007. *Biodiversity Loss and Conservation in Fragmented Forest Landscapes: The Forests of Montane Mexico and Temperate South America*. Oxford, UK: CABI.

Millennium Ecosystem Assessment (MEA). 2005. *Ecosystems and Human Well-being Volume 4: Multiscale Assessments*. Findings of the Sub-global Assessments Working Group. Washington, D.C.: Island Press.

Mittermeier, R.A., P. Robles-Gil, and C.G. Mittermeier. 2005. *Mexico: Biological Heritage*. Mexico City: Semarnat / CEMEX.

Moguel, P. and V.M. Toledo. 1999. Biodiversity conservation in traditional coffee systems of Mexico. *Conservation Biology* 13(1): 11-21

Moran, E.F. and E. Ostrom (eds). 2005. *Seeing the Forest and the Trees: Human-environment Interactions in Forest Ecosystems*. MIT Press.

Mutersbaugh, T. 2002. Migration, common property, and communal labour: Cultural politics and agency in a Mexican village. *Political Geography* 21:473-494.

Mutersbaugh, T. 2004. Serve and certify: paradoxes of service work in organic-coffee certification. *Environmental Planning D*. 22(4): 533.

Mutersbaugh, T. 2004. Demographic change, commons management, and migration: A Response. *IASC Commons Digest* No. 69, June 2004.

Myrdal, G. 1944. *An American Dilemma: The Negro Problem and Modern Democracy*. New York: Harper & Brothers.

Navarro, A.G., E.A. Garcia-Trejo, A. Townsend Petersen and V. Rodrigues-Contreras. 2004. Aves. In: García-Mendoza, A.J., M. De Jesús Ordóñez and M. Briones-Salas (eds). 2004. *Biodiversidad de Oaxaca*. Mexico City, Mexico: Instituto de Biología de la UNAM, Fondo Oaxaqueño para la Conservación de la Naturaleza, and the World Wildlife Fund.

Naveh, Z. 1995. Interactions of landscapes and cultures. *Landscape and Urban Planning* 32: 43-54

Nazarea, V.D. 2006. Local knowledge and memory in biodiversity conservation. *Annual Reviews of Anthropology* 35:317-335.

Nelson, J.G. 1991. Research in human ecology and planning: An interactive, adaptive approach. *The Canadian Geographer* 35(2): 114-127

Netting, R. 1976. What alpine peasants have in common: observations on communal tenure in a Swiss village. *Human Ecology* 4:135–146.

Newton, A. C. (ed). 2007. *Biodiversity Loss and Conservation in Fragmented Forest Landscapes: The Forests of Montane Mexico and Temperate South America.* Oxford, UK: CABI.

Nisbett, R.E. 2003. *The Geography of Thought*. New York: Free Press. 288pp.

North, D.C. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge, UK: Cambridge University Press.

North, D.C. 2005. *Understanding the Process of Economic Change*. Princeton, New Jersey: Princeton University Press.

ODI. 2004a. People on the move: New policy challenges for increasingly mobile populations. *Natural Resource Perspectives*, Number 92, June 2004. The Overseas Development Institute, London: UK.

ODI. 2004b. How can the rural poor participate in global economic processes. *Natural Resource Perspectives*, Number 103, November 2004. The Overseas Development Institute, London: UK.

O'Riordan, T. 2000. Environmental science on the move. In O'Riordan, T. (ed.), *Environmental Science for Environmental Management.* Harlow, UK: Pearson Prentice Hill.

Olson, Mancur. 1965. *The Logic of Collective Action: Public Goods and Theory of Groups*. Cambridge, MA: Harvard University Press.

Orlove, B. 1999. Working in the field: Perspectives on globalization in Latin America. In: Loker, W.M. (ed), *Globalization and the Rural Poor in Latin America*. Boulder, CO: Lynne Rienner Publishers.

Orozco-Quintero, A. and I.J. Davidson-Hunt. 2010. Community-based enterprises and the commons: the case of San Juan Nuevo Parangaricutiro, Mexico. *International Journal of the Commons* 4(1): 8-35

Ostergaard-Nielsen, E. 2003. The politics of migrants' transnational political practices. *International Migration Review* 37 (3): 760-86.

Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge, UK: Cambridge University Press.

Ostrom, E. 1992. *Crafting Institutions for Self-governing Irrigation Systems*. San Francisco, CA: ICS Press.

Ostrom, E. 2001a. *Vulnerability and Polycentric Governance Systems*. Newsletter of the International Human Dimensions Programme (IHDP) on Global Environmental Change, Number 3/2001.

Ostrom, E. 2001b. Reformulating the commons. In: Burger, J., E. Ostrom, R.Norgaard and D. Policansky (eds). 2001. *Protecting the Commons: A Framework for Resource Management in the Americas*. Washington, D.C: Island Press.

Ostrom, E. 2005. *Understanding Institutional Diversity*. Princeton, New Jersey: Princeton University Press.

Ostrom, E., R. Gardner, and J. Walker. 1994. *Rules, Games and Common-pool Resources*. Ann Arbor: University of Michigan Press.

Otero, G. 1999. *Farewell to the Peasantry? Political Class Formation in Rural Mexico*. Boulder, CO: Westview Press.

Otero, G. 2004. Mexico's double movement: neoliberal globalism, the state and civil society. In: Otero, G. (ed). 2004. *Mexico in Transition: Neoliberal Globalism, the State and Civil Society*. London, UK: London.

Papademetriou, D.G. and A. Terrazas. 2009. *Immigrants and the Current Economic Crisis: Research Evidence, Policy Challenges, and Implications.* Washington D.C: Migration Policy Institute (MPI)

Peredo, A.M. and J.J. Chrisman. 2006. Toward a theory of community-based enterprise. *Academy of*

Management Review 31(2):309-328.

Perera, A.H., L.J. Buse and M.G. Weber (eds). 2004. *Emulating Natural Forest Disturbance: Concepts and Applications*. New York: Colombia University Press.

Peters, P. 1987. Embedded systems and rooted models: The grazing lands of Botswana and the commons debate. In: McCay, B.J., and J.M. Acheson (eds), *The Question of the Commons: The Culture and Ecology of Communal Resources*. Tucson, AZ: University of Arizona Press.

Peterson, G.D., G.S. Cumming and S.R. Carpenter. 2003. Scenario planning: A tool for conservation in an uncertain world. *Conservation Biology* 17(2): 358-366.

Phillips, A. 1998. The nature of cultural landscapes: a nature conservation perspective. *Landscape Research* 23(1): 21-37.

Phillips, A. 2002. *Why Lived-in Landscapes Matter to Nature Conservation*. APT Bulletin

Pineda, E., C. Moreno, F. Escobar and G. Halffter. 2005. Frog, bat, and dung beetle diversity in the cloud forest and coffee agroeco*systems of Veracruz. Conservation Biology 19(2): 400-410.*

Piore, M. 1979. Birds of Passage: Migrant Labour in Industrial Societies. Cambridge, UK: Cambridge University Press.

Polanyi, K. 2001. *The Great Transformation: The Political and Economic Origins of Our Time.* Boston, MA: Beacon Press. 360pp.

Portes, A. 1978. Migration and underdevelopment. *Politics and Society* 8(1): 1-48.

Portes, A. 2001. Introduction: The debates and significance of immigrant transnationalism, *Global Networks* 1 (3): 181-94.

Portes, A., L. E. Guarnizo and P. Landolt. 1999. Introduction: Pitfalls and promise of an emergent research field, *Ethnic and Racial Studies* 22: 463-478.

Portes, A. and J. DeWind. 2007. Rethinking Migration: New Theoretical and Empirical Perspectives. New York: Berghahn Books.

Poteete, A. and E. Ostrom. 2004. Heterogeneity, group size, and collective action: The role of institutions in forest management. *Development and Change* 35(3): 435-61

Prakash, S. 1998. Fairness, social capital and the commons: The societal foundations of collective action in the Himalaya. In: Goldman, M. (ed), *Privatizing Nature: Political Struggles for the Global Commons*. New Jersey: Rutgers University Press.

Pretty, J. and D. Smith. 2004. Social capital in biodiversity conservation and management. *Conservation Biology* 18(3):631-638.

Rey-Benayas, J. M. Cayuela, L. González-Espinosa, M. Echeverría, C. Manson, R. H. Williams-Linera, G. Castillo, R. F. del Ramírez-Marcial, N. Muñiz-Castro, M. A. Blanco-Macías, A. Lara, A. Newton, A. C. 2007. Plant diversity in highly fragmented forest landscapes in Mexico and Chile: implications for conservation. In: Newton, A. C. (ed). 2007. *Biodiversity Loss and Conservation in Fragmented Forest Landscapes: The Forests of Montane Mexico and Temperate South America.* Oxford, UK: CABI.

Reyes Deramona, V. 2006. First person. *A Common Place* 12(6): 10-12.

Ries, L., R.J.J. Fletcher, J. Battin and T.D. Sisk. 2004. Ecological responses to habitat edges: mechanisms, models and variability explained. *Annual Review of Ecology, Evolution and Systematics* 35:491–522

Robson, J.P. 2007. Local approaches to biodiversity conservation: Lessons from Oaxaca, southern Mexico. *International Journal of Sustainable Development*, 10: 267-286.

Robson, J.P. 2008. *Plan de manejo de la biodiversidad: comunidad de Santiago Comaltepec, Oaxaca*. Unpublished. For internal community use.

Robson, J.P. 2009. Out-migration and commons management: Social and ecological change in a high biodiversity region of Oaxaca, Mexico. *International Journal of Biodiversity Science and Management*, 5(1): 21-34.

Robson, J.P., A.N. Miller, C.J. Idrobo, C. Burlando, N, Deutsch, J-E, Kocho-Schellenberg, R. Pengelly, and K. Turner. 2009. Building communities of learning: Indigenous ways of knowing in contemporary natural resources and environmental management. *New Zealand Journal of Zoology* 36: Forum on Traditional Ecological Knowledge.

Robson, J.P. and F. Berkes. 2010. Sacred nature and community conserved areas. In: Pretty, J. and Pilgrim, S. (eds.), *Nature and Culture: Rebuilding Lost Connections*. London, UK: Earthscan Books.

Robson, J.P. and P.K. Nayak. 2010. Rural out-migration and resource dependent communities in Mexico and India. *Population and Environment*, Special issue on migration and environment. First available online: August 21, 2010.

Rudel, T.K., O.T. Coomes, E. Moran, A. Achard, A. Angelsen, J. Xu and E. Lambin. 2005. Forest transitions: towards a global understanding of land use change. *Global Environmental Change* 15(1):23–31.

Rudel, T.K., L. Schneider and M Uriate. 2007. Forest transitions: An introduction. *Land Use Policy* 27(2): 95-97

Ryszkowski, L. 2002. The functional approach to agricultural landscape analysis. In: Ryszkowski, L. (ed), *Landscape Ecology in Agroecosystems Management*. CRC Press.

Rzedowski, J. 1978. *Vegetación de México*. Editorial Limusa, Mexico, D.F. 432 pp.

Rzedowski, J. 1993. Diversity and origins of the phanerogamic flora of Mexico. In: Ramamoorthy, T.P., R. Bye, A. Lot and J.E. Fa (eds), *Biological Diversity of Mexico: Origins and Distribution*. New York: Oxford University Press.

Salas Alfaro, R. and M. Perez Morales. 2004. *Migración internacional, remesas y actividades agrícolas en una comunidad zapoteca oaxaqueña*. Unpublished manuscript. Instituto Tecnológico de Oaxaca, Oaxaca City, Mexico.

Sarukhan, J. and J. Larson. 2001. When the commons become less tragic: Land tenure, social organization, and fair trade in Mexico. In: Burger, J., E. Ostrom, R.Norgaard and D. Policansky (eds). 2001. *Protecting the Commons: A Framework for Resource Management in the Americas*. Washington, D.C: Island Press.

Pennington, T.D. and J. Sarukhan. 2005. *Árboles Tropicales de México: Manual para la Identificación de las Principales Especies* (Third Edition) UNAM/FCE 523p.

Sassen, S. 1990. *The Mobility of Labor and Capital: A Study in International Investment and Labor Flow.* Cambridge, UK: Cambridge University Press

Sassen, S. 1991. *The Global City: New York, London, Tokyo*. Princeton, NJ: Princeton University Press.

Sauer, C.O. 1925. The morphology of landscape. *University of California Publications in Geography* 2(2): 19-54.

Schlager, E. and E. Ostrom. 1992. Property-rights regimes and natural resources: A conceptual analysis. *Land Economics*, Vol. 68 (3): 249–62.

Schroth, G., C.A. Harvey and G. Vincent. 2004. Complex agroecosystems: Their structure, diversity, and potential role in landscape conservation. In: Schroth, G., G. A.B. da Fonseca, C.A. Harvey and C. Gascon (eds), A*groforestry and biodiversity conservation in tropical landscapes*. Island Press Washington, D.C.

Schuren, U. 2003. Reconceptualizing the post-peasantry: Household strategies in Mexican *ejidos*. *Revista Europea de Estudios Latinoamericanos y del Caribe* 75: 47-63.

Scott, A. 1955. The fishery: The objectives of sole ownership. *Journal of Political Economy* 63(2): 116-124.

Scott, J. 1977. *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia*. Connecticut: Yale University Press.

Scott, R.W. 1991. Unpacking institutional arguments. In: Powell, W.W. and P.J. DiMaggio (eds) *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press.

SERBO, A.C. (The Society for the Study of Biotic Resources of Oaxaca). Consulted on April 22, 2010 at: http://serboax.org/oaxaca/biodiversidad-de-oaxaca/

Shugart, H.H. 1998. *A Theory of Forest Dynamics: The Ecological Implications of Forest Succession Models*. Blackburn Press.

