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**Documenting and Contextualizing Pjiekakjoo (Tlahuica) Knowledges
through a Collaborative Research Project**

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Abstract

**Documenting and Contextualizing Pjiekakjoo Knowledge
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The Pjiekakjoo (Tlahuica) people and their culture have managed to adapt to the globalized world. They have developed a deep knowledge-practice-belief system (Traditional Environmental Knowledge (TEK) or Contemporary Indigenous Knowledges (CIK)) that is part of the biocultural diversity of the region in which they live.

This dissertation describes the economic, social and political context of the Pjiekakjoo, to contextualize the Pjiekakjoo CIK, including information on their land tenure struggles, their fight against illegal logging and the policies governing the Zempoala Lagoons National Park that is part of their territory.

The collaborative research on which this dissertation draws, based on a dialogue of knowledges and heavily influenced by the ideas of Paolo Freire, fully recognized Indigenous people as subjects. Through participant observation, interviews and workshops we documented the names, uses, myth, beliefs and stories that the Pjiekakjoo people give to an extensive variety of organisms: mushrooms, invertebrates, vertebrates and the most important useful plants. Basic knowledge about *the milpa* and *corn* was also documented. Through the analysis of the information gathered it is clear that the relation of the Pjiekakjoo with other living beings is far from solely utilitarian in nature.

My initial assumption that scientists documenting TEK/CIK should work for their full recognition as valid knowledge systems that are essential for the redefinition of public policies and development projects, as well as the reinforcement of Common Property Systems, was reaffirmed through the research undertaken. I also concluded that ethnobiological research should more actively address the dynamics of CIK and its

intracultural diversity related to variables such as gender, age and schooling, inter-ethnic relations and the migratory experience. I was found that due to migration TEK is locally based but not locally attached, as at least some concepts may be used in transnational settings.

This dissertation is a translational work that draws on the New Rationality proposed by Boaventura De Sousa Santos that appeals for cognitive justice. Pjiekakjoo knowledges represent an immense living cultural heritage that should be documented and contextualized through the active and empowered action of the Pjiekakjoo people with support of academicians.

Table of Contents

Table of Contents.....	i
List of Figures.....	ii
List of Tables.....	iv
I. Introduction.....	1
II. Ethnobiological research, for what and for whom?.....	11
III. The Pjiekakjoo People and their locale.....	57
IV. Land struggles a National Park and Communitarian Ecotourism.....	116
V. An introduction to Biocultural Diversity and Traditional.....	151
VI. The Pjiekakjoo Knowledges about the forest (El monte).....	170
VII. Variability in TEK, Education and Migration.....	248
VIII. Culture and the Conservation and.....	287
IX. General Conclusions.....	323
List of References.....	333
Appendix I Agreement.....	350
Appendix II. People involved in the Project.....	352
Appendix III. Organism used in the quantitative interviews.....	353
Appendix V. Decree of the Zempoala Lagoons National Park.....	355
Appendix VI. Tepetongo's Leyend.....	357
Appendix VII. Categories of Risk for Native Mexican species according to the Official Mexican Norm (Nom 059).....	358
Appendix VIII. Edible Plants.....	359
Appendix IX. Medicinal Plants.....	360
Appendix X. Ornamental Plants.....	362
Appendix XI. Total number of taxa, species names and in Pjiekakjoo and Spanish.....	363

List of Figures

Figure	Page
Figure 1. The Teponaztle and the People in the Fifth Sun Festival.	4
Figure 2. Tonatiahua Lagoon.	6
Figure 3. Catalina asking Dña Paula.	18
Figure 4. Me and my daughter with delegados and elders.	20
Figure 5. The elders paying attention.	25
Figure 6. Catalina comparing lists of vocabulary.	30
Figure 7. Christian and Xavier showing the mushrooms.	33
Figure 8. Angel with his mushroom with the labels of their names in Pjiekakjoo.	33
Figure 9. Brenda videotaping the workshop and the children working.	48
Figure 10. The author reviewing the final list of names of mushrooms.	48
Figure 11. Benito Ruperto in one of the workshops he attended.	49
Figure 12. Children drawing and writing down the names of animals in Pjiekakjoo.	49
Figure 13. Angel asking his grandmother Dña Julia some mushrooms names.	51
Figure 14. The new <i>delegación</i> where the last workshops were held.	51
Figure 15. The banner made with the partial results of the project.	53
Figure 16. The author explaining to the kids a crossword.	53
Figure 17. A photographic exposition I did in the patronal party in January 2008.	56
Figure 18. Map of the Localization of the Pjiekakjoo (Tlahuica) Communities.	58
Figure 19. The second anniversary of la Delegación Indígena Tlahuica de Teocalcingo.	63
Figure 20. Celebration in the main square of San Juan Atzingo.	66
Figure 21. The Kios and the main square.	66
Figure 22. Panoramic view of Teocalcingo.	67
Figure 23 . Copy of the original <i>Teponaztle</i> at the Church of San Juan Atzingo.	77
Figure 24. Teponaztle with Cempasuchil flowers.	77
Figure 25 . Example of a <i>contenido</i> .	86
Figure 26. Christopher's Baptism. The Godmother getting him dressed.	89
Figure 27. Godparents and parents with the child at the church.	89
Figure 28. Emmanuel and Lupita's wedding (May 2011).	90
Figure 29. The Blessing of the seeds.	91
Figure 30. The church of San Juan Atzingo.	91
Figure 31. San Juan Bosco's celebration.	92
Figure 32. San Juan Bosco's celebration.	92
Figure 33. Mojiganga in San Juan Atzingo. 2010.	93
Figure 34. Mojiganga in San Juan Atzingo. 2010.	93
Figure 35. Dña Lina holding a <i>Tejamanil</i> (see footnote 28).	93
Figure 36. Easter Sunday at La Loma de Teocalcingo (April 2011).	94
Figure 37. Easter Sunday at La Loma de Teocalcingo (April 2011).	94
Figure 38. Day of the Holy Cross at the top of Zempoala (May 2007).	94
Figure 39. Baskets with cempasúchil flowers for the San Lucas's celebration.	95
Figure 40. The Blessing of the livestock.	95
Figure 41. The celebration of San Lucas at Nativitas (October 2007).	96
Figure 42. Pericón cross (<i>Tagetes lucida</i>), hung on the day of San Miguel Archangel.	96
Figure 43. The Day of the Dead celebration at La Loma de Teocalcingo.	98
Figure 44. The Day of the Dead celebration at La Loma de Teocalcingo.	98
Figure 45. The Fifth Sun Festival.	99
Figure 46. The Fifth Sun Festival.	99

Figure 47. Graduation day at the Kindergarten (July 2011).	100
Figure 48. Graduation day at the Primary school (July 2010).	100
Figure 49. Parades at San Juan Atzingo on the Day of the Revolution.	101
Figure 50. "El Grito", on Independence day.	101
Figure 51. Arrieros.	102
Figure 52. Chinelos.	102
Figure 53. Concheros.	102
Figure 54. Little chinelos.	102
Figure 55. Map of the Pjiekakjoo communities in Mexico and the U.S.	114
Figure 56. Map of Zempoala Lakes National Park in the COBIOCH.	132
Figure 57. View from the Tonatiahua Lake.	133
Figure 58. One of the cabins that was burnt next to Tonatiahua Lake.	134
Figure 59. Tonatiahua Lake.	144
Figure 60. Sign of the Communitarian Ecotourism project.	144
Figure 61. Ildelfonso Zamora in a rehearsal.	149
Figure 62. My students from the junior high school visiting the Ecotourism Project.	149
Figure 63. <i>Huevito</i>	181
Figure 64. Hongo de Trozo	182
Figure 65. Hongo de Madroño	183
Figure 66. Xical loco	183
Figure 67. Chonchines	184
Figure 68. Mazorquitas y Negritos	184
Figure 69. Mazorquitas	185
Figure 70. Campana	185
Figure 71. Mazorquitas	187
Figure 72. Mazorquitas	187
Figure 73. Pancitas	188
Figure 74. Xical	189
Figure 75. Gusano de los Palos	194
Figure 76. Edible wasp	196
Figure 77. Animal of the death	196
Figure 78. Number of Taxa per use	198
Figure 79. Percentage of harmless and harmful arthropods	199
Figure 80. G. de Tepozán	201
Figure 81. Rattle	209
Figure 82. Dried rattlesnake	209
Figure 83. Escorpión	210
Figure 84. Gavilán	218
Figure 85. Tlacucache	232
Figure 86. Armadillo	232
Figure 87. Cacomixtle	235
Figure 88. Deer feet	236
Figure 89. Deer's blood	237
Figure 90. Deer's head used for ornamental purposes.	238
Figure 91. Squirrel's tail.	238
Figure 92. Total number of Taxa pero groups of animal and their uses.	241

List of Tables

Table number	Page
Table 1. Total population that speaks Pjiekakjoo and the percentage they represent in each of the localities where it is present.	75
Table 2. Annual Calendar of Celebrations.	92
Table 3. Schooling statistics according to the 2010 Census.	105
Table 4. Taxonomic distribution of the mushroom species registered.	174
Table 5. Taxonomic relation of the species of mushrooms documented, and their common names in Spanish and in Pjiekakjoo.	175
Table 6. Species of mushrooms that are considered the most often sold and their prices	187
Table 7. Taxonomic determination of the invertebrates' species, their names and uses.	202
Table 8. Species of Amphibians and Reptiles, their names in Spanish and Pjiekakjoo and their uses.	214
Table 9. Taxonomic of the species of birds documented, their names in Spanish, English and Pjiekajoo, and their uses	221
Table 10. Taxonomic list of the Mammal species, their common names in Spanish, Ebglish and Pjiekakjoo, and their uses.	228
Table 11. Summary of the number of taxa with the most common uses, and per group of animal.	241
Table 12. Terms with Spanish elements and of Nahuatl origin.	244
Table 13. Agricultural cycle.	246
Table 14. Maize varieties with their Pjiekakjoo names and some of their uses.	246
Table 15. Number of taxa documented and the number of names in Spanish and Pjiekakajoo.	248

Abbreviations

EDMTM	Enciclopedia Digital de la Medicina Tradicional Mexicana
CBTA	Centro de Bachillerato Tecnológico Agropecuario
CDI	Comisión para el Desarrollo de los Pueblos Indígenas
CEAMA	Comisión Estatal del Agua y Medio Ambiente del Estado de Morelos
CNC	Central Nacional Campesina
COBIOCH	Corredor Biológico Chichinautzin
CONAFOR	Comisión Nacional Forestal
CONANP	Comisión Nacional de Áreas Naturales Protegidas
CONAPRED	Consejo Nacional para Prevenir la Discriminación
CONASUPO	Compañía Nacional de Subsistencias Populares
COPLAMAR	Coordinación General del Plan Nacional de Zonas Deprimidas y Grupos Marginados
CRIM	Centro Regional de Investigaciones Multidisciplinarias
Ha	Hectare
IMSS	Instituto Mexicano del Seguro Social
INALI	Instituto Nacional de Lenguas Indígenas
INEGI	Instituto Nacional de Estadística y Geografía
INI	Instituto Nacional Indigenista
INJUVE	Instituto Mexicano de la Juventud
ISSTE	Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado
LEGEPA	Ley General Del Equilibrio Ecológico y La Protección Al Ambiente
NPA	Natural Protected Area
NPZL	National Park Zempoala Lagoons
NTFP	Non Timber Forest Products
PAN	Partido Acción Nacional
PRI	Partido Revolucionario Institucional
PROFEPA	Procuraduría Federal de Protección al Ambiente
SEMARNAT	Secretaría del medio Ambiente y Recursos Naturales
UAM	Universidad Autónoma Metropolitana
UIEM	Universidad Intercultural del Estado de México
UNAM	Universidad Nacional Autónoma de México

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Dedication

For the Past, Present and Future generations of the Pjiekakjoo (Tlahuica) people.

For Camila, my daughter.

For my great grandmother Clementa Cecilia Cedillo Chávez, who was a midwife.

I. Introduction

"...la imposición y la terca Resistencia, caigo y me levanto, dejo de ser pero vuelvo a ser porque soy, cedo y reclamo, acepto y rechazo. Persisto a pesar de todo"

Bonfil 1986

I had the good fortune of visiting San Juan Atzingo¹, on January 20 2007. I was invited by some of my students from the town to the inauguration of "Radio Tlahuica". In that year I was a professor at the Intercultural University of the State of Mexico², which has students from all the ethnic groups of the state, including the Tlahuicas or Pjiekakjoo.

I had been very curious about visiting the town as it is the primary center of the smallest ethnic group in the State of Mexico. I was aware of the struggle for cultural survival and the defense of their forest that this community had undertaken for generations. But beyond that, I remember the very pleasant feeling I had when I arrived there....leaving the primary, and fairly busy, road that continues on to the famous sanctuary of Chalma, in less than five minutes, I arrived in a small town, with a typical central square with a church and kiosk. Being there, it seems that life can have another cadence, notwithstanding the proximity to Mexico City (about a two hour drive). It took my breath away: the view of the forest and Zempoala Mountain (the dominant physical feature in the region) from the front of the "delegación"³. It was during that first visit that I decided to pursue the idea of doing my research in San Juan about Traditional Environmental Knowledge (TEK) and its dynamics.

The Pjiekakjoo presence, over generations, in this territory has been possible because of a deep and complex relationship with the local ecosystem. This relationship is embodied in their TEK: "*a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment*" (Berkes 1999:8). TEK is continually transformed and highly adaptive; it is essential to the preservation of the Pjiekakjoo's autonomy in their native homeland and to

¹ In 2009 the *delegación* of San Juan Atzingo split into two: San Juan Atzingo and the new one formed by what used to be the neighborhood of La Loma de Teocalcingo.

² Universidad Intercultural del Estado de México (UIEM).

³ The building where the local authorities meet and receive people, a sort of town hall.

the survival of their livelihood and the forest: together, the people and their environment constitute a clear case of biocultural diversity⁴ (Maffi 2001, Boege, 2008). Because of TEK dynamics I propose in the present study to refer to it as Contemporary Indigenous Knowledge (CIK) in order to eliminate the misconceptions that may be attached to the word "traditional" and the perception that TEK is frozen in time.

I was very surprised to find that only one study about edible mushrooms had been done in the town, which meant that the Traditional Environmental Knowledge (TEK) of the Tlahuica people was mainly unknown to scientists and to the Mexican society in general. The study and diffusion of TEK has been my main objective since 1999, when I undertook research for my undergraduate thesis about Hñã hñu Ethno-entomology in the Mezquital Valley (Hidalgo State, México) (Aldasoro 2001). Over the years, with graduate school training, my interest in TEK broadened. Since my perception was that research frequently referred to this body of knowledge as if it existed in a sort of limbo, I became obsessed with registering it as it exists, immersed in the socio-political and cultural context in which it flourishes. My objective was to study TEK contextualized, embedded in, and therefore influenced by, the historical, social, cultural, economic and political setting of the community. My belief is that, to the extent that we situate Indigenous knowledges in their real contexts, it will be more feasible to conserve them. For example, I wanted to contrast how, while in the academic realm we take for granted the importance of the concept of biocultural diversity and its implications, Mexican policymakers frequently totally dismiss it. I hope that my dissertation can serve as a bridge so that eventually this type of gap between reality and the policymakers/academy will be reduced.

One of the principal elements in the everyday life of the Pjiekakjoo people is the struggle they have had for years against illegal logging, and the *Comisariado de Bienes Comunes* has had a particularly important role in these efforts. The other relevant element I wanted to address was the fact that the Pjiekakjoo Territory includes part of the "Zempoala Lagoons National Park", designated as a Natural Protected Area (NPA) in 1936. What is the role of TEK in the conservation and management of the Park and its natural resources? What has been the impact of living with and in a protected area for Pjiekakjoo TEK?