Somerville, W., J. Durana and A. Matteo Terrazas. 2008. *Hometown Associations: An Untapped Resource for Immigrant Integration*? Washington, D.C: Migration Policy Institute (MPI).

SSA. 2008a. *Diagnostico de salud 2008*: *Municipio de Santiago Comaltepec*. Tlacolula de Matamoros, Oaxaca: Secretaria de Salud SSA.

SSA. 2008b. *Diagnostico de salud 2008: Municipio de San Juan Evangelista Analco*. Tlacolula de Matamoros, Oaxaca: Secretaria de Salud SSA.

Shelley, T. 2007. *Exploited: Migrant Labour in the New Global Economy*. London, UK: Zed Books.

Shiva, V. 1993. *Monocultures of the Mind: Biodiversity, Biotechnology and Agriculture*. New Delhi: Zed Books.

Soliva, R. 2007. Agricultural decline, landscape change and out-migration: Debating the sustainability of three scenarios for a Swiss mountain village. *Mountain Research & Development* 27(2): 124-129

Smith, M. E. and M.A. Masson (eds). 2000. *The Ancient Civilizations of Mesoamerica: A Reader*. New Jersey: Wiley-Blackwell.

Smith, R.C. 1998. Transnational localities: Community, technology and the politics of membership with the context of Mexico-U.S. migration. In: Smith, M.P. and L. Guarnizo (eds), *Transnationalism from Below, Vol. 6, Comparative Urban and Community Research*. New Brunswick, NJ: Transaction Publishers.

Smith, R.C. 2006. *Mexican New York: Transnational Lives of New Immigrants*. University of California Press.

Soysal, Y.N. 1994. *Limits of Citizenship: Migrants and Postnational Membership in Europe*. Chicago: University of Chicago Press.

Stark, O. 1991. *The Migration of Labour*. Cambridge, MA: Basil Blackwell

Starr, F. 1899. *Indians of Southern Mexico: An Ethnographic Album*. Lakeside Press, Chicago.

Stephen, L. 2007. *Transborder Lives: Indigenous Oaxacans in Mexico, California and Oregon*. Durham, U.S: Duke University Press.

Stevens, S. 1993. *Claiming the High Ground: Sherpas, Subsistence, and Environmental Change in the High Himalaya*. Berkeley, CA: University of California Press.

Tainter, J.A. 1988. *The Collapse of Complex Societies*. Cambridge, UK: Cambridge University Press.

Tang, S.Y. 1992. *Institutions and Collective Action: Self-governance in Irrigation*. Oakland, CA: ICS Press.

Taylor, J.E. 2001. Migration: new dimensions and characteristics, causes, consequences and implications for rural poverty. In K.G. Stamoulis (ed), *Food, Agriculture and Rural Development: Current and Emerging Issues for Economic Analysis and Policy Research*. FAO, Rome, Italy.

Tilman, D. 1982. *Resource Competition and Community Structure*. Princeton, New Jersey: Princeton.

Tucker, C. 2008. *Changing Forests: Collective Action, Common Property and Coffee in Honduras.* New York: Springer Academic Press.

Tucker, C.M. and E. Ostrom. 2005. Multidisciplinary research relating institutions and forest transformations. In: Moran, E.F. and E. Ostrom (eds), *Seeing the Forest and the Trees: Human-environment Interactions in Forest Ecosystems*. Cambridge, MA: MIT Press.

Turner, M.G., R.H. Gardner and R.V. O'Neill. 2001. *Landscape Ecology in Theory and Practice: Pattern and Process*. New York: Springer Books.

Van Hook, J. 2010. The demographic impacts of repealing birthright citizenship. *MPI Insight*, September 2010. Migration Policy Instituite; Washington, D.C.

VanWey, L.K. 2005. Land ownership as a determinant of international and internal migration in Mexico and internal migration in Thailand. *International Migration Review* 1: 141-172.

VanWey, L.K., C.M. Tucker and E.D. McConnell. 2005. Community organization, migration, and remittances in Oaxaca. *Latin American Research Review* 40(1): 83-107.

Varughese, G. and E. Ostrom. 2001. The contested role of heterogeneity in collective action: Some evidence from community forestry in Nepal. *World Development* 29(5): 747-65.

Velasquez, M.C. 2000. *El nombramiento: Las elecciones por usos y costumbres en Oaxaca*. Oaxaca, Mexico: Instituto Estatal Electoral de Oaxaca.

Velasquez, M.C. 2004. Migrant Communities, gender, and political power in Oaxaca. In: Fox, J. and River-Salgado, G. (eds), *Indigenous Mexican Migrants in the United States*. Center for U.S-Mexican Studies; Center for Comparative Immigration Studies.

Velázquez, A., E. Duran, I. Ramirez, J-F Mas, G. Bocco, G. Ramirez and J-L Palacio. 2003. Land use-cover change processes in highly biodiverse areas: The case of Oaxaca, Mexico. *Global Environmental Change* 85: 175-184.

Vertovec, S. 2004. Migrant transnationalism and modes of transformation. *International Migration Review* 38(3): 970-1001. Center for Migration Studies of New York.

Walker, B., C.S. Holling, S.R. Carpenter and A. Kinzig. 2004. Resilience, adaptability and transformability in social–ecological systems. *Ecology and Society* 9(2): 5. [online] URL: http://www.ecologyandsociety.org/vol9/iss2/art5/

Walker, D.M. and Walker, M.A. 2008. Power, identity and the production of buffer villages in "the second most remote region in all of Mexico". *Antipode* 40(1): 155-177.

Wallerstein, I. 1974. *The Modern World-System Vol I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. New York: Academic Press

Warman, A. 1988. *La historia de un bastardo: Maíz y capitalismo, México*: Instituto de Investigaciones Sociales, UNAM: Fondo de Cultura Económica. Mexico City.

Warman, A. 2001. *El campo mexicano en el siglo XX*. Mexico City: Fondo de Cultura Económica.

Warman, A. 2003. *Los indios mexicanos en el umbral del milenio*. Mexico City: Fondo de Cultura Económica.

Waterbury, R. 1999. "Lo que dice el mercado": Development without developers in an Oaxacan peasant community. In: Loker, W.M. (ed), *Globalization and the Rural Poor in Latin America*. Boulder, CO: Lynne Rienner Publishers.

Watson J.W. and P.B. Eyzaguirre (eds). 2008. *Home gardens and in situ conservation of plant genetic resources in farming systems*. IPGRI. Proceedings of the Second International Home Gardens Workshop, 17–19 July 2001, Witzenhausen, Federal Republic of Germany

Watson, D. M. 2002. A conceptual framework for studying species composition in fragments, islands and other patchy ecosystems. *Journal of Biogeography*, 29, 823-834.

Weick, K.E. 1995. *Sensemaking in Organizations*. Thousand Oaks, CA: Sage.

Weins, J.A. 2002. Central concepts and issues of landscape ecology. In: Gutzwiller, K.J. (ed), *Applying Landscape Ecology in Biological Conservation*. New York: Springer Books.

Weins, J. and M. Moss (eds). 2005. *Issues and Perspectives in Landscape Ecology*. Cambridge, UK: Cambridge University Press.

Wenger, E. 1999. *Communities of Practice. Learning, Meaning and Identity*, Cambridge, UK: Cambridge University Press.

Wertime, M.B, E. Ostrom, C. Gibson and F. Lehoucq. 2008. *IFRI Field Manual*. Center for the Study of Institutions, Population, and Environmental Change, Bloomington, IN: Indiana University.

White, M., C. Salas and S. Gammage. 2003. *Trade Impact Review: Mexico Case Study, NAFTA and the FTAA: A Gender Analysis of Employment and Poverty Impacts in Agriculture*. Washington, D.C.: Women's Edge Coalition.

White, S. and M. Ellison. 2007. Wellbeing, livelihoods and resources in social practice. In: Gough, I. and McGregor, J.A. (eds), *Wellbeing in Developing Countries: From Theory to Research*. Cambridge, UK: Cambridge University Press.

Wiest, R.E. 1973. Wage-labor migration and the household in a Mexican town. *Journal of Anthropological Research* 29(3): 180-209.

Wiest, R.E. 1978. *Rural Community Development in Mexico: The Impact of Mexican Recurrent Migration to the United States*. University of Manitoba Anthropology Papers No. 21. Winnipeg, Canada.

Wiest, R.E. 1983. La dependencia externa y la perpetuacion de la migracion temporal a los Estados Unidos. *Relaciones: Estudios de Historia y Sociedad*. El Colegio de Michoacán, Morelia, Mexico.

Wiest, R.E. 2010. Impressions of transnational Mexican life in Anchorage, Alaska: *Acuitzences* in the far north. Alaska Journal of Anthropology 7(1): 21-56.

Wilson, J. 2002. Scientific uncertainty, complex systems, and the design of common-pool institutions. In: Ostrom, E., T. Dietz, N. Dolšak, P. C. Stern, S. Stonich and E.U. Weber (eds), *The Drama of the Commons*. National Research Council. National Academy Press, Washington, D.C.

Wirth, C., Gleixner, G. and Heimann, M. (eds). 2009. *Old-Growth Forests: Function, Fate and Value*. Springer Books.

Wiltshire, K. 2001. Management of social transformations: Introduction. *International Political Science Review* 22(1): 5-11.

Wolf, E.R. 1957. Closed corporate communities in Mesoamerica and Java, *Southwestern Journal of Anthropology,* 13(l): 1-18.

Wolf, E.R. 1982. *Europe and the People Without History*. Berkeley, CA: University of California Press.

Wood, C.H. 1981. Structural changes and household strategies: A conceptual framework for the study of rural migration. *Human Organization* 40(4):338-344.

World Bank. 2008. *Migration and Remittances Factbook 2008*. Washington, D.C: The World Bank.

Yin, R.K. 2003. *Case Study Research: Design and Methods* (Third Edition). Thousand Oaks, CA: Sage Publications.

Young, O.R. 2002. *The Institutional Dimensions of Environmental Change: Fit, Interplay, and Scale*. Cambridge, MA: MIT Press.

Young, O.R., F. Berkhout, G.C. Gallopin, M.A. Janssen, E Ostrom, and S. van der Leeuw. 2006. The globalization of socio-ecological systems: An agenda for scientific research. *Global Environmental Change* 16:304-316.

Zahra, S.A., Gedajlovic, E., Neubaum, D.O. and Shulman, J.M. 2009. A typology of social entrepreuneurs: Motives, search processes and ethical challenges. *Journal of Business Venturing* 24: 519-532.

Zucker, L. 1991. The role of institutionalization in cultural persistence. In: Powell, W.W. and P.J. DiMaggio (eds) *The New Institutionalism in Organizational Analysis*. Chicago: University of Chicago Press.

APPENDICES

Appendix I: Example of Research Contract with Study Community

UNIVERSIDAD NACIONAL
AUTÓNOMA DE MÉXICO

IIS
INSTITUTO DE INVESTIGACIONES SOCIALES
DRA. LETICIA MERINO PÉREZ

México, D.F., a 10 de enero de 2008

ACUERDO DE INVESTIGACION:

Acuerdo que celebran por una parte los coordinadores de la investigación **"La migración en las experiencias de manejo forestal comunitario: Reflexión sobre sus impactos y perspectivas"**, representado por el Mtro. James Robson. Y por la otra parte, la comunidad agraria de Santiago Comaltepec, representado por el Presidente del Comisariado de Bienes Comunales. Se comprometen a cumplir con las siguientes obligaciones en torno al estudio de investigación:

El equipo de investigación se compromete a:

1: Realizar dos fases de trabajo: primero, un estudio IFRI llevado a cabo por un grupo de investigadores de la UNAM para entender la relación comunidad-bosque; y, segundo, un estudio más detallado sobre las consecuencias de la migración en el uso y el manejo forestal que realiza la comunidad.

2: Incorporar a la comunidad, a través de sus autoridades, en el diseño de la metodología y en la discusión de los avances del estudio.

3. Se compromete a la entrega y discusión del conjunto de los resultados del estudio con las autoridades de la comunidad.

4. Se compromete a la entrega de una copia del estudio IFRI y de la tesis doctoral del Mtro. James Robson, derivada de esta investigación, a las autoridades de la comunidad.

INSTITUTO DE INVESTIGACIONES SOCIALES, Circuito Mtro. Mario de la Cueva s/n,
Ciudad de la Investigacion en Humanidades, Ciudad Universitario, C.P. 04510
ESTUDIOS AGRARIOS, tels.: (0155) 5622 7400 ext. 284, fax: 5622 7508
correo-e: lmerino@servidor.unam.mx
www.iis.unam.mx

La comunidad de Santiago Comaltepec se compromete a:

1. Participar activamente en el estudio, lo cual representa un elemento fundamental de la investigación. No solamente dentro de las entrevistas que van a realizar, sino también en el diseño de la metodología y en la discusión de los avances y los resultados finales del estudio.

2. Proveer alojamiento para las estancias del equipo de investigación y la asistencia de uno o dos guías locales durante la etapa del trabajo de campo para que los acompañen en el bosque y los apoyen en las actividades a realizar allí. Estos servicios serán pagados con recursos del proyecto de investigación.

Leido al presente acuerdo, enteradas las partes del contenido y alcance de cada una de sus obligaciones se comprometen a cumplirlo:

Dra. Leticia Merino Pérez – Responsable del proyecto
Investigadora titulada de la IIS-UNAM

Mtro. James Patrick Robson – Coordinador del proyecto
Candidato doctoral de la Universidad de Manitoba, Canadá

Tomás López Hernández
Presidente del Comisariado de Bienes Comunales
La comunidad de Santiago Comaltepec, Distrito de Ixtlán, Oaxaca

Este acuerdo fue firmado el 15 de enero de 2008, en las oficinas del Comisariado de Bienes Comunales de la comunidad agraria de Santiago Comaltepec.

INSTITUTO DE INVESTIGACIONES SOCIALES, Circuito Mtro. Mario de la Cueva s/n,
Ciudad de la Investigacion en Humanidades, Ciudad Universitaria, C.P. 04510.
ESTUDIOS AGRARIOS, tels.: (0155) 5622 7400 ext. 284, fax: 5622 7508
correo-e: lmerino@servidor.unam.mx
www.iis.unam.mx

Appendix II: Household Survey (General)

IFRI – CUESTIONARIO DE HOGARES SANREM

INFORMACIÓN DE IDENTIFICACIÓN

País _____

Sitio IFRI ID _____

Información de control

Tarea	Fecha(s)			Por quien?	Autorización del Estado? Si no, de comentarios
	Año	Mes	Día		
Entrevista					
Comprobación del cuestionario					
Codificación del cuestionario					
Entrada de Datos					
Revisión y aprobación del ingreso de datos					

Identificación y Localización de los hogares

1. Número de hogar		
2. Comunidad	*nombre*	*comunidad ##*
3. Distrito		
4. Nombre y PID (véase I.A.1 abajo) del primer responsable	*nombre*	*PID*
5. Nombre y PID (véase I.A.1. abajo) del Segundo responsable	*nombre*	*PID*
6. Ubicación GPS del hogar *(Formato UTM)*		
7. Distancia entre el hogar y el centro de referencia de la comunidad		*kms*
7a. Punto de referencia en la comunidad		
8. ¿A qué grupo de usuario IFRI (véase el formulario IFRI del grupo de usuario de la comunidad) está este hogar afiliado?		

1

I. Características del hogar

A. Quienes son los miembros del hogar *(Quienes regularmente toman las comidas juntos?)*

1. Número de identificación personal (PID)	Nombre de cada miembro del hogar	2. Relación con el jefe del hogar*	3. Edad Estimada	4. Sexo *(0=Hombre 1=Mujer)*	5. Educación *(numero de años completados)*	6. Ocupación** 'fuente primaria del efectivo + de la renta de subsistencia'
1		Jefe de hogar				
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

**1=esposo; 2=niño; 3=yerno/nuera; 4=nietos; 5=padre; 6=Suegra/suegro; 7=hermano o hermana; 8=cuñado/cuñada; 9=tia/tía; 10=sobrino/sobrina; 11=entenados/hijos adoptivos; 12=otra familia; 13=no relacionado; 99=otro, especifique*

***1= Campesino (cosechas agrícolas crecientes); 2=ganadero; 3=cosecha de madera, 4= producción del carbón de leña; 5= cosecha de otros productos de bosque (es decir no madera o carbón de leña); 6=Pesca; 7=profesor; 8=persona de negocios; 9=Funcionario público; 10=fabricación de ladrillo; 11=elaboración de cerveza o algún otro tipo de alcohol; 12=trabajo asalariado; 99=otro, especifique.*

B. ¿Cuál es la pertenencia étnica del jefe de hogar? _____

B1. ¿La cabeza de Hogar pertenece al grupo étnico mayoritario de la comunidad? _____ *(0=No; 1=si)*

C. ¿Cuál es la religión del jefe de hogar*? _____
**1= Católico; 2=Musulmán; 3=Creencias tradicionales; 9=Otra (especifique)*

D. ¿Algún miembro de la casa han migrado? _____ (No/Yes)

D.1. ¿Si la respuestas es Si, cuantos miembros de la casa han migrado? _____ (número).

II. ACTIVOS DEL HOGAR

A. Describa la casa en la que habita éste hogar *(Observación del empadronador)*

1. ¿Cuál es el tipo de material (de la mayoría) de los muros? *	
2. Cuál es el tipo de material (de la mayoría) del piso? **	

** 1=barro y zarso; 2=Madera (tableros); 3=metal (u otro metal) hojas; 4=Ladrillos o cemento; 5=cañas/paja/hierba/fibra; 9=otro, especifique*

***1=paja; 2=madera (tableros); 3=metal u otras hojas; 4=azulejos; 9=otro, especifique:*

B. Favor indicar el número de los siguientes artículos que posee el Hogar:

Artículo	Número de unidades poseídas por el hogar
1. Auto/Camión	
2. Bicicleta	
3. Motocicleta	
4. Teléfono	
5. TV	
6. Radio	
7. Otro artículo, especifique	
8. Otro artículo, especifique	
9. Otro artículo, especifique	

C. ¿El hogar posee tierra individualmente o como parte de un grupo? _____
(0=No; 1=Si, individualmente; 2= Si, como parte de un grupo)

Si responde si, favor indique la extensión de la tierra (en hectáreas) que le pertenece. Si la tierra propia es parte de un grupo, aproximadamente cuanta tierra el grupo tiene en total (hectáreas)? _____

*Ver el memo de definiciones de diferentes usos de tierra

Categoría	Área (hectáreas) propiedad individual	Si hogares tienen tierras propias como parte de un grupo, indicar el tipo de propiedad de tierra por el grupo. (0=Grupo que no poseen este tipo; 1= Grupo que poseen de este tipo)
1.Cultivo (con riego)		
2.Cultivo (sin riego)		
3. Pasto (natural o plantado)		
4. Agroforestería		
5. Bosque (incluyendo lotes de madera y plantaciones)		
6. Silvopastoreo		
7. Barbecho		
8. Otro tipo de vegetación/usos de la tierra (residencial, arbustos, pradera, humedal, etc.)		
9. Total de tierra poseída (1+2+3+…+7)		
10. Tierra rentada o prestada fuera		
11. Tierra rentada o prestada dentro		

III. Bienestar y Riesgo del Hogar

A. ¿En el pasado año, de dónde vino el alimento del hogar?

Fuente	Proporción del total
1. Alimento crecido en tierra propia y cultivado por el hogar	
2. Alimento crecido y cultivado en tierra que no pertenece al hogar (i.e. tierra rentada en)	
3. Alimento adquirido del Mercado	
4. Alimento adquirido a través de algún tipo de trueque	
5. Alimento otorgado cómo regalo o ayuda	
9. Otro *(especifique)*	
Total	100%

B. El hogar a tenido que encarar algún déficit grande en sus ingresos, algún gasto grande inesperado en los últimos 12 meses?

Evento	1. Grado de Crisis *0=no;* *1= si, crisis moderada; 2= si, crisis severa*	2. Cómo hizo su hogar para afrontar la pérdida de ingresos o el costo imprevisto?*
1. Severa pérdida de la cosecha		
2. Severa enfermedad en la familia *(i.e. miembro en edad productiva incapacitado para trabajar por más de un mes durante los últimos 12 meses, que sufrió la enfermedad o que tuvo que cuidar de la persona enferma)*		
3. Muerte de un adulto en edad productiva		
4. Perdida de tierra (expropiación, etc.)		
5. Gran pérdida de ganado (robo, sequía, etc.)		
6. Otro tipo de pérdida de activos (fuego, robo, inundación etc.)		
7. Boda		
8. Funeral		
9. Otro, especifique:		

**1= Cosechar más productos del bosque, 2= Cosechar más alimentos silvestres no encontrados en el bosque; 3= Cosechar más productos naturales; 4= Gastar los ahorros; 5= Venta de activos (i.e. tierra, Ganado, etc.); 6= Hacer algún trabajo extra o casual; 7= Ayuda de amigos o familiares; 8= Ayuda de alguna ONG, comunidad religiosa o similar; 9= Conseguir un préstamo de algún prestamista, asociación de crédito, banco etc.; 10= Intento reducir los gastos del hogar; 11= No hizo nada en particular; 99= Otro (especifique)*

IV. Opiniones del Hogar sobre manejo del bosque

A. Estas de acuerdo con la declaración:

"Los Bosques deben ser protegidos"

Indica por favor el grado de su favorabilidad usando cualquier número entre 1 y 3 donde

_____ 1 (Desacuerdo)

_____ 2 (ni acuerdo ni desacuerdo)

_____ 3 (acuerdo)

B. ¿Con cuál de las dos siguientes declaraciones estás más de acuerdo?:

_____ 1 *"Mejoramientos en la condición del bosque local son necesarios por razones económicas tales como su contribución de forraje, de leña, y de abono verde".*

_____2 *"Mejoramientos en la condición del bosque local son necesarios, por sus beneficios no-económicos, incluyendo un aire más limpio, la conservación del suelo, y la retención del agua".*

C. Esta usted de acuerdo con la declaración:

"Para mejorar las condiciones del bosque local, mi familia y yo estamos dispuestos a reducir nuestro consumo de recursos de bosques locales."

Indicar por favor el grado de su favorabilidad usando cualquier número entre 1 y 3 donde.

_____1 (Desacuerdo)
_____2 (Ni acuerdo ni desacuerdo)
_____3 (Acuerdo)

D. ¿Cuáles son los 3 problemas más importantes que tu comunidad esta afrontando en los bosques de protección, y cuales son tus sugerencias para mejorarlo?

Problema	Sugerencia para mejorarlo
1.	
2.	
3.	

V. Ingresos del hogar, gastos y tiempo usado (empleado) (Ejercicio del DRA)

INSTRUCIONES PARA LOS ENCUESTADORES
Los siguientes ejercicios incluyen una serie de actividades de rankings y de valorización (weightings activities). A los entrevistados se les deben pedir de tomar en cuenta sus ingresos, gastos y el tiempo, empleado de todos los miembros de su hogar, de los últimos 12 meses.
Cada encuestador debe tener 2 juegos de cartas (cards). Las cartas (cards) deben ser de al menos 3 x 5 pulgadas y deben contener dibujos (imágenes) descriptivas. Un conjunto es para la categoría "ingresos" y el segundo conjunto es para las categorías de "gastos/tiempo usado". Adicionalmente cada enumerador debe tener un Conjunto de 50 "tokens". Una vez organizadas las cartas (cards) en orden de importancia (de la más importante a la menos importante) por el entrevistado, se debe preguntar al entrevistado respecto al peso de la importancia relativa de cada una de las categorías de ingreso, gastos o tiempo usado en la categoría.

A. Ingresos del hogar por categoría (Portfolios) (subsistencia; dinero, y subsistencia + dinero) – de los últimos 12 meses

Notas para el encuestador:

Rankeando (Ordenado) los ingresos de/para subsistencia:
A1. Nosotros queremos entender la importancia de varias fuentes de ingresos para el bienestar de los hogares.
Nosotros queremos que las cartas se pongan en orden de importancia. Por favor ordenarlas de acuerdo a los ingresos de subsistencia del hogar (al que entrevistas) – eso es lo que el hogar produjo para su propio consumo en los últimos 12 meses.

Valorizar (Weighting) los ingresos de subsistencia
A2. Ahora que tienes indicado el orden de importancia de varias fuentes de ingreso de los ingresos de subsistencia del hogar, nos gustaría que Ud. distribuya 50 "tokens" de acuerdo a la importancia de cada fuente de ingreso del total de ingresos de subsistencia del hogar de los últimos 12 meses.

Rankeando ingresos en efectivo (dinero en efectivo)
A3. Ahora nos gustaría que Ud. *rankee* (ordene) según la importancia de varias fuentes de ingresos en efectivo que contribuyan al bienestar del hogar. Por favor ordene las cartas de acuerdo a los ingresos en efectivo del hogar de los últimos 12 meses.

Valorizar (*Weighting) ingresos en efectivo*
A4. Ahora que tienes ordenada la importancia de varias fuentes de ingreso del ingreso en efectivo de los últimos 12 meses. Nos gustaría que Ud. distribuya 50 "tokens" de acuerdo a la importancia de cada fuente de ingreso en efectivo del hogar (del total de fuentes de ingreso en efectivo del hogar)

Rankeando ingresos de subsistencia + ingresos en efectivo:
A5. Finalmente, deseamos que Ud. piense en la importancia de todas las fuentes de ingreso del hogar, poniendo juntas las fuentes de ingreso de subsistencia más las de ingreso en efectivo. Por favor ordene las cartas de acuerdo a la importancia de las varias fuentes de ingreso del total de ingresos del hogar de los últimos 12 meses.

Valorizar(Weighting) ingresos de subsistencia + en efectivo

A6. Ahora que tienes indicado el orden de importancia de varias fuentes de ingreso del total de ingresos, deseamos que Ud. distribuya 50 "tokens" de acuerdo a la importancia de cada fuente del total de ingresos del hogar de los últimos 12 meses

A7. Forma de entrada de datos ranking y valorización (Weights)
Nota: ranking del 1 al 11 donde 1 es el más importante. La valorización (weight) debe corresponder al número de tarjetas que el entrevistado le ha asociado a la fuente de ingreso.

Fuente de ingreso	Rankin del ingreso de subsistencia	Weight del ingreso de subsistencia	rankin del ingreso en efectivo	Weight del ingreso en efectivo	Rankin del total del de ingresos (subsistecia + efectivo)	Weight del total de ingresos de (subsistencia + efectivo)
Productos sin procesar del bosque						
Productos procesados del bosque						
Pesca y acuacultura						
Productos silvestres (no provenientes del bosque o cuerpos de agua)						
Remesas, envio						
Ingresos por salario, sueldos						
ingresos de negocios propios						
Agricultura						
Pecuerios (livestock)						
Productos pecuarios *(live stock)*						
Ingresos de otras fuentes						
		Total=50		Total=50		Total=50

B. Gastos del hogar y tiempo usado por categoría (gastos; Tiempo usado y gastos + tiempo usado)

Guía para el encuestador:

Rankenado los gastos:

7

B1. Deseamos entender como los hogares gastan su dinero. Por favor ordene las cartas por actividades en la que los miembros del hogar que gastan más dinero. Por favor toma en cuenta las compras de los últimos 12 meses.