The other key part of the Pjiekakjoo context is, undeniably, the migration to Mexico City and to the US that Indigenous people have been experimenting for several decades, a

⁴ Mexico is considered to be the fourth most bioculturally diverse country in the world, preceded by Indonesia, Australia and India, and followed by Brazil (Toledo 2003).

phenomenon that puzzled me since I was working in Hidalgo where I observed its complexity among the Hñã hñus. Therefore one of the main topics I wanted to approach in the present research, since San Juan Atzingo is a transnational community, was to start exploring the intersection of migration and the production and reproduction of TEK. I wanted to know if there is a difference in the amount and quality of knowledge between migrant and nonmigrant families. Has TEK survived globalization? Is TEK still a viable asset in the survival of Pjiekakjoo language and culture? Today, entire Indigenous towns live on remittances. Has the practical value of TEK decreased, since it is no longer indispensable for people's livelihood strategies? What was happening with TEK and the movement of people? Would they lose their knowledge and forget about everything they may have known about the forest, or they would keep it as part of their Indigenous identity? Would the migrants use this knowledge abroad? Would they enrich it through contact with other cultures?

To situate the research of TEK in the contemporary context, I wanted to determine if San Juan was part of the trend documented in different parts of the world (Benz, *et. al.* 2000; Brodt 2001; Hoffmann 2003) involving the erosion of TEK, or if, on the contrary, it confirmed what some studies emphasize, the enduring "symbolic value of TEK" (Hunn 1999; Hunn 2008). A third possibility was to analyze to what extent TEK was an essential resource in the creation of a "transnational sense of place" (Mares y Peña 2010). Very few studies have approached TEK and migration; in fact there are few studies about Indigenous migration in general. In the past few years, some studies have appeared about migrants in their host countries (Pieroni *et. al.*, 2005; Pieroni and Vandebroek, 2007; Volpato, *et. al.*, 2009). , but they do not consider the home countries. The approach in the present research is in this sense very different. I tried to at least start exploring the impact that migration has on TEK *in situ*. The relevance of migration for me goes beyond migration as such. It is a pretext to talk about TEK's dynamics, change, adaptation, traveling, erosion and danger of extinction.



Figure 1. The Teponaztle and the People participating in the Fifth Sun Festival. March 20th 2011.

Before contextualizing TEK, it was necessary to document it. I and my Pjiekakjoo colleagues recorded the relation of this culture with an extensive variety of living beings: mushrooms, invertebrate and vertebrate animals and the most important categories of useful plants. This scope is certainly uncommon (Hunn, 2008; Anderson, 2005) among ethnobiologists.

The idea of getting a general comprehension of TEK was also a demand from the people with whom I worked. They did not see the point of documenting only certain parts of it; they wanted to work with all of it. The result is an initial approximation but there is still a lot of information to document: just to give a concrete example we did not address all the knowledge in relation to domestic animals, a completely different universe.

In any case the holistic documentation of the Pjiekakjoo knowledge about such biological diversity is one of the main contributions of my dissertation. It has been an incredible challenge and it has been possible only with the help of several people. I have had the luck of counting with the support of several colleagues that allowed me to conduct the inter/trans disciplinary research that the case required.

I conceptualize Traditional Environmental Knowledge as part of the immaterial cultural heritage of Indigenous people and of the country in general, and, considering that its survival is a key element for the revitalization of Indigenous identities and the conservation and management of natural resources, I propose that in order to keep it alive, *in situ*, the active participation of its ultimate owners is essential. This is why the research was a collaborative project, in which the different authorities as well as interested individuals from different age, gender and occupation, participated actively. This was facilitated on the

one hand by the fact that the *Comisariado de Bienes Comunales* is developing an ecotourism project in the national park, for which it will be very necessary to have TEK registered, systematized and documented. And on the other hand, the enthusiasm of the *delegados* of the new *delegación* Indígena Tlahuica de Teocalcingo was a necessary element. They were the main supporters of the project because of their awareness of the importance of their cultural heritage.

I consider that, especially in Mexico, the methodologies used in ethnobiology in general, and in particular the participative ones, need to be discussed in greater depth. This dissertation puts on the table several points that I believe can promote this discussion, because the way we do the research reflects its objectives and determines its consequences. True participative methodologies are scarcely used; we need to discuss their implications and ways to improve them. I hope my dissertation contributes to this discussion. The methodology used attempts to situate Indigenous people in a more empowered situation in which they can decide with whom and how to share their knowledge, and find the research activities meaningful. I visualize the research as being a door to the Pjiekakjoo TEK, and of course an invitation to, hopefully, other students and to myself, to now do more detailed research about it.

This research was done with the intention that present and future Pjiekakjoo generations may have the option of appreciating the importance of their culture and have more elements to decide whether to keep or dismiss it. The project of the Mexican nation has been exclusionary and has denied the presence of living Mesoamerican civilizations and all the contributions they can make to the country (Bonfil 1986). I consider it essential that the cultures of the Indigenous people be fully acknowledged and I do want *mestizo*⁵ society to become familiar with the richness of the Pjiekakjoo culture.

⁵ The non-Indigenous people in Mexico, a cultural mixture that draws on European, Indigenous and African influences.



Figure 2. Tonatiahua Lagoon.

What is an Environmental Anthropology dissertation?

I want this dissertation to contribute to discourses and discussions on topics such as biocultural diversity and conservation, Indigenous rights, Indigenous wisdom, bioprospecting, intellectual property rights, natural resource management, and social and environmental justice. It should contribute to the design of better strategies for approaching the issues faced by the Pjiekakjoo communities, as well as for Indigenous communities in many other parts in the world. It provides a useful ground of engagement between Indigenous people and other social actors interested in their cultural and biological diversity, such as scientists, biodiversity prospectors, NGOs, policy makers, politicians and government officials. I hope I can translate relevant issues to each of them, by documenting Pjiekakjoo environmental knowledge and its political, social and cultural context. As Durand (2008) proposed, anthropology can help diverse discourses become audible and understandable to many different actors. She wants these discourses to reach the "Other," which often includes women, Indigenous peoples, the elderly, and subsistence producers. In my case, I want the "Other's" knowledge and at least part of their discourse to get through to politicians, policymakers and civil society in general. Undoubtedly, as Durand noted, there is a need for dialogue so that different perspectives can live together: the coexistence of the diverse (*la convivencia de lo diverso*), following Leff *et. al.* (2002).

I consider that in the academic world we often take for granted certain concepts, and there is too little effort to link our work with other sectors of society, including the people we

work with. I have a few beautiful examples of this. I was talking with a former student in his house about the forest, the forest resources and their management. His mother was near, and suddenly, when someone mentioned mushrooms as a non-timber forest product, she blurted out: “*a chinga!!! A poco esos son?*”of course we laughed hysterically at such an expression, as she was so shy. But this is the reality, academicians and policy makers talk about such things as natural resource management while the people for whom these resources are part of their everyday life, have no idea how we have labeled them. Beyond labels – or perhaps regarding labels of a different sort - I wonder how mushrooms are represented in this woman's mind? In the same context, a student was shocked, telling me how the Jñato (Mazahua) women with whom she was working, in recording their ethnomycological knowledge, did not consider this to be part of their culture. What is the meaning of “culture” for them? How has it been constructed? Concepts such as sustainability, ecology and natural resources have been incorporated through actions proposed by public institutions, in charge of designing and carrying out policies of environmental protection (Castillejas, 2009). It may be through anthropology that such concepts would become relevant to the multiple environmental perspectives that characterize human societies.

Both of these cases represent for me the “disconnect”, the lack of dialogue between the academic world and the people with whom we work, and of course this has important implications for decision making with respect to the future of biocultural diversity. Is the academic world and its vocabulary, along with those of policy makers and politicians, really incommensurable with those of the people who own the resources and who have managed them historically?

I also want this work to be an invitation to academicians to get more involved with the people they work with, and to recognize that the entire fascinating cultural heritage is immersed in a complex socioeconomic reality. If we realize this, we can always find ways of helping. It was a very enriching experience to visit the Tlahuica's ecotourism project as a teacher with high school groups. In anthropological terms, it was important to see how local systems actually function, but also as a way to actively support them, in moral and economic terms. The groups I brought contributed important income to the people, and we hope that they will also serve to publicize the project. This is just an example of the type of actions that I undertook in order to support these people beyond my fieldwork and/or academic research.

Ramos-Delgado (2004) made an urgent call for academicians, NGOs and actors interested in the management of natural resources, and the knowledge associated to it, to define their posture, as it is impossible to be in favor of Indigenous and peasant communities and at the same time support projects that may put their sovereignty at risk.

It is certain that Indigenous people are those primarily responsible for defending their biocultural diversity, as certain as it is that there are few chances of them achieving success if they are left entirely on their own in the Mexican context, where the power imbalance is considerable. We have already witnessed some cases, such as the Zapatistas and the case of San Salvador Atenco. Academicians, NGOs and civil society had to show their concern and solidarity to stop the government from crushing these initiatives. The use of violence and its consequences were present in both cases.

Lastly I would like to share Mora's (1989) observation: *To get to study an Indigenous culture, or any other, should always be done with honesty and respect. To get to know their world's vision, its language and its religious and belief systems, should contribute to creating a solid consciousness inside the community, oriented to their political and social freedom.* I would like to also add their cultural freedom and a life with dignity.

Reader, be generous when necessary,

the scope of the research frequently sacrificed depth.

III. Overview

The importance of the participative methodology used will be discussed in chapter II, in which I explain the most important ideas, mainly those of Paulo Freire and Linda Tuhiwai Smith, that inspired me in the methodological design. An essential part of this project was the recognition of Indigenous people as subjects and not only objects of study, as well as to set a framework for their empowerment. The methodology used intends to contribute to the survival of the Pjiekakjoo culture *in situ*, and not only in academic archives. I describe in detail the way the research was conducted, emphasizing that this methodology allows a wider scope than that normally present in ethnobiological research, besides having implications beyond the research itself.

All of the characteristics of the region where the research was undertaken are presented in chapter III. The description begins with the physical characteristics of the area and runs through to the most significant elements of Pjiekakjoo culture, so that the reader can situate himself or herself in the context in which TEK was documented. Despite their proximity to some of the most important urban centers of the center of the country and intense cultural interchanges with them, the Pjiekakjoo have managed to reproduce their culture through to the present. This chapter is an introduction to the fascinating world of the Pjiekakjoo people, as well as to some of the most difficult issues they face.

In chapter four I addressed some of the main elements that constitute the context of the Pjiekakjoo communities: the land struggles, their fight against illegal logging, the Zempoala Lagoons National Park and their Communitarian Ecotourism Project. All these elements are linked to TEK, and it is in relation to it that they are analyzed. This chapter makes evident the struggles that the Pjiekakjoo people have faced, and continue to address, but also the alternatives that they have created to respond to the pressures that impinge upon them, such as the Communitarian Ecotourism Project and the defense of their own institutions and of their common property systems.

The introduction to the biocultural axiom (Nietschmann, 1992) and the importance of TEK are approached in chapter V. I discuss issues such as the importance of the axiom in a country such as Mexico, the relation of TEK with development projects, with western science, the dialogue of knowledges, conservation biology, common property systems and Indigenous Peoples rights.

The heart of this dissertation is chapter VI: Pjiekakjoo Knowledges, and in it I describe all the data gathered about the names, uses, stories and beliefs about the mushrooms, vertebrate and invertebrates animals and the most significant useful plants. We also documented the most important facts about the *milpa* and corn.

The Contemporary Pjiekakjoo Knowledges are diverse and dynamic; part of their variability is described in chapter VII, in addition to their relation to the topic of education. The relation of variables such as migration, education and age with the production and reproduction of TEK are analyzed.

After the documentation and contextualization of TEK, I analyzed what is its position in relation to public policies around the Zempoala Lagoons National park and in general for natural resource management, in particular those under a common property regime.

Besides emphasizing the importance of considering the cultures for the process just mentioned, I look at some of the actors that have had projects in, or that in other ways have impacts on, the Pjiekakjoo communities and the risks that their presence may represent for the cultural heritage that TEK embodies. I situate the research in a broader theoretical context, the proposals of De Sousa Santos regarding a new rationality. Finally, the general conclusions of the research can be reviewed in chapter IX.

II. Ethnobiological research, for what and for whom?

In chapter II I explain how this research was conducted in terms of the methods applied and the theoretical framework behind those methods. A participative methodology was used, inspired mainly by the ideas of Paulo Freire (1970, 1973) and Linda Tuhiwai Smith (1999). The main issues faced by the researcher for the development of this research will be discussed as well. Some of the most important of these are cultural differences, communitarian conflicts, gender limitations and challenges, and building trust and rapport in the communities. The research recorded Pjiekakjoo knowledges about an impressive range of biological diversity (all of the animal kingdom, mushrooms and the most important categories of plants). This was made possible in the time frame thanks to the participatory methodology and the development of an interdisciplinary approach. Beyond the academic realm, the research was intended to at least initiate the reconsideration of the importance of Pjiekakjoo Knowledge for its own people. I propose that these knowledges are a tool for the empowerment of the Pjiekakjoo people.

Methodology

“Un granito de arena para que los pueblos indios se vieran a sí mismos y se sintieran orgullosos de serlo”.

Anguiano, 2003

The Initial Rejection

After attending the opening of the “radio Tlahuica” project in January 2007, I decided to conduct my dissertation research in San Juan Atzingo, the largest of the five Pjiekakjoo speaking communities in the world. Some months later, I organized a presentation of the project for the local authorities. The principal *delegado* at that time was a very intelligent man who had a peculiar life history. He grew up in Mexico City, later emigrated to the U.S.A and then returned to live in his parents' home town. He started studying at the university but dropped out at an early stage. When I asked for a meeting with the authorities in order to request permission to carry out research within the community, he told me they were not interested. I was surprised and frustrated because they did not know the nature of the research yet were already rejecting it. I was able to come to an arrangement with him whereby I would make a presentation of the proposed project and if they were still not interested, I would pursue the matter no further; but I was not willing to accept a rejection before being heard. He was at pains to express the disillusion and

animosity felt by the community towards researchers who had worked in the town previously without first acquiring permission or sharing the results of their projects, profiting in one way or another from local knowledge while dismissing real problems within the community. Eventually, the *delegado* consented to my proposal. But first we must consider the reasons why the process was so difficult for me and for the community members.

Trust and Rapport

“Maurilio me comentó que cómo me tardé en llegar, su mamá ya estaba preocupada, que a ver si ni hacía lo que los demás que sólo iban a robar. El le contestó que no, que era diferente porque esta vez yo los había considerado en el proyecto (a los delegados). El me comentó que sólo porque como hijos los delegados les explicaron que íbamos a trabajar juntos, los ancianos participaron, porque de no ser así ellos ya no querían saber nada de nada de investigadores”.

“Maurilio told me that because I took so long to return, his mother was worried that I would do just as others had done previously, and steal from them. He told her that was not the case, that this time was different as I had taken the delegados into consideration when planning the project. He told me that the elders only participated because the delegados, as their offspring, explained the project and convinced them to participate. Prior to this, they had shown no interest in having anything to do with researchers”

(Field note 23 January 2011).

The biggest challenge I faced was establishing rapport with the people. Indigenous communities in Mexico have profound historical reasons to be distrustful of outsiders⁶. In the past, members of the Pjiekakjoo communities have felt betrayed by visiting academics who have spent time with them but failed to share the results of their research, choosing to publish them without providing copies for the community, giving benefits to specific families only. Therefore, from the outset, simply to get the authorities to listen to the project proposal was a challenge.