Valorizando (weighting) los gastos:
B2. Ahora que tienes indicado el orden según la importancia de las compras, deseamos que distribuyas 50 "tokens" de acuerdo a la importancia de la categoría de las compras del total de compras del hogar pasados los 12 meses.

Ranking del tiempo usado:
B3. Ahora queremos que Ud. Ponga en orden de importancia las maneras en la que los miembros del hogar pasan su tiempo en los últimos 12 meses. Por favor ordena las cartas de acuerdo las actividades que requieren de más uso de tiempo hasta la que requiere de menos uso de tiempo.

Valorización (weight) del tiempo usado:
B4. Ahora que tienes indicado el orden de importancia de varios usos de tu tiempo, deseamos que Ud. distribuya las 50 "tokens" de acuerdo a la importancia de cada fuente de uso de tiempo en el contexto del tiempo total usado de su hogar en los últimos 12 meses.

Ranking de gastos + tiempo usado:
B5. Finalmente, deseamos que Ud. piense sobre la importancia de los varios tipos de compras en efectivo y del tiempo usado por el hogar poniendo juntas las compras en efectivo más el tiempo usado. Por favor ordenen las tarjetas de acuerdo a la importancia de los varios tipos de gastos y tiempo usado en los últimos 12 meses.

Valorizado (weighting) los gastos + tiempo usado:
B6. Ahora que tienes indicado el orden de importancia de los varios tipos de compras y tiempo usado de los miembros del hogar, deseamos que Ud. distribuya 50 tokens de acuerdo al tipo de importancia de cada tipo de gasto/tiempo usado.

B7. Forma de entrada de datos de gastos/tiempo usado; Ranking y Valorización (Weights)
Nota: Ordene del 1 al 10 donde 1 será el más importante. La valorización (weight) deberá ser el número de tarjetas que el entrevistado asocie con cada fuente de ingreso.

Gastos y tiempo de uso correspondiente	Ranking de gastos	Weight de gastos	Ranking de tiempo usado	Weight de tiempo usado	Ranking de gastos + tiempo usado	Weight de gastos + tiempo usado
Productos forestales comprados/ productos forestales silvestres y recolectados/ procesado						
Peces y pesca						
Alimento/ producción agrícola/ procesados/ Mercado (marketing)						
Pecuario (Livestock), productos pecuarios (livestock products) /						

mantenimiento pecuario/ productos pecuarios procesados						
Gastosn en funerales y bodas/ asistencia a eventos sociales formales						
atención médica/ correspondientea enfermedades/ enfermedades en/de nacimiento						
Trasnporte/ viajes						
Entretenimiento, alcohol y tabaco/esparcimiento social/ actividades de relajo						
Alimentación escolar y suministros/ colegiatura/ correspondiente a entrenamiento y talleres						
Otro, especifique						
		Total=50		Total=50		Total=50

VI. Recursos del Bosque

A. Cómo valorizaría usted la importancia de los siguientes tipos de bosque de acuerdo a los varios usos y servicios que provee a su hogar? *Sólo llene aquí si esta presente algún de los tres tipo de gobernancia en el área.*

Gobernancia	Tipo interno o ingreso de subsistencia	Ingreso en efectivo	Contribución para la renovación del suelo fértil	Control de erosión del suelo y conservación del agua	Cultural/ Espiritual
Bosque del Gobierno					
Bosque Comunal					
Bosque Privado					

1= No es importante; 2= Es algo importante; 3= Muy importante

B. El periodo de recolección de forraje, leña, madera y otros productos del bosque ha aumentado o disminuido en los últimos 10 años? *(Marca uno para cada tipo de bosque relevante)*

Tipo de Bosque	Aumentado	Disminuido
1. Bosque del gobierno		
2. Bosque comunitario		
3. Bosque Privado		

B1. Si aumentaron, ¿cómo a respondido su hogar?

Tipos de Bosque	Respuesta de Hogares que incrementaron el tiempo de recolección	Ranking 1-3
1. Bosque del Gobierno	1. Disminuyo la cantidad recolectada.	
Favor ordenar las respuestas más	2. Plantaciones de Arboles	

importantes, max 3.	3. Obteniendo productos forestales	
	4. Uso substituto para productos forestales *(ej: kerosene substituto para leña)*	
	9. Otros (Especificar)	
2. Bosque comunitario **Favor ordenar las respuestas más importantes, max 3.**	1. Disminuyo la cantidad recolectada.	
	2. Plantaciones de Arboles	
	3. Obteniendo productos forestales	
	4. Uso substituto para productos forestales *(ej: kerosene substituto para leña)*	
	9. Otros (Especificar)	
3. Bosque privado **Favor ordenar las respuestas más importantes, max 3.**	1. Disminuyo la cantidad recolectada.	
	2. Plantaciones de Arboles	
	3. Obteniendo productos forestales	
	4. Uso substituto para productos forestales *(ej: kerosene substituto para leña)*	
	9. Otros (Especificar)	

C. Comparando con otros bosques en esta región en general (< 20 kilómetros de distancia desde su comunidad), es la vegetación del bosque local que usas denso o disperso (Marca uno para cada tipo de bosque relevante)

Tipo de bosque	Muy Disperso	Disperso	Promedio	Denso	Muy denso
1. Bosque del Gobierno					
2. Bosque comunitario					
3. Bosque privado					

D. Comparando con otros bosques en esta región en general (<20 kilómetros de distancia desde tu comunidad), la condición del bosque que usas cambiaron en los últimos 10 años? *(Marca uno para cada tipo de bosque relevante).*

Tipo de Bosque	1 = Mejoraron	2 = Empeoraron
1. Bosque del Gobierno		
2. Bosque Comunitario		
3. Bosque privado		

VII. Derechos del Bosque

A. Cuan lejos en minutos y kilómetros esta el hogar del bosque local por tipo de gobernancia? Favor anotar el tiempo/ kilómetros de trayecto por el medio más común de transporte (especificar cuando sea indicado) por la ruta más directa, sin paradas a lo largo del camino)?

Tipos de Bosque	Medio de transporte :	
	Tiempo para llegar al bosque?	
	a. Minutos	*b. Kilómetros*

1. Bosque del Gobierno		
2. Bosque Comunitario		
3. Bosque privado		

A1. Si un nuevo hogar llega a la comunidad, como le afectan las reglas del uso del bosque que esta en o cerca de tu comunidad? Favor responde si o no a cada pregunta…. (0=No; 1=Si)

Derechos del Bosque	Bosque del Gobierno	Bosque Comunitario	Bosque Privado
1. Permitir la entrada al bosque			
2. Permitir recolectar productos de el bosque			
3. Permitir contribuir al manejo del bosque			
4. Permitir tomar decisiones sobre el manejo del bosque			
5. Permitir decidir quienes pueden y no pueden entrar al bosque			
6. Permitir tomar decisiones sobre ventas o alquileres de tierra del bosque			

A2. ¿En los últimos 12 meses tuviste…? (Favor responde si o no a cada pregunta… (0=No; 1=Yes)

Derechos del Bosque	Bosque del Gobierno	Bosque Comunitario	Bosque Privado
1. Entrada al bosque			
2. Recolectar productos del bosque.			
3. Contribuir al manejo del bosque			
4. Tomar decisiones sobre el manejo del bosque			
5. Tomar decisiones sobre quienes pueden y no pueden entrar al bosque			
6. Venta o alquiler de tierra del bosque			

B.1. Tu sientes que las reglas respecto al uso del bosque son: completamente justas, más o menos justas, o no son justas?

Completamente justas_ _____ Más o menos justas _____ No son justas _____

B.2. Tu sientes que las penalidades por romper el uso de las reglas del bosque son: completamente justas; mas o menos justas; o no son justas?

Completamente justas_____ Más o menos justas _____ No son justas _____

No hay penalidades por romper las reglas de uso del bosque _____

B.3. ¿Estas tu enterado de algún cambio en políticas de gestión (local, regional, o nacionales) que afectron como usas el bosque? _____ (0=No; 1=Yes)

Si es así entonces, favor describa esos cambios y como ellos han afectado a tu hogar

_____

_____

_____

VIII,. Participación en Organizaciones y Grupos Usuarios Forestales

A. Usted, o cualquier miembro de su hogar, es actualmente un funcionario o un miembro en cualquier organización local (incluyendo cualquier organización relativa a bosques)?

1. Nombre de la organización	2. Nombre del miembro del hogar	2ª. Miembro del hogar PID (desde pagina 2)	3. Posición (1=miembro; 2=oficial; 9=otros especificar)	4. Cantidad de años involucrado

B. Estamos interesados en aprender sobre el involucramiento de su hogar en Grupos dedicados al manejo del Bosque (i.e. esos pueden ser además grupos formales o informales que comprometen o emprenden actividades en el manejo del bosque).

1. ¿Estas tu o algún miembro del tu hogar participa en un grupo que realice actividades en el manejo del bosque? Si no; ir a 13. (0=No; 1=Yes)	
2. ¿El grupo en el que tu hogar participa esta formalmente organizado o es más informal? (1=Formal; 2=Informal)	
3. ¿Cuál es el nombre del grupo en el que tu hogar participa?	
4. Algún miembro de su hogar asiste normalmente, regularmente a reuniones del grupo? Si no; ir a 6. (0=No; 1=Yes)	
5. Si la respuesta es Si: en su hogar, quien asiste normalmente a las reuniones y participa en otras actividades de grupo? *Códigos: 1=solo la esposa; 2=ambos, pero principalmente la esposa; 3=ambos participan de igual manera; 4=Ambos, pero principalmente el esposo; 5=sólo el esposo; 9= otros arreglos*	
6. ¿Cuantos jornales diarios (días completos de trabajo) tu hogar gasto en actividades grupales (reuniones, patrullaje, trabajo de equipo, etc.), en los últimos 12 meses?	Días - Mujeres Días –

12

		Hombre
7. Tu hogar hizo algún pago o contribuciones al grupo? Si no; ir a 9. (0=No; 1=Yes)		
8.Si la respuesta es si: Cuanto tu pagaste en los últimos 12 meses? (Lc$)		
9. Tu hogar recibió algún tipo de pago en efectivo del grupo (e.g., parte de las ventas) en los últimos 12 meses? Si no; ir a 11		
10. Si la respuesta es Si: ¿Cuál es la cantidad que recibió en los últimos 12 meses (Lc$)		
11. ¿Cuáles son tus razones para unirte al grupo? Favor rankear las razones más importantes, máximo 3.	Razón	Rankear 1 -3
	1. Acceso creciente a los productos de bosque	
	2. Una mejor gerencia del bosque y más ventajas en futuro	
	3. Acceso a otros beneficios, e.g., programas del donante de la ayuda de gobierno	
	4. Mi deber para proteger el bosque para la comunidad y el futuro	
	5. Ser respetado y reconocido como persona responsable en Comunidad	
	6. Aspectos sociales (conocer gente, trabajo en equipo, temor a ser excluido, etc.)	
	7. Forzado por Gobierno/líderes locales/vecinos	
	9. Otro, especificar:	
12. Total, cómo dirías la existencia del GUF ha afectado los beneficios que el hogar obtiene del bosque? *Códigos: 1= efecto negativo grande; 2=efecto negativo pequeño; 3=sin efecto; 4=efecto positivo pequeño: 5=efecto positivo grande.*		
13. Si no participas en ninguna actividad de grupo dedicada a la forestería, porqué no? *Favor alinear las rezones más importantes máximo de 3*	**Razón**	**Ranking 1-3**
	1. No existe grupos formales en la Comunidad	
	2. Soy nuevo en la Comunidad	
	3. Los miembros de esos grupos generalmente pertenecen a otros grupos (étnico, políticos, religiosos, etc.) de los cuales yo participo	
	4. No puede pagar las contribuciones a tiempo	
	5. No puede pagar las contribuciones en efectivo requerido	
	6. La calidad de miembro del Grupo restringirá mi uso del bosque, y deseo utilizar el bosque como lo necesito	
	7. No creo que el trabajo en grupos es muy eficaz en el manejo del bosque	
	9. Otro, especifique:	

IX. Acceso a la información

A. 1. ¿Cuál es la fuente de noticias del mundo externo para el hogar, y con qué frecuencia el hogar interactúa con esa fuente?

Fuente	1. fuente usada por el hogar *(0=No; 1=Yes)*	2. Frecuencia de uso/interacción *(1=diario; 2=semanaly; 3=mensual; 4=anualy; 9=otro, specify)*
1. Periódico		

2. Radio		
3. Televisión		
4. Cable televisión		
5. Visitas al mercado		
6. Interacción con oficiales del gobierno		
7. Interacción con el personal de ONG´s fuera de la comunidad		
8. Teléfono (fijo o cellular)		
8. Instituciones religiosas *(i. e. iglesias, parroquia (mezquita), etc.)*		
10. Asambleas comunales		
99. Otro *(especifique)*		

B. Por favor liste los nombres de todas las personas de la comunidad que lo provén de información acerca de política, economía y temas sociales. Adicionalmente indique la relación de cada persona con el hogar:

Categoría	1. Nombre del informante *(opcional)*	2. Relación del informante con el hogar*
1. Asuntos sociales (e.g. políticas; votación, reuniones etc.)		
2. Asuntos económicos (e.g. agricultura/agricultor; construcción de casas; gastos por matrimonios y otros eventos, etc.)		
3. Asuntos socials (e.g. ocaciones religiosas, festivales; salud y medicina; viajes fuera de la comunidad, etc.)		