In the following chapter I will reconsider many of Linda Smith's ideas contained in her book: “Decolonizing methodologies: research and Indigenous peoples” (1999). The author is a Maori woman who has done extensive research on education and the impact of research

⁶I consider that in the Mexican context in an Indigenous community I am an outsider. Frequently I have even felt there was more distrust of me as non-Indigenous Mexican than of any foreigner from another country; this due to the fascination/respect/curiosity that foreigners may show plus the power relation that tends to be even more unequal between an Indigenous community and a foreigner than between an Indigenous community and a non-Indigenous Mexican. Another factor is that Indigenous people have suffered racist practices from non-Indigenous Mexicans and not so directly from foreigners.

on Indigenous people⁷. She stated that many Indigenous communities have become aware of the implications of research in general in their communities. In many cases they are no longer passive spectators but socially interested activists who have reclaimed greater control over the research which is being carried out in their communities. As Clifford (1999) considers, political subjects will continue appearing, demanding the recognition of their excluded history. Indigenous peoples want to tell their own versions of their stories, in their own ways and for their own purposes (Smith, 1999). This represents ironically another issue, the heterogeneity of the communities; this is something that should not be forgotten, as there is always the risk of romanticizing the "we (Indigenous people)", while inside an Indigenous community there are points in common as well as topics in which the range of opinions and interests may be totally opposed. Inside the Pjiekakjoo communities, for example there are people affiliated with different political parties, people with differential access to cash and therefore to commodities and education and a whole range in the way people assume their ethnic identity or reject it.

This new scenario is a double-edged sword. On the one hand, the defense of Indigenous peoples' rights and on the other difficulty involved in conducting research. Hunn (2008) comments on how ethnobiologists feel "*all distressed by a groundswell of hostility from Indigenous activists, who suspect that we are but agents of the continuing misappropriation of their cultural and natural heritage.*" He adds that, "*it can be the last chapter if its study becomes so fraught with questions of power and violations as to preclude the delicate collaboration such ethnographic research requires.*" But despite these circumstances, he comments that ethnobiologists persevere "*hoping that by our appreciation and understanding of the humanity of Indigenous people, we might encourage support for all of them in their struggles to keep their lands and lives intact*".

⁷ Linda Tuhiwai Smith is Professor of Education and Māori Development and Pro-Vice Chancellor Māori at the University of Waikato. She has worked in the field of Māori education for many years as an educator and researcher and is well known for her work in Kaupapa Māori research. Professor Smith was an inaugural Co Director of Ngā Pae o Te Maramatanga, New Zealand's Māori Centre of Research Excellence and has recently established the Te Kotahi Research Institute for Innovation at the University of Waikato. She has recently completed a three year term as President of the New Zealand Association for Research in Education. She is a member of the Health Research Council and Chair of the Māori Health Research Committee. In December 2010 she delivered the He Waka Tangata Social Science Address.

<http://www.royalsociety.org.nz/programmes/funds/marsden/about/council/smith/>. Recuperated 25 February 2012. I had the fortune to participated in a group discussion with her at the UW in January 2004.

In my opinion, as ethnobiologists and researchers we have to learn how to take advantage of the new circumstances that many Indigenous communities find themselves in. It has been a very necessary advance to get, at least, some Indigenous people to stand up for their rights. To ask them now not to be assertive in order to avoid having them question research would be counterproductive. Hunn (2008) clearly stated that “[contemporary] ethnobiology is of, by and for the Indigenous people”, and that this should not impede the collaboration between Indigenous and non-Indigenous scholars, as we each can learn from the other. I resolved this dilemma by conducting ethnobiological research *with* the Pijekakjoo, through co-research. This recognizes the need for participatory research techniques (Betancourt y Cruz, 2009), that fully acknowledge the significance of the active and continuous participation of Indigenous people in research (Smith, 1999). In fact, research should be a activity planned, coordinated, directed and controlled by local and regional social organizations, and ideally it should respond to concrete social demands (Toledo, 2000) along with the researchers' personal interests; and not just the latter, as usually happens. Freire (1970), states that when working with people you cannot think authentically if others do not think also. It is not possible to think for others. Research into peoples' thought processes cannot be done without involving those concerned and must be done with them, the subjects of their own thoughts. He also asserted that it would be naïve to expect positive results from a program that does not respect or consider the particular vision of the world that the people being researched have, as well as their circumstances. The projects that are developed under such an intrusive framework become cultural invasions, conducted with the best intentions, but cultural invasions nonetheless. Consequently, ethnobiologists should take into consideration issues such as community participation from the outset of a research project and when applying for funding in order to publish their results in a way that doesn't exploit Indigenous knowledge and reduce participants to the role of informant. Also, we need to explore and define, alongside our Indigenous colleagues, the relationship they are willing to establish between their cultural heritage and its use for economic gain, and lastly but no less importantly, the role that universities and the state should have in the promotion of respectful and responsible ethnobiological research (Maya *et. al.*, 2009). Researchers need to acknowledge that research “brings to bear, in any study of Indigenous peoples, a cultural orientation, a set of values, a different conceptualization of such things as time, space and subjectivity, different and competing theories of knowledge, highly specialized forms of language, and structures of power” (Smith, 1999: 42).

It is a fact we cannot deny that local or Indigenous knowledge is more at risk now than ever before. Several scholar-activists from Indigenous communities have denounced for years the misappropriation of Indigenous knowledge that has been escalating, particularly in key areas of research such as environmental sciences and medicine (Mead, 1993 in Smith, 1999: 100; Delgado, 2004).

It is not uncommon to hear communities complain about how *"researchers enter the communities armed with goodwill in their front pockets and patents in their back pockets, they bring medicine into villages to extract blood for genetic analysis"* (Smith, 1999:24). Even if this were not the case, the worrisome issue is that this is the prevalent perception in many Indigenous communities.

It is a travesty of justice, be it intentional or not, for an anthropologist to interpret Indigenous knowledge for the benefit of companies or a select few and not for the legitimate owners of the knowledge (Anguiano, 2003). Ethnobiological research must be developed alongside communities so that the design and development of the research guarantees that they, and not a select few, are the main beneficiaries.

It is without doubt that ethnobiological research can be used to extract knowledge, to isolate and patent it and commercialize it, or it can be used for the benefit of the communities under investigation. I am certain that ethnobiological research can be conducted in a way that does not contribute to biopiracy and the promotion of patents. Researchers must think beyond the gigantic ethnobiological research on the one hand, and consider the epistemological, geostrategic, economic, social and cultural implications of the projects (Delgado-Ramos, 2004, Betancourt, 2009). They must consider their ethical responsibilities. In this way it is possible to prevent their research being used by those who want to commercially exploit Indigenous knowledge. This becomes feasible if we consider that Indigenous knowledge is translated into a Western scientific format in order to validate it, and that it is through this process that the possibility exists of it becoming an instrument to continue the pilfering of cultural heritage (Maya *et. al.*, 2009). The existing paradigm, the research methodology that positions Indigenous people as ignorant and undeveloped and that presumes that research can be justified by the ends rather than the means, must be challenged and changed (Smith, 1999). It is necessary, even urgent to record Indigenous knowledges, but with the active participation of their owners and with full recognitions of their property rights over those knowledges. The research objectives must be clearly stated and be for the benefit not only of Western science but more importantly for the Indigenous people.

Some alternative proposals have already emerged. For example Ardón (2001) proposed a Participative Ethnoecology, based on a mutually beneficial relationship between external researchers and Indigenous communities. He suggested support mechanisms for research subjects with regard to the recording, analysis and development of their own knowledge potential as an alternative that could develop projects with higher levels of sustainability at the individual, familial, communitarian and regional dimensions. Ardón proposed a triangular analysis between the environmental, social and economic components to avoid disequilibrium, to which I would add a fourth, the cultural, as it is distinct from the social component.

A final point I would like to make is in relation to trust. As Smith (1999) pointed out, consent to carry out a project is not so much given to the project itself but to the person responsible for it, based on his or her professional and personal credibility. She states, "Consent indicates trust and the assumption is that the trust will not only be reciprocated but constantly negotiated - a dynamic relationship rather than a static decision" (Smith, 1999:136). I think to overlook this is a common mistake among colleagues who assume that once they have obtained consent to undertake research they are then free to progress without any further negotiation as the project develops.

Dialogue and its importance

"Dialogue cannot exist, however, in the absence of a profound love for the world and for people"

(Freire, 1970:89)

In this section in particular, but in general in the present chapter, I will be drawing on the ideas of the Brazilian pedagogue Paulo Freire; mainly those contained in his book *Pedagogy of the Oppressed* but also in *Education for Critical Consciousness (Impacts)*. He proposed "education for freedom," in which he emphasized the importance of the active participation of the oppressed to change his condition.

Freire (1970) also proposed that education for freedom would take place through a dialogue of knowledges ("*diálogo de saberes*") that can identify how people see themselves and the world in which they exist, a basic concept that is obscured by the idea of saving the poor and peasants. The objective should be to enable the oppressed to become aware in a new way. In this way it is feasible to avoid imposing our belief system

on the oppressed but rather to establish a dialogue with them about complementary and contradictory visions of the world

It was through intense discussions amongst the elders, between the elders and the *delegados* and between the elders, women and youngsters, alongside the rigorous biological conceptualizations presented by me in one or another way, that we were able to establish this “*diálogo de saberes*,” in which intercultural dialogue was truthfully represented and there were fewer power imbalances⁸. This is critical in working with Traditional Environmental Knowledge (TEK), because rather than trying to make it fit in with Western categorization; we have the challenge of understanding Indigenous people’s knowledge and perceptions.

Some technicians, policy makers or social scientists may argue that constructive dialogue is problematic, forgetting that Indigenous people are not at fault as far as this is concerned but that it is the result of the oppressive and closed social structure in which they have had to live. They are used to rigid and vertical social structures where there is no place for dialogue and it is within these historically constructed relations that the oppressed peasant’s consciousness is constituted. In this context there are no previous dialogic experiences with actors with whom they have a considerable power imbalance. Therefore it is natural that the peasants have a tendency towards mistrust in relation to those who claim to be looking for dialogue. It is easy for them to function within the anti-dialogue dynamic. It is undoubtedly a complex issue. At the beginning of the project, it was hard for them to share their thoughts as they did not trust me, but over time we were able to establish a supportive environment for discussion. One of the contributing factors in this trust-building process was the promotion of the argument that, “There is no such a thing as absolute ignorance or absolute wisdom.” No one person knows everything and nobody is completely ignorant (Freire, 1973:39).

⁸ As it is was a collaborative project the local people and authorities were in charge of it as much as I was. I did not play the role of the researcher that controls everything and that is the only one making decisions.



Figure 3. Catalina asking Doña Paula some of her doubts during one of the workshops.

I would like to emphasize Freire's elucidation that peasants are not by nature anti-dialogic, but that their attitudes respond to historic, sociological, cultural and structural boundaries that determine them. In fact in rural societies it is more common that dialogue be developed than in urban societies. An excellent example is how several Indigenous communities solve their issues by consensus, but it is very hard to establish a true dialogue under contrasting unequal conditions among the actors involved.

The concept of dialogue, as proposed by Freire (1970), considers it a creative action, one that requires humility. As dialogue is a human encounter, with the common goal of knowledge and acting, it cannot be successful if one of the parties feels superior. Dialogue requires an immense faith in the people and their power to make and create over and over, faith in their vocation to "be more" (*ser más*) as a right for everybody and not only for the chosen few. The result of this dialogue is mutual trust.

If we as researchers do not construct these spaces for dialogue, in order to be more time-efficient, we objectify Indigenous people. The perceived "lost" time is actually time gained in the construction of trusting relationships and self-confidence. For example it is unfortunate to find that some quantitative research methodologies do not leave room for the extended conversations that are initiated frequently by the persons being interviewed (Smith, 1999).

I would like to close this section on dialogue and its importance with one more of Freire's ideas (1973): "Dialogue is the loving encounter of people, who mediated by the world,

'proclaim' that world. They transform the world and in transforming it, humanize it for all people."

Sadly, I have found that Freire's concept of limiting situations (*situaciones límite*) can be applied to the Pjiekakjoo communities; this concept makes reference to a context in which people are unable to see beyond the difficult conditions they experience and feel the only option available is to adapt to them. They do not see viable alternatives. Today the Pjiekakjoo are living in such a limiting situation,

"Once ...(people) come to perceive these situations as the frontier between being and being more human, rather than the frontier between being and nothingness, they begin to direct their increasingly critical actions towards that perception" (Freire, 1970: 102).

Once the problem of the fragmentation of TEK was identified, we proceeded to act in a way that was coherent with our words and thoughts and with our praxis in order to transform the world. I appreciate that it would be pointless to merely acknowledge and denounce the erosion of TEK, as identified by the authorities and the elders, if there were no transformative commitment and action (Freire, 1973). It was a basic requirement that the possibility of expressing themselves be returned to those from whom it had been taken away by irresponsible state policies, racism and even researchers. The feeling of powerlessness felt by some elders needed to be transformed, and the workshops presented a space in which this was possible.

The Agreement

Against their history of exploitative research, it is not surprising that, the first time I asked for permission to undertake research in San Juan Atzingo, it was denied. But once the *delegado* realized that it would be unfair to reject a researcher who asked permission, following so many that hadn't, he relented and allowed me to present the project and its implications to the four *delegados* and the "comandantes." They responded particularly positively to the subject matter, as they remarked that the topic of traditional knowledge had, as yet, not been studied in the community⁹ as they were used more to linguists and social anthropologists. They were also enthusiastic with regard to my working methodology,

⁹ Later I found a thesis that had been done about local Ethnomicological knowledge by Palomino (1990)

as I stated I would only undertake the research if the community, or at the very least certain sectors, would actively engage with it.

In order to acknowledge their concerns around my work, I proposed that we sign an official agreement where key points would be clearly stated (see below and Appendix I). I explained that this type of agreement could potentially be a solution to the problems they had had with researchers in the past. In my opinion it was important to learn from previous mistakes in order to change the current situation, for them to start regulating and to take control over the academic activities in the town.



Figure 4. Me and my daughter with the delegados of Teocalcingo and some of the elders that participated in the workshops with the author.

I was obliged to detail the likely benefits of the research, a condition that Smith (1999) demands from researchers, and in doing so was able to neutralize existing negative perceptions of academic research. Indigenous people are tired of hearing that research will bring benefits for humankind, when there are already many benefits that “humankind” has received and that have not been delivered to the Indigenous communities. Today in many Native American communities Indigenous people question scientists about the benefits of their research, as they are able to get involved in local projects of varying natures (Clifford 1999). Unfortunately however, not all communities have the capacity to formulate such demands, which is more often than not the case in most of the communities in Mexico. Smith (1999:4) sustains that “many Indigenous communities and organizations have developed policies about research, are discussing issues related to

control over research activities and the knowledge that research produces, and have developed ethical guidelines and discussion documents."

Active engagement in research by Indigenous people is something that needs to be developed more thoroughly in Mexico. A few empowered communities such as those of the Zapatistas in Chiapas, who have their own autonomous governments (*juntas de buen gobierno*) have achieved this to some extent, but unfortunately it is not the case for the majority of the country.

Some scientists express concern, as they believe that if bureaucratic protocols are established, they would inhibit research with Indigenous people, as allegedly has happened in other countries, such as Brazil. The academic community must rise above its own fears and take responsibility for this, particularly in Mexico. We must start addressing the issue in order to counteract projects that have been developed that pilfer the biocultural heritage of the country for the benefit of a select few (Barreda, n.d.; Alarcón, 2010; Ribeiro, 2007).

The complexities of research ethics may be one reason why there is very little writing on ethics at the project level (Finnis, 2004). Unfortunately the debate around ethical issues and intellectual property systems are taking place due to the rapid advance of science and the rapid disappearance of diversity, and this debate is taking place against a background of rampant prospecting in the biodiversity and pharmaceutical fields (Smith, 1999).