**1=parientes; 2=amigo; 3=lider local; 4=servidor social; 5=NGO representante; 6=representante de negocios 9=otro, especifique*

COMENTARIOS DEL ENCUESTADOR (continúe en el anverso si es necesario):

Appendix III: Household Survey (Migration)

Place:
Date and Time of Interview:
Questionnaire Number:

House Address:
How was the interview?

How well did they speak Spanish?

Would it be worthwhile to do another interview with this person/family? Why?

SECTION I - Data on nuclear and extended family:

1. What is your full name?
2. How old are you?
3. Are you a *comunero*(*a*) (rights-holder)? SI NO
4. Are you married/single/widowed?
5. What is your occupation?
6. What school grade have you attained?
7. Do you have children? How many?
8. Age and Sex?
9. What school grade are they in / attained?
10. Do they live here in the village? If not, where?

11. (If they live elsewhere) For how long have they been away?

12. Why did they leave home/village?

13. Will they come back to live in the village?

14. If not, why not?

15. How many brothers and sisters do you have?
16. What do they do?
17. Where do they live now?
18. If they live outside the village: for how long have they been away?
19. Why did they leave home / village?

20. Will they come back to live in the village?

SECTION II - Migration:

21. Are there family members who have migrated? YES NO
22. How many are in: i) Oaxaca?
    ii) Other parts of Mexico?
    iii) USA?

NOTE: locality, state

23. How many in total have migrated?

(i) From the nuclear family (parents and/or children)?
(ii) From the extended family (siblings, uncles, cousins)?

24. Who decides if someone from the family should migrate?

25. How do they decide where they should migrate to?

26. Where do you think it is easier to find work?

    (i) Here?
    (ii) In Oaxaca?
    (iii) In Mexico City?
    (iv) In another part of Mexico?
    (v) In the USA?

27. Why? (**extended text**)

28. Do you know other people from the village who have migrated?
29. How many (as % of total population)?

30. Do you know of whole families who have left?
31. How many (estimate)?

SECTION III - Migration to Mexico (members of the nuclear family):

Member (age / civil status)	**What year did they migrate?**	**When did they return?**	**Where did they go?**	**Why did they go?**	**What do/did they do?**	**Is he or she a rights-holder?**

32. Did friends or family help them get work?

33. Do (did) they send money home?
34. How do (did) they send it?
35. How much do (did) they send each year?

36. What do (did) you spend that money on?

37. Do (did) they send money to the community? How? How much?

38. What is (was) that money used for?

39. In what way does (did) the money they send(t) change the family's life here? (**extended text**)

40. Do (did) they maintain contact with the family? How?
41. Do (did) they maintain contact with the community? How?

42. Do (did) they maintain their communal rights?
43. Do (did) they comply with their obligations?

44. How?

45. Do you believe that migration to other parts of Mexico has made the village better or worse?

Better	YES	NO
Worse	YES	NO
No change	YES	NO

46. Why? (**extended text**)

47. In your opinion, is it worth migrating to other parts of Mexico for work?

YES NO

48. Why? Or why not? (**Extended text**)

SECTION IV - Migration to the USA (members of the nuclear family):

Member (age / civil status)	**What year did they migrate?**	**When did they return?**	**Where did they go?**	**How much for the trip?**	**Why did they go?**	**What do/did they do?**	**Is he or she a rights-holder?**

49. Did they travel with other members of the family/village?
50. Were there family of friends who helped them pay for the trip?

51. Were there family or friends who helped get somewhere to live and find work?

52. Do (did) they send money home?
53. How do (did) they send it?
54. On average, how much do (did) they send each month (or year)?

55. What is that money spent on? (**list in order of importance**)

56. What items have they brought back home?

57. How has the family's life changed because of the money?

58. Do (did) they have much contact with the family here? How?
59. Do (did) they maintain contact with the community? How?

60. Who do (did) they live with there?

61. Do (did) they get together there with other people from the village?

62. Is there a home-village association where they are?

63. Do (did) they send money to the village? How? Do you know what the community spends the money on?

64. Do (did) they come back to the village for any festivity or special occasion?

65. Do you think there are more opportunities for men or women in the USA?

    Men Women Same for both

66. Did they take their family with them?
67. How is daily life in the USA different to life in the village? (**extended text**)

68. Other differences that you know of? (**extended text**)

69. (if applicable) Why did they come back to Oaxaca? (**extended text**)

70. Do you think that migration to the USA has made the village better or worse?

Better	YES	NO
Worse	YES	NO
No change	YES	NO

71. Why? (**extended text**)

72. In your opinion, is it worth going to the USA to work?

    YES NO

73. Why? Or why not? (**extended text**)

74. (If they are here currently) Are they thinking of going back to the USA?

    YES NO

75. Why? Or why not?) (**extended text**)

SECTION V – Community participation of migrant *comuneros*:

76. In the past year, has some member of the family participated in *tequio*?
77. And for those family members who have migrated and cannot participate, what happens?
78. Do (did) they use substitutes for the *tequios* that they can't do?

79. How much do they (you) pay?

80. In the past five-ten years, has some member of your family been asked to perform a *cargo*?
81. Which?
82. And for those family members that have migrated, have any been asked to do a *cargo*?

83. How did they comply with this obligation?

84. If they don't comply, what will happen?

85. Do you use a substitute for the *cargos* that they cannot perform personally?
86. How much do they (you) pay?

SECTION VI – Agriculture and Migration:

87. Does the family have land to cultivate?
88. How many hectares do you currently cultivate each year?
89. How many hectares did you cultivate? 10 years ago:

20 years ago:

90. What crops do you grow?
91. Do you always plant the same crops?
92. Do you farm more or less than before? Why? (**extended text**)

93. In recent years have you rented or lent your lands to another family/*comunero*?
94. Do you sell what you produce or is it all for domestic consumption?

95. Do you have animals?
96. How many?
97. Did you own more before? If so, why?

98. When the *comunero* is living away from the village who is in charge of the family plot(s)?

99. Where do you get the financial and human resources needed to plant and harvest? (**extended text**)

100. In what ways has migration impacted agriculture and farming locally? (**extended text**)

SECTION VII – Forest use and Migration:

101. What products do you harvest from the forest? (**list in order of importance**)

102. Do you use the forest more or less than before?

103. Why? (**extended text**)

104. In what way is migration affecting forest use? (**extended text**)

105. Why is the forest important to you and your family? (**extended text**)

106. Is the forest as important to your children as it is to you? (**extended text**)

Appendix IV: Migration Questionairre for Communal Authorities

1. What proportion of comuneros do you estímate have migrated?

a. 0 < 10%
b. 10 < 20%
c. 20 < 30%
d. 30 < 40%
e. More than 40% (specify)

2. How many mígrate or have migrated to other parts of the country?

_____ comuneros

_____ %

3. How many mígrate or have migrated to the USA?

_____ comuneros

_____ %

4. How many have migrated permanently to other parts of the country?

_____ comuneros

_____ %

5. And of these, how many have taken their family or are about to take them?

_____ comuneros

_____ %

6. How many have children that live in other parts of the country?

_____ comuneros

_____ %

7. How many have migrated permanently to the USA?

_____ comuneros

_____ %

8. And of these, how many have taken their family with them?

_____ comuneros

_____ %

9. How many comuneros have children in the USA?

_____ comuneros

_____ %

10. How many migrant comuneros maintain agrarian rights in the village?

_____ comuneros

_____ %

11. How many migrant comuneros comply with their obligations towards the community?

_____ comuneros

_____ %

12. Have migrant comuneros and their children formed committees or groups to help support the community? (**extended text**)

13. How are you using money sent by migrants?

Área	**Yes or No?**
Village fiestas	
Church	
Schools	
Health services	
Investment in forestry and forest conservation	
CFE	
Community servivce (cargo or tequio)	
Other (specify)	

14. What impacts have migration had on the social aspects of community life? (**extended text**)

15. What have been the impacts of migration on forest use and conservation?

Área	Yes	No
Is there less pressure on forest resources from agricultura and livestock?		
Are there fewer people actively involved in forest management and conbservation?		
Is there less interest in the forest and forest-based resources?		
Are migrants opposed to forest extraction?		
Has there been a loss of skilled and knowledgeable forest workers?		
Has forest cover increased due to the abandonment of agricultural plots by comuneros who have migrated?		
Other (specify)		
Other (specify)		

15. Participation in community customs and institutions among those who migrate:

Can migrant comuneros use substitutes for tequio?

How much do they pay?

Do migrant families have top ay some kind of cooperation to the communal authorities?

Among migrant comuneros, have any been named to carry out a cargo?

Can they use a substitute for the cargos they cannot perform in person?

How much do they pay?

If they do not comply with this obligation, what happens?

Observations:

Appendix V: IFRI Forest Plot Form

IFRI FORM P

MAY 2007
Version 13

FOREST PLOT FORM

Plots are demarcated areas useful for studying the ecology of a forest. IFRI researchers use them to identify the trees, saplings, and herbacious matter found in the forests they are examining. By carefully determining the number and distribution of plots, IFRI researchers can hypothesize how local populations use (or misuse) forest resources. Plots, in other words, are the key link between the social and institutional data collected on most forms and the biological data collected in the forest(s).

A plot can be any geometric shape. The IFRI manual guidelines explain the methods used for circles and squares. Be sure to ***record the area in square meters below*** *and describe the forest sampling methods used on Form F.*

Using the Forest Plots Map drawn in the Forest Form (B1a), the field researcher should record below the Plot Identification Number that corresponds to this Forest Plot.

Research ID _____ _____ . Country ID _____ . . _____ . Site ID _ _____

Date of site visit (mm-dd-yr): _____ _____ _____

Name of forest <FK_FOREST>: _____

Plot identification number <PPIN>: _____

Date data collected for this form (mm-dd-yr) <PPLOTDATE>: _____ _____ _____ _____

Record the area (in square meters) of each plot below.

_____ Small Plot <PAREASMALL>

_____ Medium Plot <PAREAMEDIUM>

_____ Large Plot <PAREALARGE>

Name of person filling out this form: _____

A. CONDITIONS OF THE PLOT

A1. Describe the soil within the forest plot. *(long text)* <PSOIL>
Soils may be sampled in any location in the forest plot. Include a description of this sample by addressing each of the items listed below. Please refer to Tables 5, 6, and 7, and Figures 10 and 11 in Section III.A.3. of the Field Manual.

Preparation of soil sample hole:

Location of plot topographically:

Surface description and depth of humus layer:

Depth of A and B horizons:

Color/soil drainage (A and B horizons):

Texture (A and B horizons):

Hardness of soil (A and B horizons):

©Elinor Ostrom for the IFRI Team

Rev. 5-07

A2. Is there evidence of active soil erosion in the forest plot? <PEROSION>

Mark only one answer.

(1) _____ No
(2) _____ Yes, minor erosion; surface vegetation and humus layer are absent
(3) _____ Yes, major erosion; large gullies are present in barren soil.

A3. Is there evidence of livestock use within the forest plot? <PLIVESTOCK>

Mark only one answer.

(1) _____ No
(2) _____ Yes

A4. Is there evidence of extreme damage by insects/pests within the forest plot? <PINSECTS>

Mark only one answer.

(1) _____ No
(2) _____ Yes

A5. Is this plot located within a section of the forest that is set aside for specific forest management practices? <PLOCATION>

The answers to A5-A5b here should correlate to answers for B3 B3g on the Forest Form.

Mark only one answer

(1) _____ No
(2) _____ Yes

A5a. If yes, how many years has it been since this section of the forest was subject to a major harvesting effort?

Please use whole numbers. <PYEARS>_____ years

A5b. If yes, what is the name of this unit as listed on the *Forest Form*, B3g? <PMGMTNAME>

_____ _____ _____ _____ _____ _____

Information for the following three questions is required for each plot so eventually it may be recorded on a GIS map of the forest. Information about the species and sizes of trees may be related to the elevation of the plot, the direction toward which the plot faces (e.g., primarily south facing or primarily northeast facing), and the steepness of the plot. A ***clinometer*** *is typically used for measuring slope (steepness) in degrees.*

A6. Plot elevation in meters. <PELEVATION>: _____

A7. What is the steepness of the slope in degrees? <PSLEEP> _____ _____

A8. If the plot is on a slope, what direction does the plot face? <PORIENT>

Mark only one answer.

(1) _____	North	(5) _____	South
(2) _____	Northeast	(6) _____	Southwest
(3) _____	East	(7) _____	West
(4) _____	Southeast	(8) _____	Northwest

A9. Provide any other observations that pertain to plot conditions, e.g., tree falls, evidence of charcoal burning, fire damage, storm damage, etc. *(text)* <PCONDITION>

Take note of any observed species of interest in or around the plot and be specific about its relative abundance, location, and apparent condition.

A10. What is the percentage of crown cover in this plot? <PCROWN COV> _____ %

A11. Are epiphytes <PEPIPHYTES>

(1) _____ absent?
(2) _____ few?
(3) _____ abundant?