The discussion around the importance of and need to respect intellectual and cultural property rights has started and codes of conduct have been promulgated by different organizations (Smith, 1999), but in Mexico there is still a lot of work to be done. In Mexico there is no institution, either within the government or in the universities, such as the Human Subjects Review process at U.S.A. universities. The Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT) has established a protocol with regard to the collection of living organisms, but there are no regulations on work with Indigenous people in general or traditional knowledge in particular. Some may argue this is a responsibility of the communities, with which I may be inclined to agree on the condition that they be fully informed before making agreements that may put at risk their biological and/or cultural heritage.

There are groups of responsible scientists who have proposed the establishment of a functional bioethics committee and have been struggling against bureaucracy for two years in order to achieve this at the Facultad de Estudios Superiores (FES) Iztacala at UNAM. There is a committee, but only on paper and it does not function, despite being established by the UNAM's legislation. According to the research done by Vásquez (2011)¹⁰ there are very few Faculties that have a functional bioethics committee, such as those of the Institutes of research at the UNAM. She also commented that there are bioethics courses in some curricula of professions such as medicine and psychology, but there is none in biology. She showed her concern through her research about the Bioethics committees that exist in several higher education institutions in the country. She has learned that even in those Bioethics committees that are functional, there is a total lack of information in relation to the bioethics associated with work with Indigenous knowledge, no protocols have been developed and there is hardly any information about the topic.

Undertaking research with Indigenous people implies negotiating and transforming institutional practices and research frameworks, which makes it a highly political activity (Smith, 1999).

I would like to see evaluated and questioned by a Mexican institution all projects that are not formally presented to local authorities, that is, those carried out with only a few individuals or families (as opposed to the community as a whole, when they are about collective knowledge), motivated by exclusively academic or economic interests with an unequal distribution of profits, and that position Indigenous people as informants as opposed to active contributors. If in Mexico if a protocol for researchers and companies to work on Indigenous Knowledge were established I would like to believe that it would be more difficult to fund projects under the conditions expressed at the beginning of this paragraph.

It would be reassuring to know that university lecturers do not have the power to demand that their Indigenous students obtain information from their grandparents and/or extended family with a view to using that information for academic objectives without engaging with the community themselves. Research should not be carried out without prior discussion within the community concerned.

¹⁰In December 2011 I interviewed Josefina Vásquez who is a member of the Commission for the Formation of a Bioethic Committee at FES Iztacala. She works in the Plant Physiology Laboratory at the Unidad de Biotecnología y Prototipos (UBIPRO), at FES Iztacala, UNAM.

Smith (1999:25) states that “the global hunt for new knowledge brings new threats to Indigenous communities” and that this requires both state legislation and international agreements. In addition to this I would propose that those that already exist be respected.

It is ironic and unjust that while Indigenous communities have to deal with the threat of further loss of their intellectual and cultural heritage due to the enormous potential that their biocultural capital represents for the capitalist system, they continue to live in political and social conditions that perpetuate high levels of poverty, chronic ill health and poor educational opportunities. These conditions are exacerbated by the constant messages they receive about their worthlessness, laziness and dependence (Smith, 1999). Smith is disgusted by the Western desire to extract and claim ownership over Indigenous peoples’ knowledge while at the same time denying them opportunities for cultural survival.

This is the scenario in which I started working with the Pjiekakjoo’s authorities. I should emphasize that once they had accepted the project they were very supportive, in particular the principal *delegado*. Once the relationship had been established, we started having meetings to discuss and organize the different activities required.

Through this process I was also supported by the students of the UIEM, some of whom had been my students there and to whom I am deeply grateful: Emmanuel Felipe Neri, Guadalupe and Clara Cristino.

Parallel to this procedure, I also presented the project, in the same terms, to the *Comisariado de Bienes Comunes*. They were very enthusiastic from the outset as they said they needed to systematize their TEK for the Ecotourism project, but they did not know how to do it nor did they have someone willing to take responsibility for the project. By accepting the conditions of the community, the proposed project would now be valued by the Pjiekakjoo instead of being considered solely beneficial to the researcher, which, sadly, is the most common scenario in Mexico and many other places (Smith 1999).

When the new delegation was formed, and the change of authorities made, the agreement was signed again.

Expectations and Funding

It was fundamental for the success of the present research to be very clear with the authorities and the people about both their and my own expectations. This related as much to the academic work as to financial issues. I explained the goals of the research in

the short, medium and long term, and specified that I only had funding in place for the short term. This clarity avoided potential problems that may have arisen otherwise. In this same vein, when they asked for support, it is important that researchers clarify their area of expertise and the type of activities they are willing to get involved in. In good humor, I often assert that I can write letters but I can't provide them with the new tractor they need or the money for the new church they want. In the past I have witnessed the way in which some colleagues fail to clarify parameters from the outset, which inevitably gives rise to problems.

A final reason why it was so important to be clear with this particular community project was because it required community input, which may be substantial in economic terms considering the living conditions of the Pjiekakjoo. "*Every meeting, every activity, requires energy, commitment and protocols of respect*" (Smith, 1999:140). Foreign and native researchers must be aware of the project demands in order to be able to define their participation.

The Language

As an academic, language was one of the biggest challenges I experienced throughout the project. Even though a system had been developed to transcribe the language by a linguist, the *delegados* did not want to use it, as they didn't feel the linguist had been respectful towards their culture, so they had no desire to share our results with her nor to legitimize her academic work.

There were two people in the workshops, the Tlahuica Chief and an ex Tlahuica Chief, who wanted to write Pjiekakjoo according to the way a linguist, had shown them, and then there were the younger generations for whom Spanish is their native tongue, who wanted to write it in a way that would be feasible for everybody to read. The chiefs had had some linguistic training as had a couple of women from San Juan Atzingo, but we were unable to work with them for political and ideological reasons.

After some discussion we decided to write it both ways, which we did for as long as the two chiefs attended the workshops, but from then on we continued using the Latin alphabet, which is of course more accessible to the wider population. I loved the role that two young women in particular, Lizet and Brenda Ramírez, played in these discussions, one of whom is now studying Indigenous Languages and Culture at the UIEM and the other has been accepted into one of the most prestigious high-schools in the country, affiliated with Chapingo University, where she will have the chance to study after finishing high school.

Both of these young women were incredibly helpful, but beyond this for me they represent the standpoint of the new generation of Pjiekakajoo, how they perceive their cultural heritage and how they would like to have things done in order to encourage interest in their language.

The complexities involved in transcribing the Indigenous names led us to the idea of making the CDs. Nevertheless, we persevered with the transcriptions because literacy is a powerful tool and symbol and has the potential to change attitudes toward an endangered language, as well as maintaining and revitalizing it. Linguists continue to debate which has greater importance, literacy or a level of communicative competence in spoken language (Muntzel 2004).

We did not have a specific project concerning language revitalization, but some people in the community consider it in this way. It was amusing for me to hear them refer to me as the “Pjiekakajoo teacher,” when I only knew a couple of names! Of course they were aware of that, but I was facilitating the process of protecting and supporting the language.

Despite my lack of training as a linguist, we decided to work under the premise asserted by Hinton (2001:241 in Muntzel, 2004) whereby “a community should never decide that documentation and language teaching should wait until after the development and teaching of literacy.”



Figure 5. The elders paying attention and getting ready for one of the recording sessions.

Cultural Differences

Gender

On a different note, and one that exemplifies the way in which I had to be very tolerant with the Pjiekakjoo with whom I worked was the issue of gender roles. Most of the workshops we organized were on Sunday mornings, so I was often accompanied by my husband and my daughter. He would take care of her outside the delegation, playing with other kids, while we held discussions and made recordings. One day one of the men commented how funny it was that my family was "the other way around"; I worked and my husband took care of our daughter. He was respectful but I understood how curious it was for them. I explained that this only happened on Sundays as he worked from Monday to Friday, but that it was true, we shared more domestic responsibilities than they normally do.

All of the authoritative figures in the community are male and as such all of the negotiations I undertook were with men. The only women in positions of authority are on school committees. It is challenging for them to see a woman directing a project and to have to deal with her as an equal. In the 5th Sun festival they gave a collar of *cempasúchil* flowers (marigolds, *Tagetes erecta*) to honor the guests. I was the only woman there and when they listed all the people they had called, they skipped over my name. I couldn't help feeling it was deliberate, that in some way it was a means of giving less importance to me than to the men. I am well aware that women cannot hold the *teponaztle*, or stand at the altar of the church. It was an interesting experience for me on the occasions that I had to talk to the *delegados* and *Comisariado de Bienes Comunales* to be surrounded by men only. On another occasion I wasn't allowed to attend the celebration of the "Holy Cross" because it was strictly for men only. During this celebration they drive to a certain point and from there hike to the top of the Zempoala hill where they hold a ceremony and spend the night. Two former male students of mine invited me, but when it was time to leave no other women had arrived, so I decided to stay behind. I later learned that some women had gone, but later in the evening and only to take food. The decision to stay behind was one I didn't want to make and when I got down from the truck, with all the sandwiches I had prepared and the celebratory bottle of tequila, I was really upset as the other anthropologist, a man, left with them without any issue.

Physical Security Issues

While doing "fieldwork" at the Zempoala Lakes National Park (NPZL), physical security is an issue that has to be considered seriously. There are illegal loggers in the area who have

extended their illegal activities to stealing cars and kidnapping. From time to time cadavers are found in the vicinity, which emphasizes the importance of taking care when out in the field.

Clifford (1999) discusses the importance of gender and race with regard to the traveler. I had no issues with race as my phenotype is very typical, but I did encounter gender discrimination. I wasn't able to go as the only woman in a group of males to collect mushrooms for example but it was also out of the question for me or any other woman to go alone without a male presence. We also had to be careful to always travel in daylight.

In 10 years of doing fieldwork, I have only experienced a small number of incidents, an example being one in which a man tried to force me to give him a kiss. Aside from the fear and anger I felt at that moment, it was also extremely uncomfortable, as he was a relative of one of the families I had been working most closely with. I was subsequently forced to continuously treat him in a civil manner despite the incident. This made things very clear for me: I could not go on my own with a man even to take a picture of a dead animal just a few meters from the house where I was staying. Having said this, throughout my career, in general, men have been respectful, despite feeling challenged by my beliefs and level of education. It can be extremely draining to always feel on guard and self-aware in order to avoid misunderstandings or uncomfortable situations. It does bother me that this is not the case for a man in my position.

Administrative Changes and Political Divisions in San Juan Atzingo

After I arrived in the community for the first time, there was a change of administration. I have identified this as one of the main challenges, as I had to re-present the project and get the approval of the new authorities. This may seem unnecessary for some researchers, but I think it is a way of evaluating the researcher's work and check to see if the scholar has been fulfilling his promises. Based on my own experience I can assert that this basic procedure is something that some researchers do not pay enough attention to, causing the authorities to feel powerless in relation to outside researchers coming in and out of the community. In addition to this, gaining permission for projects became more complicated due to the tension inside the community after they had divided into two towns.

As I explain in the Place chapter, the Pjiekakjoo community was initially one municipal delegation which in January 2009 split into two. As a result of the tensions between the two delegations and the ideological positions of each, I ended up working only with the Indigenous delegation of La Loma de Teocalcingo. On the few occasions I met with the

new authorities of San Juan Atzingo, I felt that they had an extremely patronizing and disrespectful attitude towards the Indigenous population. When the division had just happened, they were angry that I was working in La Loma, since according to them they did not have official recognition of the municipal government. I argued that I was not involved in internal politics and that I was free to work with any community that would agree to the project. After a bitter discussion they told me I had to make a decision, as they were not willing to work with me if I was working in La Loma. One of the *commandantes* defended me, arguing that it was not in their interest to make such an ultimatum and that they should agree to cooperate on my project. Nonetheless they chose not to meet with me again. I should say I tried three more times and then I gave up.

It was interesting to hear them say things such as “we also have some Indigenous people in this neighborhood” or “Indigenous people are just being manipulated, they do not really know what is going on.” As I have commented previously, since I arrived in the community and started looking for Pjkekajoo speakers, several people from San Juan Atzingo told me, in a derogatory tone, that most Indigenous people were in La Loma. The recent interest in claiming an Indigenous population in the center may be motivated by economic interests, as it implies governmental aid.

The circumstances I have faced during this research project have demonstrated how the conceptualization of the “field as a place open to neutral social science, not political, was itself a historic and political creation” (Clifford, 1999). This creation is useless if the aim is to conduct cooperative-research.

The micro-politics around these issues require additional time and energy that can prove extremely draining. To give an example, when I asked for permission to participate in the celebration of the patron saint of San Juan Atzingo in June 2010, it was under strict conditions. When they reviewed the draft of the banner I wanted to hang and the handouts I wanted to print, the authorities from the center asked me to remove the pictures of the people from the Indigenous delegation of La Loma de Teocalcingo. They also wanted me to remove the credits to the authorities of the two delegations as well as the *Comisariado de Bienes Comunes*, but I refused to accept that request. I said that regardless of internal politics, all those who had participated and supported the project deserved to be credited.

These are the types of issues that some anthropologists want to avoid in order to preserve their political neutrality, objectivity and authority (Clifford, 1999), but in the end this only

serves to give them more conceptual, social and cultural limitations than if they had confronted the problems they avoided. For example, some researchers in the region have been challenged by the Pjiekakjoo, as they do not want to legitimize the academic work done by people who are hostile towards them, their political struggles and reality. They consider this working methodology to be selfish and irresponsible and likewise those that employ it, who are unable to make a real commitment to the people beyond their academic work. Every research project with Indigenous people is embedded in a set of local values as well as those of the researcher (Anguiano, 2003), thus it is "not an innocent or distant academic exercise but an activity that has something at stake and that occurs in a set of political and social conditions" (Smith, 1999:5). The present work situates research in a much larger historical, political and cultural context. It is a challenge to break away from the "insularity that protects a discipline from the 'outside', enabling communities of scholars to distance themselves from others and, in the more extreme forms, to absolve themselves of responsibility for what occurs in other branches of their discipline, in the academy and in the world" (Smith, 1999: 67).

Some colleagues simply opt to not involve themselves in places that demand a more committed participation on their part, and work instead with less demanding populations, where people can be structured according to the exoticizing formula (Clifford, 1999) or where this formula is not an issue as it is the case of anthropologists studying in their own societies)

Other Projects for the Community

The process of establishing rapport with the authorities of a community and with the citizens in general demands a great deal of time. It requires time to organize as many meetings as necessary to gain the permissions and explain the project, the scholar needs time to allow the people to get to know him/her and get used to his/her presence in the community, and in many cases to invest time in activities not directly related to the research. In my case the first delegates I met asked me to carry provide a social service to the community, so I chose to organize their archive. They had all types of old documents from the delegation just dumped in a room. I undertook the task of organizing them chronologically and trying to rescue them from the mold and the insects. In order to maintain the organizational order I established, I donated a file cabinet to the community.

In turn, the delegates of Teocalcingo also asked me for support. I have since assisted them with written requests for different types of support and projects.

Another initiative that the delegates from Teocalcingo had was to record the “Tlatol” (ritual language, see The Place Chapter) in order to use it in the Day of the Dead celebration. Again, I was glad to be able to contribute to things that were in their interest and to their benefit.

This brief comment is intended to emphasize the importance of the level of commitment that researchers need to establish with the communities with which they work. Many times an interview that would need a couple of hours of work to get the information needed may end up taking much longer, as people decide to share other aspects of their lives. To listen to people or keep them company means getting out of the researcher role and investing more time than originally expected in certain activities. The personal experiences and emotions that people may decide to share with the researchers are in my opinion the richest part of any project, as they embody the human reality.

The Human Factor

It may sound redundant among anthropologists to state that we work with people, with humans, and therefore that they should be treated as such. However, I have met scientists who do not behave appropriately. I feel it necessary to emphasize that respect for fellow humans should be of utmost importance. I believe we work both for and with people, so scientists should avoid breaking communitarian rules and always uphold a minimum level of sensitivity in their engagement with “the Other.” One may encounter funerals, diseases and depression while undertaking work in the field, but instead of perceiving these as obstacles or problems, they should be embraced as an opportunity to share, to connect with “the Other” in a way I consider to be the most important professional reward.



Figure 6. Catalina comparing lists of vocabulary.

Education

“For many Indigenous peoples the major agency for imposing this positional superiority over knowledge, language and culture was colonial education”

(Smith, 1999)

The above quote can be applied to contemporary as well as historical Mexico. Within the country schools are playing a critical role in assimilating Indigenous cultures into *mestizo* culture that simultaneously implies the denial of Indigenous languages, knowledge and cultures.

Despite the existence of the General Direction of Indigenous Education (GDIE)¹¹ within the Public Education Secretariat, I concur with Pacheco (2010) when she states: “The school designed by the Mexican state for the Indigenous people is trapped between the contradiction of a discourse that recognizes diversity, but that results in practice in homogenization through education based on the Western matrix. The civilization model of the Mexican state has considered the Indigenous people as lacking any knowledge; that’s why the school has to civilize them through giving them knowledge”¹².

The contents of the national education curriculum represent solely Western cultural perspectives which have become even more dominant with globalization that constantly reaffirms the West’s view of itself as the center of legitimate knowledge, the arbiter of what counts as knowledge (Smith, 1999). It is impossible to justify schooling without asking to what extent it responds to the real necessities and expectations of the targeted population. The result of imposing a homogeneous education is the denial of the culture of most Mexicans and the pretension to replace it instead of developing it. This education provokes in the student a schizophrenic dissociation between real life and time spent at school. The conviction that school is the way to redemption is based on the conviction that what the student knows is useless, and only the imaginary *Mexican* (the elite, the people in power) can decide what is valuable and what must be learned to become someone of importance (Bonfil, 1986). It is in this way that those who have been culturally invaded adopt the conceptions of the invaders, and cease to have their own perspectives. They become convinced of their inferiority and recognize the superiority of the dominant social force.

¹¹ Dirección General de Educación Indígena (DGEI)

¹² Translated by the author.

This cultural invasion, defined by Freire (1970) as the antialogic theory, ignores the potential of the Indigenous people and instead consists of a cultural penetration by the invaders into the cultural context of the invaded, imposing their world view and values. The cultural invasion can be done discretely or openly, but it is always a form of violence, as it threatens the invaded culture or forces it to lose its originality.

It should therefore not be surprising to find that nowadays many Indigenous beliefs are considered to be shocking and barbaric and are dismissed along with the practices and knowledge attached to them. The cultural invasion requires that the invaded substitute their knowledge and wisdom for the invaders' concepts (Freire, 1973). An example of this might be conservation agencies and Mexican policy makers who arrive at a National park and want to impose conservationist discourse in place of traditional knowledge.

According to Shiva (1993), "Over and above rendering local knowledge invisible by declaring it non-existent or illegitimate, the dominant system also makes alternatives disappear by erasing and destroying the reality which they attempt to represent." It is urgent to reverse such processes that have made Indigenous people insecure about their own capacity after having internalized the myth of their absolute ignorance; one often finds that they do not believe in themselves (Freire, 1970, 1973).

The national educational curriculum contains discourses that have serious implications for Indigenous students as well as for many other minority ethnic groups. Taking this into account, one of the aims of the present research was to contribute to education, defining it as the result of the shared perception that reality cannot be seen in a mechanistic and simplistic way, but rather as immersed in the complexity of its permanent change (Freire, 1970). I worked with education as a "practice of freedom" that cannot deny the world of human reality. Thoughts cannot be imposed and are not created in isolation in the ivory tower but are developed and nurtured through real communication. Therefore one should avoid one of the most common failures of intellectuals, that despite having good intentions, they are alienated from the popular reality (Freire, 1970).

Considering that the education of the *mestizo* culture should not imply the dismissal of the Indigenous one, but on the contrary, should guarantee its survival, collaboration is proposed between formal education and Indigenous Knowledge to foster the transmission-conservation process (Pacheco, 2010).

We worked with the importance of Traditional Environmental Knowledge and the transmission of the partial research results in the local schools at all levels except kindergarten. The author and three students from the Universidad Intercultural del Estado de México (UIEM) (Elizabeth Magdaleno Alejandro, Ricardo Loa Izquierdo and Raquel Morales) who were conducting their compulsory social service, designed technical-pedagogical activities on the importance of IK, its documentation, systematization and conservation. This part of the communitarian work will not be included in this dissertation (for details see Aldasoro and Maya, 2010).



Figure 7. Christian and Xavier showing the mushrooms they made and Figure 8. Angel with his mushroom with the labels of their names in Pjiekakjoo.

There are two primary schools, one high school and one junior high school (*bachillerato*) (See Chapter III). Of all these institutions, only one of the primary schools belongs to the Dirección General de Educación Indígena, and it is the one with the smallest number of students, even though it has been improving. Many parents believe that sending their children there implies an educational disadvantage. The other institutions, those with curriculums designed at the federal level, do not take Indigenous culture into consideration, or if they do, it's on a folkloric level. One of the objectives of recording Pjiekakjoo knowledge is to design pedagogical material and help teachers from the "bilingual" and non bilingual schools in the community to include local knowledge in the curriculum. Teachers' attitudes vary considerably with regard to this: there are those who are open to learning and others who are entirely dismissive of Indigenous knowledge. It is lamentable that this type of initiative must come from the academic sphere and not from a policy making one. Anguiano (2003) stated how Indigenous languages, if used, are a tool to facilitate children's learning. It is also noteworthy that there are a minority of teachers who add to their teachings local/ Indigenous knowledge, which they have recorded and systematized themselves.

In order to promote what has been called lately intercultural/bilingual education it is necessary to work not only with the students but also with the parents; to give them very strong arguments of why it is important to work for the preservation of their cultural heritage. Unfortunately there are still many misunderstandings around this. For example, many parents believe that if their children learn Pjiekakjoo they will have problems mastering Spanish, so it is essential to argue that this is not only false, but that, on the contrary, children who speak more than one language learn more effectively. Another common problem is the conceptualization that paying attention to cultural heritage implies excluding Western knowledge/culture. This is not true and not even possible anymore, so the same time I organized activities about the *Pjiekakajoo saberes* with the children, I gave them English classes, as they requested. I believe several Pjiekakjoo people believe that anthropologists want them to stay frozen in time and in the same living conditions, so I will keep working to explain that this is not the case, that I fully understand their culture is dynamic and appreciate their desire to have access to the commodities urban people enjoy.

To recognize the existence of Indigenous Knowledge, its production, uses and results, can be considered the first step towards establishing a new dialogue between formal education and Indigenous culture. But this is only half the battle. It is also necessary to reintegrate this knowledge inside communities so that it becomes a heritage that can be used practically and theoretically for the benefit of Indigenous people, to transform their social realities and build new ones. If the aim of education is to reinforce the identity of Indigenous people, the foundation for it would need to be the knowledge that Indigenous people have, the communitarian pedagogies that are set in place in its transmission and the uses that are given to this knowledge in their cosmogonies (Pacheco 2010).

The workshop experiences were an education, a great way to think about several of Freire's (1970) proposals. During them, myself, the elders, the *delegados* and participants in general were simultaneously teachers and pupils, all of us were subjects in the educational act as together we recreated knowledge.

It was also very interesting and relevant to help people to understand and criticize some of the academic proposals in the field; this was done while we got together and they had the space and time to be subjects of their own thinking and to discuss and think through their own vision of the world.

It was one of my goals to transform part of this world vision, the one that has internalized racism and therefore raises doubts about the value and importance of the Pjiekakjoo culture.

After all the time spent researching and working with my Pjiekakjoo partners, I came to realize that they had ceased to be an abstract idea but had become concrete persons with names and dear facial expressions. My work is informed by a deep faith in the people and their creative potential that results from their ontological vocation of being more, of humanizing themselves. Humanization implies thinking and acting in the world in order to transform it (Freire, 1970). Whenever possible I tried to enact Freire's (1970) thought-action: we would no longer complain about researchers' irresponsibility and we would design and sign an agreement to address this issue; we would not just complain about the vanishing of traditional knowledge, but instead teach the children. We broke away from traditional research practices that reproduce dominant power relations, considering the people as the historic beings they are. Problematizing cultural action is a denouncement but also an announcement. It denounces the dehumanizing reality but it also announces a reality in which humans can become more.

Freire's (1970) methodology proposed education starting from research to determine significant topics. I have proposed here that Traditional Environmental Knowledge is a perfect example; it is a significant topic based on thought and awareness. The relevance I give to Traditional Environmental Knowledge may be debatable, but I have argued that it embodies one of the best preserved parts of Indigenous culture, as it is based on a profound relationship between humans and nature. This is a relationship that has not been so easily manipulated or affected by external cultural invasion as have other aspects of culture, such as celebrations, food, and social practice.

Participatory Methodologies in the Context of the Pjiekakjoo Project

Ethnobiologists may make fundamental contributions to the preservation of a culture, but we should be aware that "...we cannot preserve a culture the way a species in extinction is....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" (Hunn 2008). Smith (1999) mentioned the need for Indigenous people to claim a space in which they decolonize their minds and recover themselves. Participatory methodologies can be a tool to start creating this space. I want to say briefly on this topic that within the Mexican context, there is no discussion around the methodologies and the ultimate goals that ethnobiological research may achieve beyond our careers as researchers

Smith (1999:9) explains how "new methodologies have been developed to ensure that research with Indigenous peoples can be more respectful, ethical, sympathetic and useful," and she adds that ".....research can no longer be conducted with Indigenous communities as if their views did not count or their lives did not matter." Unfortunately in Mexico this is still very common, and this represents an enormous responsibility on the part of researchers to work towards developing new approaches. We need to open our eyes to the major research issues in contemporary Indigenous contexts: Whose research is it? Who owns it? Whose interests does it serve? Who will benefit from it? Who has designed its questions and framed its scope? Who will carry it out? Who will write it up? How will its results be disseminated? (Smith,1999:10). As I mentioned previously, there may be a few Indigenous communities sufficiently empowered to start making demands of researchers, but they are the minority.

Despite Stone's (1989:207) dismissal of participatory research methods as another example of Western philosophy imposed on others, I nevertheless find hope in them. The main principle that participatory methodology has is that it is possible to do research *with* people and not *on* them (Smith 2010), "they have been discussed, developed and utilized in a way to include multiple voices, reduce power differentials and allow for multiple-ownership of the knowledge generated by research" (Finnis, 2004:44).

The power differentials in research interactions, how this shapes the information gathered and who owns the knowledge generated, are the major ethical themes that have shaped research methodologies (Rocheleau, 1994; Cornwall and Jewkes, 1995; Finnis, 2004; Pain and Francis, 2003 and Pain, 2004). Approaching all these issues confronts and questions our roles and methodologies in the field. Certainly, involving different groups and individuals in research has the potential to be chaotic and surprising and implies a high level of complexity. In addition to this, it is time consuming, often extremely difficult to manage and implies confronting questions that may otherwise be overlooked, but it is also simultaneously an essential ethical practice in which satisfying results are frequently granted. It is of utmost importance that scientists acknowledge research in itself as a powerful intervention, that besides its theoretical framework it has a covert ideological foundation, one that has the potential to extend knowledge or to perpetuate ignorance about the critical issues of Indigenous people's lives (Smith, 1999).

Ethnobiological research can work to give agency to our Indigenous colleagues, "those to be studied," in an equal partnership. This means that we bring to the partnership the skills that each of us has and from these devise a research design that emphasizes symmetry in

the research endeavor and attention to the community concerns surrounding how and when information should be shared” (Simonelli, 2006: 136). At the same time the educational empowerment of such communities is supported. Research as a partnership involves a process which is inevitably political and which deeply analyses the outcomes of the research before it is undertaken (Smith, 1999).

The term “Action Research” was coined by Kurt Lewin in 1946, to describe research aimed at problem solving. In this he proposed the relocation of power from the researcher to the community. Under this framework, the internal development and ownership of the research, rather than an imposition from the outside, makes participatory research methods far more amenable to Indigenous research paradigms and agendas (Walter, 1998). The history of the methods can be traced to Latin America in the 1960’s and was inspired by the work of Paulo Freire. They flourished in the 80s and 90s, as the “result of having social scientists, local people and activists looking for ways to undertake research for social change, and also from the recognition that earlier forms of development research, in particular, were unable to alleviate poverty or adequately address problems of oppression” (Selener, 1997:11 in Finnis, 2004). There is a range of positions among the proponents of participatory methodologies, going from the more radical ones to the moderate one, all of course linked to social change. For example Selener (1997:14-15 in Finnis, 2004) states: “Participatory methodologies are based on the philosophical stances of idealism, pragmatism, and historical materialism.....(that) connect with the belief that there should be a democratic interaction between the researcher and the marginalized.” Reason (1998 in Walter, 1998) mentioned that Participatory Action Research (PAR) has two aims: 1) Produce knowledge and action directly useful to a group of people through research, adult education and sociopolitical action and 2) empower people at a second and deeper level through the process of constructing and using their own knowledge. Fals Borda (1991) identified three key elements of Participatory Action Research: the ontological possibility of a real popular science, the transformation of the researcher/researched, subject/object liaison based on the equal distribution of power, and finally autonomy and identity in collective research.

Participatory methodologies are simultaneously about education and action in order to reduce inequalities and empower the participants. These methods have the potential of addressing some of the ethical dilemmas of social science research. The radical versions proposed that if participation is in democratic terms the issues of deception and informed consent are eliminated, as the goals and agendas are set by the community (Finnis, 2004).

In my opinion this position is out of touch with reality and goes to the opposite extreme. At one end of the scale you deny the Indigenous people participation and the researcher has all the power and control; at the other extreme, the community exercises all the power and the researcher exists solely as a facilitator. This may have been originated due to the field in which these methodologies emerged, that of development research, in which the community could really define the goals and agenda of the projects. But I disagree that this should be the case in other fields of the social sciences, as, for example, in ethnobiology. The researcher's personal interests should not be denied and as Freire (1970) stated: "Nobody can be authentically, prohibiting the others to be." I believe that in the area of ethnobiology we must start using participatory methodologies but without going to either of these extremes. We should work towards truly cooperative research in which many voices and interests are included and fully acknowledged. We can develop research that is balanced between the interests of the researcher and those of the Indigenous people and that takes into consideration the participation of Indigenous people as both researchers and research subjects and in this way develop an approach to research that does not exclusively consider the interests of science (Smith, 1999).

Also, it can be dangerous to essentialize or romanticize situations, as unfortunately false and corrupt Indigenous leaders do exist. The fact that a researcher claims his/her Indigenous identity does not necessarily guarantee committed and respectful research.

Researchers interested in using participatory methodologies should develop culturally sensitive approaches beyond the topics of management of natural resources and development to include the cultural realm not merely as a diluted reference in the discourse (Rendón, 2004), but as a central element, upon which other topics can be investigated.

Instead of falling into an ethnocentric approach in which only research carried out by Indigenous individuals is considered valid, scientists have the ability to design ethical research strategies. Graham Smith (in Smith, 1999:177) proposes four models by which culturally appropriate research can be undertaken by non-Indigenous researchers, in the context of New Zealand:

1. Mentoring model: in which authoritative Maori people guide and sponsor research.
2. Adoption model: Researchers are incorporated into the everyday life of the Indigenous people, and sustain a life-long relationship which extends far beyond the realms of research.