B. GROUND COVER AND SEEDLING INFORMATION

B1. What are the different ground cover plant species in the plot? To obtain the names of all of the species, the field researcher may ask the residents of the village the local name(s) of the species and cross-check the local name with the botanical name. (P_GCOVER)

Starting at the center of the plot, create a circle with a 1-meter radius. For each woody seedling species in this area, identify the species name and count the number of stems of that particular species in the 1-meter circle. Do this for each woody seedling species. Remember that woody seedlings are defined as young trees, shrubs, or woody climbers with stem diameters less than 2.5 cm or a height less than 1 m. If the researcher chooses to group nonseedling ground cover, grouping choices should be created in the Master Species List ((F_ORGAN)*) as follows: "**Grasses**," "**Herbs**," "**Total Grasses and Herbs**," and "**Bamboo**." The researcher is encouraged to record the names of as many individual species as funds and time allow, and if possible, collect a sample of each unknown species. At a minimum, select the aggregate names as suggested here.*

What is the family name of this plant species?	Name of Species		Is the species a woody seedling or a herbaceous plant? Write "S" for seedling or "H" for herbaceous plant. <P_TYPE>	What percent of the 1-meter circle does this species (non-woody seedling) cover? <P_PERCENT>	If the species is a woody seedling, how many seedlings are there? <P_STEMCNT>
	Botanical	Local			

C. SHRUB, SAPLING, PALM, AND WOODY/HERBACEOUS CLIMBER INFORMATION

C1. Record the local and botanical names of each shrub, sapling, palm, and woody/herbaceous climber found in the circle of 3-meter radius. For shrubs and climbers, record **maximum diameter** and height in metric units. For saplings, record **DBH** and height in metric units. {P_ISID}

Starting at the center of the plot, create a circle with a 3-meter radius. For each sapling, shrub, palm, and woody/herbaceous climber species in this area, answer the questions below. Remember that a sapling is defined as a young tree with a DBH greater than 2.5 cm but less than 10 cm.

What is the family name of this plant species?	Name of Species		Is this a shrub, sapling, palm, or climber? Write "B" for shrub, "P" for sapling, "L" for palm, "W" for woody climber. <P_TYPE>	Maximum stem diameter of the shrub or climber, or DBH of the sapling (cm) <P_DBH>	Estimated height of the shrub or sapling (not climbers) (m) <P_HEIGHT>
	Botanical	Local			

Rev 5.07

Forest Plot Form (FP), Version 13, Page 5

XXXV

D. TREE, PALM, AND WOODY CLIMBER INFORMATION

D1. Record the local and botanical names of each tree, palm, and woody climber found in the circle of 10-meter radius. For each tree, record its DBH and height in metric units. {P_INFO}

Starting at the center of the plot, create a circle with a 10-meter radius. For each tree, palm, and woody climber species in this area, answer the questions below. Remember to record only those trees with a DBH greater than or equal to 10 cm. If possible, collect a sample of each unknown species.

What is the family name of this plant species?	Name of Species		Is this a tree, palm, or woody climber? Write "T" for tree, "M" for palm, or "C" for woody climber. <P_TYPE>	Maximum stem diameter of the climber, or DBH of the tree (cm) <P_DBH>	Estimated height of the tree or palm (not climbers) (m) <P_HEIGHT>
	Botanical	Local			

E. GEOGRAPHIC AND POSITIONING INFORMATION

If using GPS technology to collect data for this section, all GPS units must be set to the same Datum and Spheroid while collecting data across all plots. Be sure to specify in the *Site Overview Form* (Form O) which Datum is being used across all plots.

Use decimal degrees or degrees-minutes-seconds for latitude and longitude.

E1. What is the latitude of this plot? <PLATITUDE>

_____ *(decimal degrees)*

or

_____° _____' _____" *(degrees-minutes-seconds)*

E2. What is the longitude of this plot? <PLONGITUDE>

_____ *(decimal degrees)*

or

_____° _____' _____" *(degrees-minutes-seconds)*

E3. What is the Dilution of Precision (DOP) for this position? <PDOP> _____

Please enter a decimal number from 1 to 10.

E4. What is the Estimated Position Error (EPE) for this position? <PEPE>

_____

Appendix VI: Letter of introduction to HTA of Analqueños in Los Angeles, CA

H. Ayuntamiento Constitucional
SAN JUAN EVANGELISTA ANALCO
Distrito de Ixtlán de Juárez, Oax.

DEPENDENCIA: H. AYUNTAMIENTO CONSTITUCIONAL.
SECCIÓN: ADMINISTRATIVA.
OFICIO NUM.: PM/196
EXPEDIENTE: 2008.

ASUNTO: PERMISO.

SAN JUAN EVANGELISTA ANALCO, IXTLAN DE JUÁREZ, OAXACA, A 22 DE MAYO DE 2008.

C. VIDAL SANTIAGO.
COORDINADOR DE LOS ANALQUEÑOS RADICADOS
EN LOS ÁNGELES CALIFORNIA
P R E S E N T E.

EL QUE SUSCRIBE C. VENUSTIANO ROGELIO RAMÍREZ, PRESIDENTE MUNICIPAL DE LA COMUNIDAD DE SAN JUAN EVANGELISTA ANALCO, DISTRITO DE IXTLAN DE JUÁREZ OAXACA, ME DIRIJO A USTED PARA HACERLE DEL CONOCIMIENTO QUE EL C. JAMES PATRICK ROBSON, ESTUDIANTE DE DOCTORADO EN LA UNIVERSIDAD DE MANITOTA (CANADÁ) /UNAM (MÉXICO) ESTA REALIZANDO EN ESTA COMUNIDAD UN ESTUDIO SOBRE LA MIGRACIÓN Y COMO ESTA AFECTANDO LA VIDA DE LA COMUNIDAD, POR LO CUAL PEDIMOS LE BRINDEN LAS FACILIDADES PARA REALIZAR UNA ENTREVISTA A SU PERSONA Y A ALGUNOS MIEMBROS DE LA MESA DIRECTIVA .

ESPERANDO CONTAR CON LA COMPRENSIÓN DE USTED LES REITERO MIS MAS SINCEROS AGRADECIMIENTOS Y APROVECHAMOS EN ENVIARLE UN CORDIAL SALUDO.

ATENTAMENTE
SUFRAGIO EFECTIVO NO REELECCIÓN
"EL RESPETO AL DERECHO AJENO ES LA PAZ"

PRESIDENCIA MUNICIPAL
H. Ayuntamiento San Juan Evangelista Analco
Distrito de Ixtlán de Juárez
Oax.

C. VENUSTIANO ROGELIO RAMÍREZ
PRESIDENTE MUNICIPAL

"Domicilio: 20 de Noviembre, Centro. tel: 51 45864 ó 45865. C.P. 68748"

Appendix VII: Sample Interview Guide (External Government Actor)

Salvador Anta, Head of CONAFOR-Oaxaca
Interview conducted on April 14, 2008

Place: Offices of Conafor-Semarnat in Oaxaca City

What is your position at Conafor-Semarnat?

What are your main responsibilities?

What are the key challenges facing the organisation this year?

Please run through the programs and initiatives currently being implemented?

Community-based forest management and conservation

- At regional (Pacifico-Sur) and regional (Sierra Norte) levels:

What are the most important changes you have seen over the past ten years?

What are the key challenges currently?

And the challenges / goals for the next five years?

From a national policy perspective?

Relationship between natural resources and migration

- At regional (Pacifico-Sur) and regional (Sierra Norte) levels:

How is migration affecting forest management in the regions?

And in the Sierra Norte specifically?

Do you believe these changes to be positive or negative overall?

How could migration act as an opportunity for affected forest communities?

What are the main problems facing these communities?

It appears that not all communities suffering high rates of out-migration are being impacted to the same degree. What are the most important factors (or characteristics) that can reduce their level of vulnerability to this phenonomen?

Do you feel that affected communities are responding appropriately to these impacts?

From the standpoint of Conafor-Semarnat, does migration hold any relevance to the way you operate? Is it something you are concerned about as an organisation?

How does it affect the design and implementation of policies at a state or federal level?

Scenarios

What possible scenarios so you anticípate in terms of the relationship between migration and natural resources, and the viability of rural resource-dependent communities?

Do you expect migration rates to follow current trends?

From a policy perspective, what are the government initiatives (state and federal) that are needed to provide support to affected communities?

What are the implications from a biodiversity conservation perspective?

Given the direction of current conservation planning in Mexico, how do you see the relationship unfolding between Oaxacan forest communitiesin high biodiversity areas and external agencies pushing a conservationist agenda?

Appendix VIII: Floristic List from Pine-oak Forest of Analco

Mexico City, Mexico, May 21, 2008

Preliminary floristic list from IFRI sample sites, carried out in the communal lands of San Juan Evangelista Analco, Oaxaca, during January 2007. Armando Rincón Gutiérrez (UNAM) was responsible for taxonomic determination, in collaboration with James Robson.

PTERIDOPHYTA

Adiantaceae

Adiantum sp.	ft. 4

No det.

Pterid. sp.01	ft. 41
Pterid. sp.02	ft. 38, 43 y 44
Pterid. sp.03	ft. 46
Pterid. sp.04	ft. 45
Pterid. sp.05	s./ft.

CLASE GIMNOSPERMOPSIDA

Pinaceae

Pinus	ft. 50
P. patula var. *longipedunculata*	ft. 48
P. pseudostrobus var. *chiapensis*	ft. 49

CLASE MAGNOLIOPSIDA

Asteraceae

Ageratina sp.1	ft. 76, 84
Ageratina sp.2	s/ft.
Ageratina sp.3	s/ft.
Ageratina sp.4	ft. 81
Archibaccharis sp.1	s/ft.
Archibaccharis sp.2	ft. 82
Baccharis sp.1	s/ft.

Bidens sp.1	s/ft.
Bidens sp.2	s/ft.
Bidens sp.3	s/ft.
Cirsium sp.	s/ft.
Dahlia sp.	ft. 25, 73.
Eupathorium sp.1	ft.5
Eupathorium sp.2	s/ft.
Eupathorium sp.3	s/ft.
Eupathorium sp.4	ft.14
Gnaphalium sp.	s/ft.
Roldana sp.	ft. 80 y 89
Senecio barbajohanis	ft. 85
Senecio sp.	ft. 86
Telanthophora andrieuxii	ft. 79
Verbesina sp.	ft. 87
Asteraceae sp.1	s./ft.
Asteraceae sp.1	s./ft.
Asteraceae sp.3	ft. 12
Asteraceae sp.4	s./ft.
Asteraceae sp.5	s./ft.
Asteraceae sp.6	s./ft.
Asteraceae sp.7	s./ft.
Asteraceae sp.8	s./ft.
Berberidaceae	
Berberis moranensis	ft. 10
Caprifoliaceae	
Viburnum sp.	s./ft
Lonicera cf. *mexicana*	s./ft
Cornaceae	
Cornus sp.	ft. 52
Crassulaceae	
Sedum sp.	ft. 4
Ericaceae	
Arctostaphylos cf. *arguta*	s./ft

Arbutus xalapensis?	ft. 67
Gautheria cf. trichocalycina	ft. 65
Euphorbiaceae	
Euphorbiaceae sp.1	*s.*/ft.
Fagaceae	
Quercus affinis	ft. 62
Q. candicans	ft. 57
Q. aff. *crassifolia*	ft. 56
Q. aff. *eugennifolia*	ft. 59
Q. laurina	*s.*/ft.
Q. rugosa	ft. 63
Q. trinitatis	ft. 58
Quercus sp.	ft. 60 y 61
Garryaceae	
Garrya cf. *laurifolia*	ft. 54
Labiatae	
Salvia sp.1	ft. 18
Salvia sp.2	ft. 20
Salvia sp.3	ft. 24
Salvia sp.4	ft. 21 y 22
Salvia sp.5	ft. 23
Lauraceae	
Lauraceae sp.	ft. 55
Leguminosae	
Lupinus sp.	ft. 9
Lobelliaceae	
Lobelia laxiflora	ft. 6
Oleacaceae	
Fraxinus cf. *uhdei*	ft. 11
Onagraceae	
Fuchsia sp.	s./ft.
Lopezia sp.	ft. 7
Oxalidaceae	
Oxalis sp.	s./ft.

Piperaceae	
Peperomia sp.	ft. 47
Plantaginaceae	
Plantago sp.	s./ft.?
Polygonaceae	
Monnina xalapensis	s./ft.
Pyrolaceae	
Chimaphila cf. *maculata*.	ft. 37
Rhamnaceae	
Rhamnus sp.	s./ft.
Rhamnaceae sp.1	ft. 17 y 66
Ranunculaceae	
Delphinium sp.	ft. 2
Rosaceae	
Alchemilla cf. pectinata	s./ft.
Cercocarpus cf. macrophyllus	ft. 1
Prunus cf. *serotina*	ft. 13
Prunus sp.	ft. 36
Rubus sp.	s./ft.
Rubiaceae	
Bouvardia sp.?	ft. 35
Crussea sp.	s./ft.
Rubiaceae sp.1	ft. 31 y 33
Rubiaceae sp.2	ft. 34
Solanaceae	
Nicotiana sp.	ft. 8, 15 y 16
Solanum sp.	s./ft.
Solanum sp.2?	s./ft.
Solanaceae sp.?	ft. 53
Symplocaceae	
Symplocos sp.	s./ft.
Symplocaceae?	s./ft.
Theaceae	
Ternstroemia sp.	ft. 27

Tiliaceae

Tilia sp.?	ft. 64

Umbelliferae

Arracacia sp.	s./ft.
Hydrocotyle cf. *ranunculoides*	s./ft.
Umbelliferae sp.	s./ft.

Vitaceae

Vitaceae sp.	s./ft.

No det.

sp.1	ft. 29

CLASE LILIOPSIDA

Commelinaceae

Tinantia sp.	ft. 69
Commelina sp.	ft. 3

Cyperaceae

Carex aztecica	s./ft.
Rhynchosia sp.	s./ft.

Cyclanthaceae

Asplundia sp.	ft. 90

Convallariaceae

Convallariaceae sp.?	ft. 71

Liliaceae

Echendia sp.	s./ft.

Orchidaceae

Goodyera sp.	ft. 70
Gobenia sp.	ft. 51

Poaceae

Muhlenbergia sp.	s./ft.
Bromus sp.	s./ft.

Smilacaceae

Smilax sp.1	s./ft.
Smilax sp.2	s./ft.

Appendix IX: Floristic List from Cloud Forest of Comaltepec

Mexico City, Mexico, April 29, 2008

Preliminary floristic list from IFRI sample sites, carried out in the communal lands of Santiago Comaltepec, Oaxaca, during January 2008. Armando Rincón Gutiérrez was responsible for taxonomic determination, in collaboration with James Robson.

PTERIDOPHYTA

Aspleniaceae	**Photo code**
Asplenium cf. *cirrhatum*	ft. 8
A. cf. *miradorense*	ft. 9
A. cf. *sessilifolium*	ft. 10
Cyatheaceae	
Cyathea divergens	ft. 12
C. cf. *fulva*	ft. 11
C. cf. *salvinii*	ft. 13
C. sp.	ft. 14
Dryopteridaceae	
Arachniodes denticulata	ft. 7
Lomariopsidaceae	
Elaphoglossum cf. *guatemalense*	ft. 2
Polypodiaceae	
Polypodium loriceum	ft. 6
No det.	
Pterid. sp.01	ft. 3
Pterid. sp.02	ft. 4
Pterid. sp.03	ft. 5

CLASE GIMNOSPERMOPSIDA

Podocarpaceae	
Podocarpus matudae var. *matudae*	ft. 142

CLASE MAGNOLIOPSIDA

Acanthaceae

Acanthaceae sp.	ft. 164

Annonaceae

Guatteria cf. *galeottiana*	ft. 1

Araliaceae

Dendropanax arboreus	ft. 17
D. populifolius	ft. 15 y 16

Asteraceae

Bartlettina calderonii	ft. 36
B. cf. *luxii*	ft. 35
B. pyramidata	ft. 33
B. tuerckheimii	ft. 38
Stramentopappus pooleae	ft. 37
Telanthophora grandifolia var. *grandifolia*	ft. 34
T. liebmannii	ft. 32
T. uspatanensis	ft. 31

Begoniaceae

Begonia sp.	ft. 39

Celastraceae

Celastrus vulcanicolus	ft. 44
Quetzalia schiedeana	ft. 45
Zinowiewia sp.	ft. 43

Chloranthaceae

Hedyosmum mexicanum	ft. 46

Clethraceae

Clethra conzattiana	ft. 47

Clusiaceae

Garcinia intermedia	ft. 42

Cunnoniaceae

Weinmannia pinnata	ft. 50

Ericaceae

Bejaria aestuans	ft. 52

Cavendishia bracteata ft. 58
Gautheria odorata ft. 59
Vaccinium consanguineum ft. 55
Vaccinium consanguineum ft. 56
Xolisma squamulosa ft. 57
Ericaceae sp.1 ft. 53
Ericaceae sp.2 ft. 54

Euphorbiaceae

Alchornea cf. *latifolia* ft. 64
Hieronyma oblonga ft. 65

Fabaceae

Swartzia mexicana ft. 188 y 189
Fabaceae sp. ft. 68

Fagaceae

Quercus corrugata ft. 70 y 71
Q. aff. *eugennifolia* ft. 69

Hippocastanaceae

Billia hippocastanum ft. 67

Juglandaceae

Alfaroa mexicana ft. 74
Oreomunnea mexicana ft. 72 y 73

Lauraceae

Beilschmiedia ovalioides ft. 91
Cinnamomun cf. *areolatum* vel. aff. ft. 92 y 173
Ocotea betazensis ft. 95
O. bernoulliana ft. 93
O. betazensis ft. 94
O. bourgeauviana ft. 96 y 97
O. cf. *chiapensis* ft. 98
O. cf. *leucoxylon* ft. 101, 102 y 146
O. cf. *sarcodes* ft. 85
O. chiapensis ft. 99
O. effusa ft. 100
O. saurodermata ft. 89 y 90

P. obscura ft. 104
P. rufescens ft. 86, 87 y 88
Persea americana ft. 103
Lauraceae sp.1 ft. 77
Lauraceae sp.2 ft. 76
Lauraceae sp.3 ft. 82
Lauraceae sp.4 ft. 79 y 80
Lauraceae sp.5 ft. 78
Lauraceae sp.6 ft. 83 y 84
Lauraceae sp.7 ft. 81
Lauraceae sp? ft. 63
Lauraceae sp? ft. 75

Melastomataceae

Miconia aff. *glabra* ft. 106, 107 y 108
M. aff. *hemenostigma* ft. 109
M. aff. *ibaguensis* ft. 113
M. aff. *liebmannii* ft. 114
M. aff. *sec. cremanium* ft. 110
M. lonchophylla ft. 115 y 116
M. trinervia ft. 111 y 112
Miconia sp. ft. 105

Meliaceae

Guarea glabra ft. 117
G. cf. *grandiflora* ft. 118

Monimiaceae

Mollinedia cf. *viridiflora* ft. 119 y 120

Moraceae

Pseudolmedia spuria ft. 121

Myrsinaceae

Ardisia cf. *paschalis* ft. 124 y 181
A. cf. *verapasensis* ft. 130
Gentelea penduliflora ft. 123
Myrsine juerguensenii ft. 125
Parathesis cf. *melanosticta* ft. 126

P. cf. *oerstediana* ft. 127 y 128
P. tenuis ft. 132
Myrsinaceae sp.1 ft. 129
Myrsinaceae sp.2 ft. 131

Myrtaceae

Calyptranthes schiedeana ft. 136
Myrtaceae sp.1 ft. 133
Myrtaceae sp.2 ft. 134
Myrtaceae sp.3 ft. 135
Myrtaceae sp.4 ft. 180

Ochnaceae

Ouratea sp. ft. 182 y 183

Onagraceae

Fuchsia arborescens ft. 163 y 165

Piperaceae

Peperomia sp.1 ft. 148
Peperomia sp.2 ft. 149
Piper xanthostachyum ft. 144

Rubiaceae

Deppea grandiflora ft. 154
Faramea schultesii ft. 147
Hoffmania culminicola ft. 153
P. cf. *megalantha* ft. 162
P. elata ft. 155
P. galeottiana ft. 157
Palicourea macrantha ft. 152
Psychotria berteriana ft. 156
R. buddleioides ft. 158 y 159
Rondeletia cf. *acuminata* ft. 160
Rubiaceae sp. ft. 150

Rutaceae

Zanthoxylum cf. *melanostictum* ft. 60 y 184

Sabiaceae

Meliosma cf. *dentata* ft. 166

Sapindaceae

Matayba oppositifolia ft. 61

Saxifragaceae

Phyllonoma laticuspis ft. 167

Solanaceae

Solanaceae sp.1 ft. 168

Solanaceae sp.2 ft. 169

Symplocaceae

Symplocos jurguensenii ft. 170

S. cf. *vernicosa* ft. 62

S. speciosa ft. 171

Theaceae

Cleyera integrifolia ft. 172

Ternstroemia oocarpa ft. 174 y 175

Ticodendraceae

Ticodendron incognitum ft. 176

Tiliaceae

Heliocarpus sp. ft. 177

Winteraceae

Drymis granadensis ft. 178

No det.

sp.1 ft. 66

sp.2 ft. 122

sp.3 ft. 145

sp.4 ft. 151

sp.5 ft. 161

sp.6 ft. 179

sp.7 ft. 185

sp.8 ft. 186

sp.9 ft. 187

CLASE LILIOPSIDA

Araceae

Anthurium cf. *umbrosum* ft. 23

Monstera cf. *deliciosa* ft. 18
Philodendron cf. *advena* ft. 24
Syngonium cf. *podophyllum* ft. 22
Araceae sp.1 ft. 19
Araceae sp.2 ft. 20

Arecaceae

Chamaedorea cf. *concolor* ft. 27
C. cf. *elegans* ft. 30
C. cf. *liebmannii* ft. 28
C. cf. *tepejilote* ft. 26
C. rigida ft. 29
Arecaceae sp. ft. 25

Bromeliaceae

Tillandsia cf. *viridiflora* ft. 40
Bromeliaceae sp. ft. 41

Convallariaceae

Convallariaceae sp.1 ft. 48 y 49

Cyperaceae

Uncinia cf. *hamata* ft. 51

Orchidaceae

Maxillaria tonsoniae ft. 140 y 141
Prosthechea varicosa ft. 137
Rhynchostele rossii ft. 138 y 139

Poaceae

Poaceae sp. ft. 143

Appendix X: Milpa Agriculture

In highland areas, maize (*Zea mays*) is the main subsistence crop and grown as a single species with up to five or six named varieties. Most indigenous farmers in the Sierra Norte express a strong preference for "creole" (*criollo*) varieties of corn and beans, judging them to be superior in their adaptability to local conditions, in taste, and in nutritional value. Traditionally, maize is grown as part of the *milpa* cropping system, where it shares the field with other cultivars; namely beans (genus Phaseolus) and squash (*Cucurbita spp.*). While maize requires high levels of nitrogen in the soil to grow properly and quickly depletes the soil if planted alone, bean plants are high in nitrogen and their presence extends the life of the maize plot significantly by helping to keep nitrogen levels healthy. Squashes, generally grown between the rows of maize stalks, also figure into this symbiotic relationship, as they cover the ground in between the rows of corn and help to keep unwanted weeds down.

Milpas may be located in town but are more often at a distance of one to five kilometres from the family home. Plots are worked on steep slopes, and many fields in Analco utilize terracing that was introduced to the region in the early 1970s. Except on limited streamside plots, there is little use of irrigation and the vast majority of milpa fields are rain-fed. The primary ploughing and planting is timed for the first solid spate of rain, which marks the onset of the summer wet season in May or June. If the rains don't begin in earnest until mid-June or later, this can seriously affect agricultural outcomes for the year. Those farmers with the necessary resources may cultivate in two or three fields at different elevations and of varying soil types to compensate in advance for the uncertainties of local rainfall. Corn sprouts within one week of planting. After three to four weeks, mounds are pushed up to support the young cornstalks. The first weeding takes place after a month or so, with a second weeding required when the corn flowers. This is backbreaking work, especially in northern Oaxaca with its difficult mountainous terrain. It is usually performed by hand with the help of machetes and hoes.

Green corn on the cob (*elote*) is usually harvested in September or early October. Stalks are bent over approximately two or three weeks before the main harvest to facilitate drying. These ripe, dry ears are known as *masorka* and are ready to be picked from mid-November to December. The dry ears are packed in large baskets or sacks (*costales*) and then sent home on the backs of donkeys and stored in the house until needed. Shelling the corn is an ongoing job in the

household. The vast majority of corn is used for making tortillas, with some used as animal feed. Once the field has been harvested, livestock is brought over to feed on the left-over stalks and leaves (*sacate*), with some cut, bunched and hung in nearby trees to use as feed for the oxen that will plough the field the following year. This is an example of how much the milpa system can provide; not only enough corn, beans and squash to last the family most of the year, but what remains make excellent feed for livestock. Nothing is wasted.

In addition to maize, beans and squash, a third source of edible plants are milpa weeds such as *hierba buena* and *hierba mora*, which are often found growing among the main crop. Milpa fields in fallow also abound with wild mustard (*Brassica campestri, B. Nigra*), chepiles (*Crotalaria spp*.), epazote (*Chenopodium ambrosiodes*), with wild cherry (*Prunus serotina*), blackberries (*Rubus spp*.), *hoja de borracho* and *cilantro de monte* also found close by. Many of these are harvested opportunistically, whilst people are out in the fields or tending their animals. They may be eaten on the spot or brought back in quantity for the evening meal. These wild foods add significant variety and nutrient balance to the traditional local diet.

Despite the many benefits this system provides, milpa fields are on the decline across the region. On the one hand, trade liberalization and market deregulation policies post-NAFTA have meant that maize and other staple crops produced on a huge scale by U.S. corporations are frequently available at lower prices in local markets than the products of local farmers, who struggle to sell any surplus that they are able to produce. On the other hand, demographic changes driven by ongoing out-migration have altered the balance between the local populace and their land base. Fewer people still farm, and those that do, are cultivating fewer hectares as family size decreases and available labour dwindles. As a consequence of these changes, there has been a move towards mono-cropping in recent years. Mono-crops, of course, result in growing conditions that are less biologically diverse than the milpa systems that they replace. They tend to lead to rapid depletion of the soil, which is generally counteracted by the application of chemical fertilizers that return nutrients to the soil but may have damaging effects in the long-term.

For more on these issues, see Mann's (2004) brilliant *Diversity on the Farm: How traditional crops around the world help to feed us all, and why we should reward the people who grow them*, published by the Ford Foundation.