3. Power sharing model: the researchers seek the assistance of the community to meaningfully support the development of the research.
4. Empowering outcomes model: which addresses the sorts of questions Indigenous people want to know and which has beneficial outcomes.

Another extreme is the one that proposes that power imbalances are so powerful that the only way to eliminate them is to do research inside your own community. Finnis (2004) defines this as an unpalatable option that tends towards ethnocentrism. Power relations need to be addressed and dealt with while minimizing them in order to continue to be able to share the rich tapestry of humanity.

A key element of Participatory Action Research is that problems should be defined by the community. But this assumes that the community's and researcher's perspectives are mutually exclusive, which is not necessarily the case. Within my own research I had specific personal interests that revolved around the study of traditional environmental knowledge and the community had theirs, which included documenting and systematizing their knowledge for its preservation and for the ecotourism project. The collaborative work has opened the possibility of exploring many topics in the future. Freire (1970:131) wrote that the more he conducted research alongside those he was researching, the more both parties learned and the more they learned, the more they researched.

The advantages and proposals of participatory methodologies have changed several of the traditional practices in research, as with the requirements for informed consent and the debate around it (Rosenthal, 2006). Informed consent should consider the nature of an individual's participation and the local situation, for example, communal approval against individual, cultural norms for speaking with a men/women, etc., instead of being subsumed by universal procedures such as with the standard privacy and confidentiality assurances that do not consider the culture and the methodologies employed (Finnis, 2004).

Simonelli (2006:136) clearly explains that

“...regardless of the legal and liability protections for which prior informed consent is used, until the scientific community reevaluates the philosophy driving the process we will fail in receiving the informed permission to enter Indigenous territories and carry out our jointly constructed and mutually beneficial projects. The notion of prior informed consent continues the asymmetry of elitist research, in which

those who open their cultures and communities to us are viewed as subjects of our studies" (2006:136).

Under this logic the discussions around the conditions and requisites of prior informed consent are outdated. But sadly in Mexico, the culture of prior informed consent does not yet exist, it is not requested by academic authorities in the evaluation of a project and even less so the participatory methodologies that make it unnecessary.

If ethical norms and considerations applied are the ones developed under the Western perspective, the discussion may be minimized, as issues such as Common Property Rights would be ignored. If the local concerns and practices are left aside, the research loses legitimacy and even viability. For example, it is not uncommon to find researchers who want to work with a system of individual agreements, despite this not being part of the cultural logic in collectively governed communities (Simonelli, 2006). This is particularly strange when the research is focused on collectively owned knowledge. It is the researchers' obligation to guarantee that the results of their research will not be used to the detriment of the community. U.S. institutions of higher education have a very standardized process to approve work with Human Subjects. Though it is necessary to protect people's rights, the process is very much oriented to medical research, and leaves aside important issues, at least in the field of anthropology, and particularly in ethnobiological research. Just to give couple of examples, the approval of a project depends on the correct use of individual consent and anonymity, alien concepts for the Mesoamerican cultures where the sense of the community prevails and where everybody knows each other and their genealogies. There is no room for anonymity. In relation to ethnobiological research, the most dangerous issue in the field, that of biopiracy, is totally ignored, as the process to get a project approved does not require information about property rights and ethics around the management of the information obtained. Still these processes seem advanced compared to the considerable absence of them in Mexico, already discussed above.

Besides the advantages explained in the previous paragraphs, participant methodologies also eliminate the risk of having knowledge mined as participants keep control of the research and its goals. The holders of the knowledge also decide the extent and formats in which they want information to be disseminated (Finnis, 2004).

It is undeniable that participatory methodologies offer the possibility of an emancipatory experience for all persons involved (Smith, 1999; Smith, 2010). Therefore the scientific

community should promote its use and free Indigenous people of the burden of dealing with intellectual arrogance and paternalistic practices (Smith, 1999). Also, we must be careful that participatory methodologies not be honored only in rhetoric (Finnis, 2004).

The pitfalls of participatory methodologies

There are some things to which attention should be paid while working with people in order to avoid making mistakes that may have direct negative consequences.

“Participation” can be defined in several ways. For some it may be the mere inclusion of people in an outsider’s project, for others it may entail the exclusion of outsiders in the definition of a project. In the best case scenario, scientists must be aware that communities and individuals may not always be willing to participate. The history of communities, local conditions, economic circumstances and low esteem may lead to a fatalistic attitude about the future that makes participation difficult (Finnis, 2004).

Another important challenge is to keep in mind that communities are not homogenous and cohesive. Gender, economic and even religious differences may determine, limit or enhance people’s participation (Finnis, 2010). I would like to clarify that in this dissertation “the community” refers to the inclusive working methodology I employed to issue open invitations to participate on a voluntary basis rather than a generalized sense that the entire community participated. I was careful to establish accessible ways in which those willing to participate felt able to and in this way eliminated the potential problem of working with a select few who might then gain control over the project.

It is difficult to talk about empowerment, a vague and rarely considered in-depth issue (Finnis, 2010). Nonetheless, as it is one of the principal goals of valuable research, I believe it must be achieved to some extent. Empowerment can take many forms, from a child developing a greater sense of pride in his heritage, to a local authority learning how to question governmental decisions that affect his/her community, to inspiring Indigenous youth to become professionals. Empowerment should enhance cultural revitalization (Bonfil, 1986). Scientists should promote the design of community-based initiatives to encourage local communities to do their own research (Smith, 1999).

“We write on the responsibility of social scientists to study critically “what is”, to imagine “what could be”, and to contribute responsibly to a mobilization towards “what must be”

Fine and Barreras, 2001

Methods

The Research

The present research provides a conceptual integration of all four levels of analysis of TEK that Berkes (1999) proposed. The first level includes all of the local knowledge of organisms (e.g. classificatory systems, myths and stories, edible, medicinal, symbolic, and aesthetic uses); the second involves the resource management system; the third involves the social institutions that provide the rules for use and management of resources; and the last comprises the worldview.

I employed the most common methods of anthropological research through open ended and structured interviews, the organization of workshops and participant observation. Therefore among the traditions of qualitative research¹³ the present work is an ethnographical study. It describes and interprets a group or social and cultural system, examining the meaning of its languages, behaviors and interactions through participant observation and interviews (Barragán 2009). I arrived at the community in 2007 and started making some visits to it. From then to the present time (March 2012) I have been going to the communities during weekends and celebrations. I lived permanently in the barrio of Nativitas for 4 months at the end of 2007. The largest period of absence (7 months) was when my daughter was born (August 2008).

The focus of the present research is the empowering theoretical framework, following Cameron *et. al.*, (1993). This is not based on the social subjects (ethical framework), nor is it for the social subjects (the defense framework) but is *with* the social subjects. Through this, the traditional power balance sides with the research subjects, with positive results for both them and the researcher.

The first step was to do extensive bibliographical research (Soustelle, 1937; Mora, 1989; Palomino, 1990; Contreras-MacBeath and Urbina, 1995; Muntzel, 2000; Ramírez y Reynoso, 2001; Korsbaek and Álvarez, 2002; Alvarez, 2006). The open interviews were used to approach the general ethnography of the community as well as to find out about individuals' experiences as immigrants in the U.S. The structured interviews were free listings of wild edible plants, mushrooms and animals from the forest to identify the most salient categories (for the numbers of people involved See Appendix II). In order to tackle the

¹³ The others being: biography, phenomenology, fundamented theory and case study (Barragan, 2010).

possibility that migration has had an impact on the production and reproduction of ethnobiological knowledge, a comparison of the amount of information recorded was done through a “virtual” plant and animal catalogue in a power point presentation. It was used as a tool to create structured interviews based on a sample of organisms in order to compare the knowledge possessed by migrant and non-migrant persons. The organisms chosen were singular; in order to facilitate their identification and reduce the possibilities of confusion with similar ones. This methodology has limitations, particularly in the case of animals that are identified as much by behavior and habitat as by morphology. The organisms were selected as representatives of characteristic life forms and ranges, ranging from easily identifiable fauna, such as deer, opossum and swallow to less distinctive species such as a butterfly and an unidentifiable insect. Besides identifying the species, I asked individuals which organisms have a use (edible, medicinal, ludic, and/or ornamental), or if they knew any myth or story about them. In total they were 24 pictures of organisms and one audio file of a bird singing: three mammals, four hexapods, three birds, two reptiles, three amphibians, four plants and four wild edible mushrooms (See Appendix III).) nine of the organisms were edible and nine associated with specific cultural beliefs¹⁴.

The introduction of the impact of migration as a variable in the study of TEK is one of the unique points of this research. In-depth interviews recorded ethnographic life stories with a specific focus on the migratory experience.

Responses from individuals were recorded on data sheets which also included the following biographical information: age, years of schooling, migration experience (age at first migration; destinations, occupation abroad, length of time spent outside the community and between visits to the community). I surveyed 20 individuals ranging in age from six to 85.

I would like to mention that in order to fully assess the impact of migration on the production and reproduction of TEK, it would be necessary to conduct a multi-sited ethnography. This was the original intention of the research but it was not possible due to a lack of funding. An anthropologist must face the contemporary challenge of the

¹⁴ I now acknowledge that I also should have included foreign elements that would have been useful in determining the willingness of individuals to admit unfamiliarity with a species (Rosenberg, 1998).

redefinition of the “field” in response to the realities that the people with whom we work are experiencing (Clifford, 1999).

The Biological Realm

Plants, animals (invertebrates) and mushrooms were collected. The plants were dried and mounted, the invertebrates were preserved with alcohol (70%) and mounted and the mushrooms were dried for later taxonomic identification. All the organisms collected were labeled with the date, place and local name in Spanish and in Pjiekakjoo. Simultaneously, a photographic documentation was done. The vertebrates were not collected and the identification of vertebrates species was based on their behavior, songs (in the case of the birds), and pictures of live and dead animals. I relied on the help of a taxonomist for each of the groups: Rafael Avila, Ph.D. from the Ecology Institute at UNAM for the mammals, Fausto Méndez Ph.D. from the Instituto de Biología at UNAM for the reptiles, Graciela Alcántara Ph.D. and Eugene Hunn Ph.D. for the birds and M.A. Irene Fruits from Facultad de Estudios Superiores Iztacala (FES (UNAM) for the mushrooms. In the case of the invertebrates I was fortunate to have the assistance of two taxonomists from the Biology Institute (UNAM), Julieta Ramos-Elorduy Ph.D. and José Manuel Pino, and from the Colegio de la Frontera Sur Benigno Gómez.

As it was collaborative research, the local participants also contributed through the collection of invertebrates primarily. These participants served not only as informants but also as secondary researchers. This was made possible once those involved had received clear explanations of the processes and objectives and had understood the importance and implications of the research. Researchers need to convince people of the value of research (Smith, 1999).

Participant observation was a key tool for the project, especially for the ethnozoological element. To share different environments and moments with the collaborators was of fundamental importance as it was often during those times that I would learn something new about the species we were studying. This was particularly important as we did not collect any vertebrates. The time required for participant observation is a constant challenge within a contemporary context where the main objective in the academic world is often the publication of outcomes and not necessarily the human interaction and academic quality of the research process.

The present research is very broad, which has made it complicated to conduct, but I have chosen to defy the limits of disciplines and fields in which academic work is organized (Smith, 1999), following in the footsteps of others who have done so, such as Hunn (2008) with his research about Zapotec natural history. The decision to include several groups of living organisms is also a tribute to the complexities and interconnectivity of traditional knowledge, an interconnectivity that is no longer popular within specialized Western science. I was to some extent obliged to work in a specific manner by the Pjiekakjoo people themselves who are tired of the disconnection between research projects and the realities experienced by Indigenous people (Smith, 1999:5). They wanted and needed to systematize their ethnobiological knowledge, not just certain parts of it. Despite investigating several groups of living organisms, a significant number had to be excluded (e.g., knowledge of domestic animals and plants). The complexity of Pjiekakjoo's ethnobiological knowledge is a strong reminder of the necessity of interdisciplinary research.

The Workshops

Due to the communitarian conflicts only three workshops were held with the *delegados* of San Juan Atzingo, in which the Pjiekakjoo knowledges about edible mushrooms, birds and invertebrates were addressed. It was not possible to continue working with them, as the *delegados* of San Juan Atzingo decided they could not work with me if I was also working with the *delegados* of Teocalcingo. Because of this, and other attitudes they had toward me, I decided to continue working only in Teocalcingo and with the *Comisariado de Bienes Comunes*, with which we had 4 workshops.

Approximately 20 workshops were held with the authorities (*delegados*, *comandantes* and local committees) as well as with elders (from the recently founded Indigenous delegation of La Loma de Teocalcingo). Some of the workshops were attended by adults only, while others involved participation of children also, as they included educational activities. These sessions of communitarian thinking plus the participatory nature of the research converted the participants into active subjects of the research, instead of mere informants (Rendón, 2004), opening up the possibility for the community to engage in new and exciting ways.

We started the workshops by making lists of the organisms to be discussed. The first category addressed was "little animals" (invertebrates), followed by animals of the forest, mushrooms, and finally, plants. Once we had these lists I organized the review of the information based on biological groups, some of which were also recognized by them (they did not have a category for amphibian or reptile but they do have one for birds.). We

spent as many workshops as needed per group, some of them taking several sessions (birds and mushrooms) and some requiring less time (amphibians and reptiles).

It may sound easy to make these lists, but it was a very complex issue as these lists were in Spanish and Pjiekakjoo and most of the names in the latter were being written for the first time. So frequently we had intense discussions about the best way to write down a name (see Chapter III where the language issues are discussed). Once we had all the names in Spanish and Pjiekakjoo we proceeded to record uses and all the details around them. For example, if an animal was eaten how it was prepared, or if it was medicinal, for what disease and in which quantities was it used. After all the utilitarian information was recorded, we would discuss the role of the animals in myths, stories, and beliefs.

The workshops about plants were the only ones organized around the types of uses. We held a workshop for edible plants, one for medicinal plants and one for ornamental and other uses. Half of the workshops were videotaped and for the rest I just copied the information discussed during the workshop onto big pieces of bond paper. In several workshops we used biological material, as was the case for the mushrooms and the plants. People brought some organisms they had previously collected and we discussed them. In the case of the birds we listened to the songs of the birds of the region on the CD "*Cantos de Aves del Corredor Biológico Chichinautzin*" (Romo de Vivar and Urbina, 2003). We would also use photographs of organisms previously taken by me and they would also bring animal parts, such as deer hooves or an armadillo shell, for example.

After each workshop I would organize and systematize the information. With all the debates and discussions it was hard to get all the notes straight all the time, so the first thing we would do at the beginning of a workshop would be to answer doubts and check that the information of the previous workshop was correct. We had one workshop about pile sorting, but for diverse reasons there were only a couple of elders who attended and they and the *delegados* found the exercise meaningless, despite my efforts to explain to them why it was important.

When we "finished" documenting the Pjiekakjoo knowledge about the chosen categories, we spent another couple of workshops recording the names and also some phrases (e.g. greetings) and even songs the elders and the *delegados* wanted the youth to learn.

In addition to the workshops, a research team was established with the elders, the *delegados* and myself. In particular, the participation of young women interested in the

topic was fundamental. It was important to work within their existing social structures and privilege the communitarian and public realms versus the individual and private ones, an essential fact to keep in mind when working with communally owned knowledge. We were able to establish a local knowledge research project promoting grassroots decision-making at the community level through Indigenous structures (Bicker *et. al.*, 2004). In an era where communitarian values are being challenged, if we establish ethnobiological research as a collective endeavor, we empower the collective arena. This was inspired by Freire's (1970) idea that the search to better oneself cannot be done in isolation, but is achieved through communal activity. In the same vein that Smith (1999:4.) declares:

"...to resist is to retrench in the margin, retrieve what we were and remake ourselves. The past, our stories local and global, the present, our communities, cultures, languages and social practices - all may be spaces of marginalization, but they have also become spaces of resistance and hope."

We worked towards making the workshops precisely this, spaces of resistance and hope where it was possible to "...restore a spirit, to bring back into existence a world fragmented and dying..." (Smith, 1999: 28). It is a common belief among the elders that their language and much of their knowledge is fading away. This was counteracted by the intergenerational nature of the workshops, where we had young adults and children learning about their cultural heritage directly from their grandparents. To have different generations interacting in the same time-space also allowed me to get an idea of the dynamics of TEK. For example, how names or concepts change across generations as those who have had formal education are able to create a syncretic vision of their environment, but alongside this, sadly, a fragmented knowledge of their own culture (Anguiano, 2003).

Another advantage to grouping together those considered to be "experts" or the "best informants" was that doubts were resolved much more easily. Sometimes the debates among the participants seemed to only confuse matters for a time until a consensus was achieved. Another example of how the workshops greatly validated the ethnobiological data recorded is how they facilitated the differentiation between true names and descriptive phrases. Hunn (2008:93) mentioned this represents a struggle as: "A name is not really a name if it is idiosyncratic, if it is understood only by a single inventive speaker. This is the 'cultural criterion'. Understanding must be shared to be cultural, at least to some minimal extent, while recognizing that it will rarely be the case that everyone within a

community will agree perfectly on anything.... ". This was particularly the case when working with the invertebrates, as nomenclature can be challenging in its variability, but in the workshops a solution was always found.



Figure 9. Brenda videotaping the workshop and the children working and Figure 10. The author reviewing the final list of names of mushrooms.

One of the biggest challenges Indigenous People face in the contemporary world (see details in chapter VII) is the commodification of knowledge as intellectual property, of collective knowledge as public knowledge and of knowledge as value-added (Smith, 1999:104). That is, the systems of property rights and ethics, based on the Western notion of individualized property. *"Community and Indigenous rights or views in this area are generally not recognized and not respected"* (Smith, 1999:118). This dismissal of the communitarian was counteracted by the workshops, as it was emphasized that knowledge does not belong to one person, notwithstanding the fact that some researchers' methodologies may have given that impression. Through the workshops we wanted to reinforce the concept of the communitarian possession of the Pjiekakjoo cultural heritage.

The experience of the workshops confirmed what Smith (1999) says about the importance of the process of research with Indigenous people as well as the methodology and methods, as in many cases the process may be more important than the outcome. The workshops fulfilled the prerequisites of being respectful and empowering people, to heal and to educate; and to take one step further towards self-determination. For the participants, the workshops reinforced the perspective that their cultural heritage is of value.



Figure 11. Benito Ruperto in one of the workshops he attended. He is one of the people that has had some linguistic training.

Another objective of the workshops was to educate youngsters and any other individuals interested in the recording and systematizing of their cultural heritage. It is of utmost importance to encourage more Indigenous people motivated enough to study to become native researchers in order to complement the projections of external researchers. We need to counteract the perception of research as being the "*domain of experts who have advanced educational qualifications and have access to highly personalized language and skills*" (Smith, 1999:125).

For research to contribute to the children's and youth's motivation is part of what Anguiano (2003) has called "cultural reversion." Cultural reversion also includes giving back to the community in the form of reintegrating knowledge into its place of origin in order for it to be disseminated among different sectors of the community.



Figure 12. Children making drawings and writing down the names of animals in Pjiekakjoo.

Alongside training and empowering participants, a secondary process emerged; the demystification of research. Throughout the past few years I have known colleagues to be enamored by the perceived position of power they hold as foreigners and researchers.

They work hard to maintain that status even if it implies the devaluation of the local people, who are of course the source of their studies and without whom their research would not exist. If the researchers behaved in a more humane fashion and explained and openly shared their work, the dynamic of the power relations would be more balanced and research could be perceived as something accessible to everybody interested and not restricted only to “experts” with advanced educational qualifications.

It has been well documented that projects based on a communitarian methodology have a greater chance of success (Engel, 1995; Ardón, 2001; Armstrong and Banks, 2011). Sadly, this is often used only as a discourse and not in practice. Escobar (1995 in Finnis, 2004) explained how interventions undertaken in the best interests of others without considering the participation of the local people have higher chances to fail and, in the worst case scenario, may even have a negative impact on those whom the research was intended to help.

The learning-action process that I used included by default the *emic* perspective (the owner’s perspective) that for ethnobiological knowledge is central to accurate knowledge. As I mentioned earlier, the authorities and the people actively involved in the project participated at all stages of the research. I will go into more detail on this later on in the chapter. The methods used in this dissertation were chosen and/or designed for cultural continuity, as I wanted to make a contribution to the conservation *in situ* of this living cultural heritage (Hunn, 1999).

Trust and Rapport at the Microlevel

While undertaking the quantitative interviews I always accepted that a number of people would not want to be interviewed. The interviews were conducted after the workshops and some participants felt themselves to be under examination, which although it wasn't the case, was a valid concern nonetheless.

By this stage I thought it may have been preferable for them not to know me as well as they did so that they would be less concerned about what I thought about them, but this was of course not possible, as I already knew their names and was acquainted with their families. So people did care about the amount of information they could or could not provide. Perhaps the interviews should have been done at the beginning of the project instead, but undoubtedly I would have faced other issues, such as shyness or disengagement, not to mention my own lack of knowledge of the subject matter under question. I feel it is necessary as a researcher to have a prior idea of the answers you may

potentially receive so you manage to get the information you need by asking more questions or making comments to help people.

Because of the level of confidence and respect we gained in the workshops, it became difficult to standardize certain academic procedures, such as the pile sort or the individual free listing. Elderly people in particular, but also adults and youngsters, often found it difficult to understand what I was trying to do. I sometimes perceived that they felt that the exercise objectified them to a certain degree. They much preferred the communitarian discussions, the recording of names for the CD we made, and the educational activities with the children. Bearing this in mind, I am inclined to agree with Smith (1999) when she writes "the quality of the interaction is more important than ticking boxes or answering closed questions" (Smith, 1999:136). The methodology applied therefore, may limit the collection of quantitative data, or at least make it more difficult, but simultaneously guarantees that the information obtained is valid as well as facilitating the possibility of working in the community in the future, as the participants feel acknowledge and respected.



Figure 13. Angel asking his grandmother Doña Julia some mushrooms names and Figure 14. The new delegación where the last workshops were held.

I did not want the research to be part of what Smith (1999:39) has called the "objectification of the Other, a process of dehumanization," that has established a problematic relationship with Indigenous people in many parts of the world. Most people did not feel comfortable with questions that were in one way or another oriented towards an evaluation of what they know and therefore they chose to ignore such questions. On several occasions I was explaining the rationale for the individual free listing task. However it proved useless for them, as well as intrusive, as they felt I was trying to prowl in their minds. At least that is the way they reacted when I explained the aim of the exercise. It was hard, despite my explanations, and what I like is that they trust me enough to let me know, so it

was not like in other cases where the researcher just exercises his/her power to almost force people to answer.

For cooperative research you need to be flexible, as objectives cannot be planned solely in line with the researcher's expectations. To give an practical example, I had funding to produce documentation of outcomes from the workshops, but in the end the money was reallocated as the *delegado* considered it more important to share food at the end of each workshop so that there would be time "*para convivir*." In this way the methodology used incorporated cultural protocols, values and behaviors (Smith, 1999).

Contested Versions

Smith (1999) talked about Indigenous attempts to reclaim knowledge from experts. Some Pjiekakjoo students from the UIEM experienced the frustration of being questioned during their presentation at a conference by an "expert" on Pjiekakjoo culture. I do not doubt that this social scientist had a deep understanding of certain aspects of the culture, but this does not qualify the scholar to dismiss other interpretations, especially if they are coming from the owners of that culture. There was no need to humiliate them in public. Again, if this scientist was obliged to adopt a more participative approach he or she may have been more respectful towards other interpretations of perceived facts. We should be aware that there are contested versions of the same facts within one community or culture, and that each of them are emically valid. No one person has the authority to proclaim which version holds more validity than the other, whether it be the elders' point of view that the culture is vanishing or that of the younger generation who may perceive a higher probability of cultural survival.

Giving Back: The Results

In the workshops we discussed the best ways to deliver outcomes, even partial ones, as the research took several years. To deliver the results was a fundamental element of this research project. It proved very rewarding for the Pjiekakjoo people to produce materials that demonstrated their knowledge and systematized it. This definitely helped them to realize that they have a vast amount of knowledge.



Figure 15. The banner made with the partial results of the project and that was hung on the main square kiosk on the patron saint celebration in June 2010 and Figure 16. The author explaining to the children how to solve a crossword puzzle with names of animals in Pijekakjoo and showing them an ethno-entomological insect collection.

We produced the following materials:

a) Pictures

One of the main complaints was that previous scholars who had worked in the communities had almost never provided copies of the photographs they had taken of the people and the community. Therefore, one of the main objectives was to provide printed copies of photos to the participants in the project as well as digital versions to be kept in the archives of the municipal delegation. The *delegados* also requested that I take pictures of other events in which I participated as part of my participant observation methodology, so they could keep a record of them.

b) Banners and exhibitions

As mentioned previously, in June 2010, in the patron saint celebrations, I donated a banner (approx. 2 X 3m) displaying some results of the research. This was hung in the main square. It was important for me to disseminate these results within the community

in a written format and in “culturally appropriate ways and in a language that can be understood” (Smith, 1999: 15). During the celebrations I had the opportunity to explain the results displayed to those interested. On a small table I also presented a small insect collection, again with the names in Pjiekakjoo. For the children I created a crossword puzzle using names of living things and words related to traditional environmental knowledge in general. All those who answered were given a lollypop.

I enjoyed being able to show our work at an event that was important for the community as opposed to an occasion organized solely for that purpose. I was also able to benefit from new information that was shared with me during the event.

Originally the banner was to be donated to the San Juan Atzingo delegation, but they did not want to be held responsible for what happened to it, so it was decided that the *Delegados* from Teocalcingo would take responsibility for it, which they were happy to do, and it has been hanging in the delegation ever since. When they have important events they take it out so people can see it and then they hang it back up inside the delegation.

c) CDs

Out of the need to hear the words, rather than to just read them, and taking into account the difficulties in transcribing them in a comprehensive way (see below under Language section), I decided to record onto CDs the names of the living organisms on which we had been working. These were given to each of the families participating in the workshops as well as to the bilingual school and to the delegation. This was an enriching experience, as the elders derived considerable enjoyment from it¹⁵. They took the recording process very seriously and we had to repeat it several times until it was considered good enough. The first CD was made only with the participation of the *delegados* and elders but the second one also included children and other adults. With the first CD, in addition to the Pjiekakjoo names for living organisms, I also decided to include a selection of songs for children, as I thought this might improve the children’s engagement with the material. The children seemed to like it, but it proved problematic for the *councilors* and elders as they felt it undermined the nature of the recording. For the second CD we decided to not include any songs aside from two sung by elders. In this second production, we also decided to record the most

¹⁵ Most of the families have CD players, but still three elders complain they were not able to listen to their recording.

common expressions, such as greetings and courtesies as well as the National Anthem (from a previous recording they had been made by the *Comisión Nacional para el Desarrollo de los Pueblos Indígenas* (CDI)) in Pjiekakjoo and Tlatol.

An issue that I could not have anticipated emerged once the recordings were complete. The citizens of Teocalcingo were insistent that the authorities of the other delegation should not receive copies of the CDs, as they were concerned that they would then learn and later claim they knew Pjiekakjoo or even worse, claim they had made the recording. As a result, a very limited number of copies of the CD were produced and given with discretion. It was also interesting to learn that the people that participated in the project did not want to sell the CDs among their own population, as they said it wouldn't be fair because the people who would be buying the CD's hadn't attended the workshops and that the people who did attend had invested a lot of time and effort in the recordings, for the others to just come and pay to get a CD. I found this difficult to appreciate; considering that given the endangered status of the language, any interest in learning and/or hearing it should be significant. Also, I felt that we had to take into account the many varied reasons for people not attending the workshops, predominantly economic, as Sunday tends to be the most important workday as it is market day. Later I learned that ideally, written materials on Indigenous languages should have an accompanying taped or videotaped version (Muntzel, 2004), which is something that has not been done at a communitarian level for the Pjiekakjoo language.

I created the design for the CD using some pictures of the elders, the delegates and the workshops, and credit was given to all the participants. They were pleased with the result in general, but nonetheless complained that there was not enough money to make all the front covers in color. I explained there was insufficient funding and that it was only thanks to them we were able to create it in the first place.

d) Lists of vocabulary

A list of all the names of plants, mushrooms and animals was delivered to every family that participated in the workshops.

e) Ethno-entomological collection

An insect collection will be given to the delegation, including the names in Pjiekakjoo and the different uses of the organisms.

f) Ethnomycological picture collection

All the registered wild edible fungi were photographed in order to form a collection, which, along with photos, included the scientific names in Spanish and Pjiekakjoo.

g) Copies of every paper produced.

We agreed I would present any resulting paper, publication or conference presentation and discuss it with them. It was a good experience for everyone involved to witness how the relatively informal and sociable environment of the workshops could be translated into hard data. They had their say about the way I have presented the data and the project. Some researchers claim people are not interested in this process, which for Smith (1999:16) "is arrogant, as the challenge always is to demystify, to decolonize".

An area I would have liked to work more on in relation to the above is the "sharing of knowledge" instead of the "sharing of information" in which the researcher shares more than just superficial information (pamphlet knowledge) but also "the theories and analyses that inform the way knowledge and information are constructed and represented" (Smith, 1999:16).



Figure 17. A photographic exposition I did in the celebration of the patron saint in January 2008.

Conclusions

I wrote this section with the aim of recognizing what has been done and how; and to assess what needs to be done.

Since the beginning of my academic career, I have worked with the conviction that ethical research should be conducted in a way that includes local governance systems and priorities in order to achieve respectful research collaborations that improve the wellbeing of Indigenous people and that contribute to their empowerment. This is possible only through tackling reality and its complexities.

The participative methodology used allowed the documentation of a wider range of information than is usually recorded, as diverse groups of living organisms were included. This methodology also guarantees the validity of the data gathered and the establishment of collaborative projects for the long term. Overall, the methodology recognizes Indigenous peoples' rights over their cultural heritage by allowing them to keep control over the research about their collective knowledge. The present discussion about methods aims to connect research with social justice.

“From these pages I hope at least the following will endure: my trust in people, and my faith in men and women, and in the creation of a world in which it will be easier to love”

(Freire, 1970:40)

III. The Pjiekakjoo People and their locale

The Pjiekakjoo or Tlahuica are the smallest of five surviving Mesoamerican cultures that exist in the State of Mexico today (Alvarez 2004). Tragically, current social, political and environmental conditions threaten the cultural survival of this Indigenous people. The first writings about the Pjiekakjoo were by fray Bernardino de Sahagún, who called them “ocuiltecas” because of their localization close by the town of Ocuilan. Later Jacques Soustelle (1937) proposed calling the language “atzinca”, as the language was not spoken in the center of Ocuilan, but in one locality called San Juan Atzingo (Sabino 2010). This author also mentioned that the people who speak this language use the terms /yokak'o/ (language) and /kak'o/ (us) for “our language”. This word expresses a common past and the belonging to a differentiated community (Álvarez 2006).