Appendix XI: Resource Practices in Study Communities

Subsistence and commercial agriculture

Subsistence agriculture and gathering persist as central elements of local livelihoods in both Comaltepec and Analco. Corn, beans and squash are universally grown crops in all territorial zones. Several varieties of corn (*Zea mays*) are grown, including *blanco*, *amarillo*, *negro* and *pinto*, which are favoured according to taste, soil and climatic conditions. Most indigenous farmers in the Sierra Norte express a strong preference for "creole" (*criollo*) varieties of corn and beans, judging them to be superior in their adaptability to local conditions, in taste, and in nutritional value. The most widely recognized are a general purpose "white" variety, another "white" variety good for *tierra caliente*, a local "black" variety (planted at elevations above 2,300m), a "yellow" variety, and a mottled or "pinto" variety. Corn is more often than not grown together with tepary bean (*Phaseolus acutifolius*) or common bean (*Phaseolus vulgaris*) and squash (*Cucurbita*) as part of the *milpa* system. In temperate, dry zones on the leeward side of the mountains, monocrops of pea, black bean, butter bean, broad bean, cilantro, tomatillo and mustard are also found. In some areas, wheat and other grains have traditionally been planted, in addition to orchards of peach, pear, apple, cherry, lemon and other temperate fruits, including several varieties of avocado[146]. In the tropical zone that surrounds San Martin Soyolapam, Metates and Puerto Eligio, the climate allows for the growing of more exotic crops including papaya, mamey, grapefruit, mandarin, mango, coconut, tamarind, and multiple varieties of banana and plantain. Protected home gardens provide important venues for many of these crops, as well as coffee (four varieties) and *tepejilote* palms. There are a handful of hothouses where tomatoes and chillies are grown.

For corn and other basics, the growing year can vary from zone to zone due to topographic and climatic differences, but generally runs from May (sowing) to November (harvesting). However, farmers in La Esperanza and San Martin Soyolapam, areas characterised by far greater humidity and year-round precipitation, can obtain up to two harvests per year. Corn is planted in May and harvested in November, while a second crop (if desired) can be planted in December and harvested at the beginning of May. Although swiddens prepared from forested sites produce higher crop yields, clearing primary or advanced secondary forest is time-

[146] In both communities, fruit orchards have been affected by plague and many trees no longer produce.

consuming, so farmers in the dry zone prefer to maintain their agricultural fields in early stages of ecological succession. In humid zones, the Chinantec do practice long-fallow rotational agriculture. However, they rarely abandon a site; instead of allowing mature secondary forest to return, they prefer to maintain plots in early secondary stages by cutting and burning the vegetation every few years to cultivate subsistence crops, or by planting perennial cash crops (Martin 1993).

Cash crops also exist in each climatic and ecological zone. There are small-scale fruit plantations in tropical humid areas; sugar cane is grown below La Esperanza (and to a lesser degree in San Martin Soyolapam), and shade coffee has been grown across extensive areas on the humid side of the mountains[147]. In temperate, dry areas, some monocrops of pea and butterbean, as well as cilantro, are grown to sell at local markets. This is particularly the case in Analco, where close proximity to the district centre of Ixtlan has encouraged a number of local farmers to sell produce at the weekly Monday market. A handful of individuals in both communities have established hothouses to grow tomato and chilli, though with little success to date. A handful of *comuneros* cultivate ornamental flowering plants.

Today, most farmers work individually, with additional labour sourced from within the family unit (nuclear or extended). In years gone by, there were areas of *milpa* that were worked communally. Around La Esperanza, a form of *tequio* was used to sow and harvest plots for the benefit of the whole community. In Analco, *tequio* was also used to grow corn and beans, the harvest then sold to raise funds for the annual fiestas in village neighbourhoods. This form of collective farm work is no longer practised in either community. Currently, the only form of group work is *mano vuelta* performed in San Martin Soyolapam, where 3 or 4 *comuneros* work together at key moments of the agricultural calendar to increase plot productivity and efficiency. It is perhaps no coincidence that this is the only agricultural zone (in either of the two study communities) where a majority of local farmers produce enough corn to sell the surplus in local markets.

[147] Coffee is grown anywhere between 600 and 1,500 m.a.s.l., where median annual temperatures range from 16 to 26 degree celsius, with rainfall exceeding 2000mm per year. At its peak in the 1990s, there were over 100,000 hectares of coffee plantations in Oaxaca (Challenger 1998: 493), with 95% of growers cultivating less than 5 hectares.

Animal husbandry

In Comaltepec, the main areas of livestock and pasture are found in the tropical zones surrounding the village of San Martin Soyolapam and the roadside hamlet of Metates. The majority of *comuneros* who live in Soyolapam own livestock, with an average of 15 head of cattle per rights-holder. This is also the area where ranching is having the greatest impact on forest resources. Within this zone, abandoned agricultural lands are frequently converted into pasture or tracts of virgin forest cleared to open up new *potreros*. Ranchers work an average of seven 1-hectare *potreros*, rotating their animals from one *potrero* to another on a monthly basis. Most animals are sold for beef[148] in nearby Valle Nacional. With the recent success of a new non-native grass called "*el insurgente*", many ranchers in San Martin Soyolapam are planning on opening up more *potreros* and raising more cattle. In the other two villages, far fewer *comuneros* raise livestock.

In Analco, as agricultural plots have been abandoned in both *tierra fria* and *tierra templada,* many have been converted into pasture. They are primarily used for raising beasts of burden; mules and horses used to transport agricultural products, and oxen used to plough fields. In recent years, some *comuneros* have begun to experiment with new breeds of *caprino* livestock in *tierra caliente* to sell their meat in local markets. Analco is notable for its sophisticated system of pasture rotation, which consists of two 8km long fenced areas; one that divides *tierra templada* from *tierra fria* and a second that separates pasture areas in *tierra templada* from those in *tierra caliente*. These fenced areas were built using *tequios* and designed to avoid livestock from wandering into the most intensively-used agricultural lands that surround the village. This impressive collective action, however, was carried out many years ago at a time when agriculture and animal husbandry were key activities in the majority of households. Over time, fewer families in Analco have continued to invest the time[149] and money needed to raise livestock.

Domestic and Commercial Forestry

Domestic forestry meets multiple needs in both communities. Local timber materials have long been used in local construction. Many houses use timbers as structural members,

[148] Oxen are not used in Soyolapam as plough animals; the flat terrain having encouraged the village to invest in a tractor to help farmers with this work.
[149] For at least half of the year they are tethered, which means that their owners have to move the animals on a daily basis to ensure they have access to fresh pasture.

mostly as roof beams. In addition, kitchens in San Martin Soyolapam (and, to a lesser degree, in La Esperanza) are often wooden structures. In both communities, timber is used for fence posts. These may be used in urban zones, to construct *potreros*, or to mark the border with neighbouring communities' lands. The yoke that rests on the neck of oxen to which the plough shaft is attached requires a lightweight but strong species. By contrast, the plough beam requires a very hard wood with straight grain. In some Zapotec communities, oak is singled out for this purpose (Hunn 2008, Gonzalez 2004). In Analco, fresno, aguacatal, cereza and palo de aguila are the preferred species.

In the higher, more temperate zones of Comaltepec's territory (above 2,400 m.a.s.l), the community has extensive pine-dominated forests that include large populations of commercially valuable species such as *Pinus patula*, *P. psuedostrobus* and *P. ayacahuite*. Before the 1980s, the community had not been directly involved in commercial forestry and had only used timber resources to meet domestic needs. With the end of the forestry concessions in 1983 and the cessation of logging operations by FAPATUX[150], the community was able to develop its own forestry operations for financial gain. The community forest enterprise (CFE) currently employs 15 *comuneros* and includes a sawmill for processing timber into boards and planks. Processed timber is sold in Oaxaca, while raw lumber is sold to a number of companies, including FAPATUX in Tuxtepec. The community has two areas designated for productive forestry activities, a high intensity logging zone that covers a large expanse of 'Agua Fria' and a low-intensity logging zone adjacent to 'Las Cascadas'. Logging normally commences at the end of the year and runs through to May or June, when the first heavy rains make work difficult and forest access problematic. The community's forest management plan is approved by Semarnat (Ministry of Environment and Natural Resources) and implemented by the *Comisariado de Bienes Comunales*, with technical support provided by UZACHI. This plan determines both cutting cycles and annual permitted volumes. Between 2005 and 2007, the community extracted a total of 4,500 cubic metres of lumber: 1,800 cubic metres in 2005; 1,200 cubic metres in 2006; and, 1,500 cubic metres in 2007 – all well below the annual volume permitted under the approved plan.

In the case of Analco, the highest temperate zone (*tierra fría*) of the community's

[150] Fabricas Papeleras de Tuxtepec (FAPATUX) is one of the largest processors of lumber and paper in the state of Oaxaca. From 1956 to 1981 it held concession rights to extract timber from the forests of the Sierra Norte. In 1982, local communities fought successfully against renewal of the concession and took back control of their forests.

territory is home to a small tract (approximately 150 hectares) of pine-oak forest that includes stands of commercially-valuable *Pinus patula*, *Pinus psuedostrobus* and *Pinus ayacahuite*. To date, however, the community has not approved any type of exploitation for commercial ends and has used pine timber resources for domestic purposes only. Presently, the community is discussing the possibility of approving the commercial exploitation of a limited area of pine forest (60 hectares of low impact forestry)[151].

Firewood Collection

The dry oak-pine forest that surrounds the head village of Santiago Comaltepec acts as the domestic forest zone for local residents. This is where villagers have traditionally extracted oak (*Quercus* spp.) and madroño (*Arbutus xiapensis*) for firewood. Given the ecological impact of long-term extraction from a relatively small forest area, the communal authorities have begun to limit or control harvesting access in this forest, with villagers now sent to the *Agua Fria* region for any large-scale extraction[152]. In La Esperanza, firewood is collected from cloud forest located an hour or more walk below the village. However, due to strict regulations aimed at protecting cloud forest species, only dead, dry wood is removed, with care taken when cutting not to damage living individuals. Community members in this region are only allowed to extract what they can carry. In San Martin Soyolapam, the principal species used for firewood are Guajinicuil (*Inga jincuil*), Xochicuahuitl (*Cordia alliodora*), sombrerete (*Terminalia amazonia*), Palo de Agua (*Vochysia guatemalensis*), as well as the trunks of local orange trees (*Citrus sinensis*). In Analco, areas of oak-pine forest surrounding the village are designated for domestic use, and where villagers get most of their firewood (*Quercus* spp. and *Arbutus xalapensis*). Despite long-term extraction of firewood, the communal authorities have yet to officially limit access to any parts of this forest. While a handful of *comuneros* collect 1 or 2 'pick ups' of firewood each month (the village bakers, for example), the vast majority of *comuneros* extract smaller amounts and carry them back to the village on foot or by mule. The community members are allowed to extract what they can carry. Long-term extraction of firewood from these forests

[151] The community is in the process of developing a forest management plan to be submitted to the Ministry of Environment and Natural Resources (Semarnat). If approved, the plan would be implemented by the *Comisariado de Bienes Comunales* with technical support from the NGO, ERA, A.C.

[152] This equates to 5 to 6 pick-ups of firewood per month (3 tons per pick-up or 15-18 tons in total)

has had a detrimental impact on overall condition, with some areas noted for their lack of mature oaks.

In both communities, wood remains the preferred fuel for cooking. However, while a firewood stove is still used in most households for making tortillas, heating coffee and beans, gas cookers are becoming ever more popular. The use of firewood and gas fluctuates throughout the year. For example, during the rainy season, when the supply of dry firewood is low, gas usage increases. Gas, however, is an added expense (a large tank costs between US$20-25) and so when money is tight, the family will depend more on firewood. At the same time, those families who have a reduced presence '*en campo*' (in the countryside) have less opportunity to look for firewood. Those unable to access their own supply either buy firewood from neighbours or depend wholly on gas for cooking.

Non-timber forest products (NTFPs)

The non-timber forest products (NTFPs) collected from the forests of Santiago Comaltepec and Analco include: water, pine resin, mushrooms, medicinal and edible plants, ornamental plants (species of laurel, orchids and bromeliads) humus, ocote, deer, rabbit and other forest game. While some locals will head out purposefully to harvest mushrooms, medicinal plants or the like, most harvesters are opportunists, gathering NTFPs on their way to and from local fields or working in the forest.

The numbers of medicinal plants collected are too many to name here, but some of the most common include (local names): *barba de viejo*, *hierbabuena*, *pericon*, *hierba de angel*, *hierbamora*, *hierba de borracho*, and *cacho de venado*. Several varieties of edible mushroom are harvested at different times during the rainy season (April through to October). In the head village of Comaltepec, after the first heavy rains ('*aguaceros*') fall on the highlands in April, a much sought-after mushroom can be found growing in and around old tree stumps in former logged areas. In July and August, during the middle of the rainy season, three or four types of mushroom are collected from the domestic use forest. Likewise, the forests around La Esperanza and San Martin Soyolapam are also home to their own range of seasonal mushrooms often harvested for use in soups and empanadas. In Analco, up to six varieties of edible mushroom are collected. After the first heavy showers in late April, there is a white/café (*caca de venado*) mushroom that grows in open areas of pasture, which is particularly good in empanadas. Most varieties, however, are found later in the year in August and September in oak forests around the

village or in the higher pine forests (between 2,200 and 2,900 m.a.s.l.). These are used in empanadas, or added to stews.

Ocote is the Nahuatl name for pine. Locally, it refers to the inner core of pine species with extremely high resin content that is used as a natural fire lighter. The traditional method of harvesting *ocote* involves slowly hollowing out the pine at the base of the trunk, which allows for the *ocote* to be collected without killing the tree. Alternatively, people have started to visit recently logged areas to collect *ocote* directly from the top of tree stumps. Good quality humus (top soil with degraded organic material) is found in any forest area where the soil is particularly rich in nutrients, and acts as an excellent fertilizer or natural compost for home gardens. Locals from Santiago Comaltepec claim that the best quality humus is found in the 'Las Cascadas' area, although only a handful of villagers still collect it, and even then on a fairly irregular basis. In Analco, a village of gardeners, many families still use humus. In neither community, is extraction regulated.