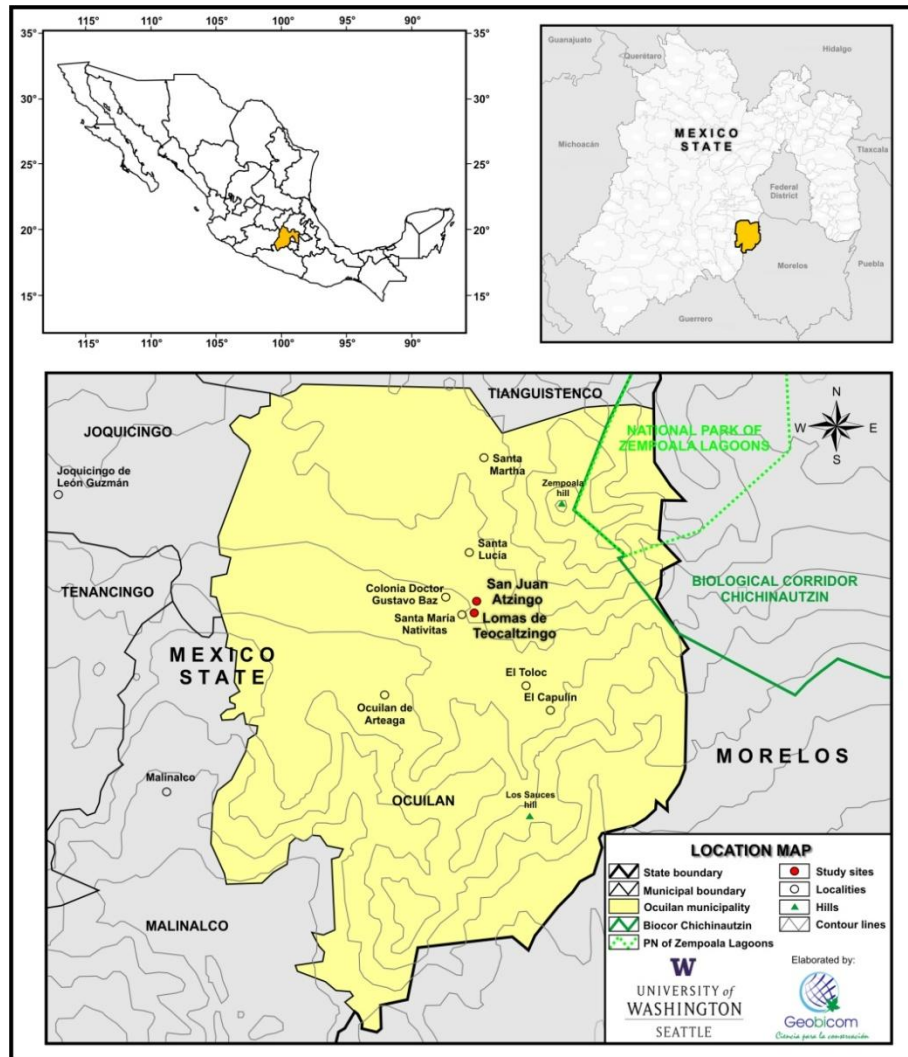


Figure 18. Localization of the Pjekakjoo Communities.

The term “Tlahuica” was first used by Pjekakjoo political leaders in 1976 when the president of the *Comisariado de Bienes Comunales*, J. Trinidad Tiburcio Santos, spoke in the Indigenous National Congress celebrated that year in Pátzcuaro, Michoacán. Tiburcio Santos rejected the term Ocuiltecos as alien, using instead the preferred term Tlahuicas (Sabino 2010). The term “Ocuilteco” was from their Nahuatl-speaking neighbors with whom they have had close relations. This term in Nahuatl means “los que amasan la tierra” (“those who knead the earth”).

The Pjekakjoo consider the term “Ocuilteco” to be an insult as they consider that term to refer to the people living in the center of the municipality (the *cabecera municipal*), Ocuilan, with whom they have had history of territorial conflicts. Furthermore, the mestizos from Ocuilan have discriminated against the Pjekakjoo. Mora (1989) mentioned that these political issues are what motivated the Pjekakjoo leaders to choose to call themselves

Tlahuica. This author narrates how during the time she was in town, many people did not know the word Tlahuica was being used, and that it was the leaders of the community who considered that through this new term they would get more attention from the government as under this new name they managed to get a rural clinic, as well as a Compañía Nacional de Subsistencias Populares (CONASUPO) store, a kindergarten and a corn mill, all this through the National Indigenous Institute - Coordinación General del Plan Nacional de Zonas Deprimidas y Grupos Marginados (INI-COPLAMAR) agreement. Rodrigo Sosa Fermin, a teacher of the language from San José el Totoc¹⁶, argued that this language did not previously have a name, and that the people would only say “Ñi kjué ye kjakjo” that means “lets speak our language” (Monroy and Escobedo, 2010). The term “Pjiekakjoo” was adopted due to the necessity of differentiating the Tlahuicas from the State of Mexico from the Nahuatl speakers also called Tlahuica from the State of Morelos, and also to reaffirm their identity (Sabino 2010).

Finally, on September 20, 2007 the National Institute of Indigenous Languages (INALI) accepted eliminating the word “Ocuilteco” and recognized the use of the words Tlahuica and Pjiekakjoo to describe this Native American group. This was done only after several requests, made over several years, by the Tlahuica Chief¹⁷, Alejandro Ramirez, on behalf of the community. Unfortunately this official resolution has not had efficient results as shown by the fact that in many important contexts, such as the National Museum of Anthropology and History, they are still calling this Native American group Ocuiltecos.

The term Pjiekakjoo is gaining popularity, and the elders still show their surprise about the debate around what name they should use to identify themselves. I consider it important in my own work to use the names the Indigenous groups use themselves, as a way of

¹⁶ He was a teacher for some time at the Intercultural University of Mexico State (UIEM). He did not have the formal education to be a university professor, but he was an *innate* teacher, and the students attending the institution would pay his expenses to travel all the way from San Jose el Totoc to the UIEM to teach them the language. Eventually he stopped going as the payment that he received would hardly cover his expenses and he would lose a great deal of time traveling. I had the honor of being his student for a couple of sessions at the UIEM, and he was really an excellent teacher. Sadly, he died in 2009.

¹⁷ The Supreme Indigenous councils were formed during October 1975, during the Indigenous Conference celebrated in Pátzcuaro, Michoacán. It was organized by the INI (Instituto Nacional Indigenista), the Peasant National Confederation (Confederación Nacional Campesina) and the Secretary of the Agrarian Reform). During the government of Luis Echeverría (1970-1975) as an intent to recover some credibility among Indigenous people, a new policy (indigenista) was created and it was characterized by: 1) an increment in the presupuesto del INI (Instituto Nacional Indigenista) and the creation of 58 new “indigenista” Centers and 2) the purpose of organizing the Indigenous people in a corporate structure, the National Council of Indigenous People (Consejo Nacional de Pueblos Indígenas, CNPI) and the supreme council of each of the 56 recognized Indigenous groups. This new organization was created to counteract the independent Indigenous organization that emerged in the middle of the 70’s (Sánchez 1999, Mattiace, 2002).

supporting these cultures in their empowerment. To choose not to has strong political implications. Ildelfonso Zamora, the president of the *Comisariado de Bienes Comunales*, to whom I was delivering some papers for him to review, prior to presenting them in conferences, made it very clear to me that they did not want me even to mention that they used to be called Ocuiltecos, not even in a footnote, to put the group in a historical context. They do have a very clear and strong position about the use of the term.

Another term commonly used is "San Juanero", but that is used to describe people involved with the Pjiekakjoo culture who may or may not be native to San Juan Atzingo.¹⁸

The Pjiekakjoo people are of particular importance because of a great capacity for adaptation that they have demonstrated over centuries in the face of "modernity". Due to their geographical location, they have been considered a very vulnerable group, because they are close to three cities -Mexico City, Cuernavaca and Toluca - and to important highways, and furthermore they are surrounded by mestizo towns with different worldviews and with whom they have to share their natural resources. Another relevant fact is the migratory experience, dating from the 1960's, to the metropolitan area of Mexico City and the U.S. Despite all these pressures, they have been able thus far to preserve their ethnic culture through different adaptive strategies that they have developed in this globalized world. Korsbaek and Álvarez (2002) stated that the Pjiekakjoo people have an ethnic project and that it is in good condition, despite the fact that their language is in danger of extinction; by contrast, their neighbors the Fot'una (Matlazincas) have higher percentages of speakers of the language but their ethnic project is in decadence.

The Pjiekakjoo are losing their language, considered to be in danger of extinction, but many other components of their identity are very much alive, e.g., their communal organization, the festivities they hold as a group, and of course the cosmovision that stands behind these forms and that makes them possible. We should be careful then to not misunderstand the situation of this ethnic group. One issue is the state of the Indigenous language and another is that of the entire culture that most certainly continues to be rich - not at all to dismiss the importance of the language being in danger of extinction -, but to avoid apocalyptic visions. Some people, as a result of their lack of knowledge about the group, make the mistake of assuming the Pjiekakjoo are at a critical stage and almost extinct. Unfortunately there is a great deal of ignorance about the Indigenous people and their contemporary lives and in particular about the Pjiekakjoo, despite their closeness to

¹⁸ This term is applied to my daughter as I spent an important part of the pregnancy in town, she has visited it frequently and people have watched her growing up.

the cities and all the modern mass media and technology. The assumption that the culture is in a critical stage is also supported by some concrete facts, for example the decreasing number of Pjiekakjoo speakers according to the official national census, which would imply that the number of people belonging to this group also appears to be shrinking, yet this considers only the speakers of the language and not the total population that participates in the production and reproduction of the ethnic project, that indeed has been growing in the face of national and international migration. In any case, a deep and extensive evaluation of the ethnic group should be done before concluding that the culture is at the edge of extinction.

This culture is present in six localities (San Juan Atzingo, La Loma de Teocalcingo, Colonia Gustavo Baz, Santa Lucía, El Capulín and San José el Totoc) in the municipality of Ocuilan de Arteaga, in the southeastern part of the State of Mexico.

The research on which this dissertation is based was conducted in San Juan Atzingo and La Loma de Teocalcingo. San Juan Atzingo was a single "*delegación*"¹⁹ until January 2009, but due to power disputes in the election of the "*delegados*" and a history of unequal participation in communitarian life, the neighborhood (*barrio*) La Loma de Teocalcingo decided to separate, choosing its own authorities. It obtained permission from the government to do so. The statistical information (INEGI 2000) about the Pjiekakjoo is therefore included in the data that refers to the localities of San Juan Atzingo and its two "*barrios*" (Centro and Colonia Hank González), Nativitas (which is registered as a separate locality, even though it still forms part of the San Juan Atzingo *delegación*), and La Loma de Teocalcingo, which has been awarded an independent *delegación*. Among all the localities where Pjiekakjoo is spoken, this *new delegación* holds the largest number of speakers (221), even larger than San Juan Atzingo and Santa Maria Nativitas combined (208) and also where the Indigenous language speakers have the greatest percentage in relation to the total population (34%). See chart I.

The concentration of Pjiekakjoo speakers in La Loma de Teocalcingo became evident to me during my first visits when, after explaining to people my objectives in town, they would refer me to "La Loma", saying that those who speak the language lived there. The people from the center of the community are very aware of their different origin: as a man told me on one occasion, "I am from a different race". There have been historical tensions between the people of the center, who made fun of the way the Indigenous language

¹⁹ Smallest unit of administration in the Mexican federation

sounded, and those of La Loma. I have also had to deal with totally patronizing comments, such as when one of the *delegados* from the center told me at the end of 2010 that “there are also Indigenous people in the center”, or when the supposedly new Supreme Chief of the Tlahuica, in reference to the separation of La Loma de Teocalcingo, commented, “my poor Tlahuicas, they are manipulated by a few people because they do not really know what it is best for them”. So I have witnessed how Tlahuica identity is manipulated, as the people from the center are unwilling to lose their status as an Indigenous community and all the government benefits this gives them. They are able to apply to a larger number of welfare programs, but under the new circumstances it becomes harder as there are very few Pjiekakjoo speakers in the center, and even among those, there are supporters of the separation. Most of the people in the neighborhood of Nativitas and Carlos Hank González are supporters of the separation promoted by Ildelfonso Zamora, the representative of the *Comisariado de Bienes Comunales*.

I have heard people in both towns say how sad it is that they have become divided, a town that was famous in the region for its unity and combativeness. The authorities of San Juan feel outraged about the fact and cannot hide it. The authorities from La Loma do not even mention it and are very focused on the projects they intend to undertake. After I questioned them openly, they said it is sad but they were fed up with the people of San Juan Atzingo (mainly the center) using them (e.g. in communal work projects and in financing celebrations in honor of the saints), and not providing support when they asked for help. The final issue that forced the separation was the refusal by San Juan to help finance the construction of Teocalcingo’s football field. It is relevant to mention that there are a few families (around 10%) who decided not to separate from San Juan Atzingo, and who claim they continue to belong to that *delegación*.



Figure 19. The second anniversary of the recently independent Loma de Teocalcingo Indigenous *Delegación* (January 2011).

Interestingly, Mora (1989) mentioned that the neighborhood of Nativitas also intended to become independent. They already had a church and they were looking forward to building their own town square. About La Loma de Teocalcingo, she mentions that it was a neighborhood with fewer economic resources, but in which everybody claimed to be native, they being the ones who conserved the language and the traditions of their ancestors. Several of the people of Nativitas still know the language, unlike the center where its use and knowledge is absent.

The Pjiekakjoo territory encompasses part of the environs of the National Park “Zempoala Lagoons”, a protected national area. The Park is part of the “Ajusco-Chichinautzin Biological Corridor²⁰”, a priority conservation zone for the National Commission for the Knowledge and Use of Biodiversity (CONABIO). It is estimated that this forest shelters almost two percent of the world's biodiversity. It has more than 3,000 plant species, 195 birds, and 350 mammals, reptiles and amphibians; about 10 percent are considered endemic and

²⁰ “The Biological Corridor Chichinautzin is located in the northeast región of the Morelos State. Its territory includes the municipalities of Cuernavaca, Huitzilcam Juitepec, Tepoztlán, Tlalnepantla, Tlayacapan, Atlatlahucan and Yautepec. The political delegaciones of Milpa Alta and Tlalpan in the south of the Federal District and Ocuilan the Arteaga in Mexico State. Its extreme geographic coordinates are: 18°50'30" and 19°05'40"N; 98°50'51" y 99°20'00"W. Its surface area is 65,721.57 hectares, the sum of 37,873.81 ha from the area for the protection of flora and wild fauna declared on the 5th of December 1988 and modified in 2000, added to the 4,561.75 ha of the National Park Zempoala Lagoons decreed as such in 1936, but modified in 1947, and the 23,286.51 ha from the park “El Tepozteco” decreed in 1937. In: <http://chichinautzin.conanp.gob.mx/index.php>. Translated by the author.

many are in danger of extinction (Portugal and Lopez 2007). Unfortunately, this region is threatened by illegal logging and urbanization processes, and also by soil extraction, fires and illegal hunting.

The Physical Locale

What follows is a brief description of the abiotic elements present, leaving most of the biotic ones to be discussed later on in relation to the Pjiekakjoo Knowledge related to them (Chapter VII). I decided to mention the type of vegetation as it will not be addressed in detail later.

Climate

According to Köppen, as modified by García (1987), the local climate in the study area is subhumid temperate – type C(w2)(w), the most humid of the subhumid types with summer rain. The average high temperature is between 12° C and 18° C, with lows between -3° C and 6.5° C. There are three zones: a) altitudes below 2,800 meters with a C(w2)(w)big climate, temperate with a long, cool summer; b) altitudes between 2,800 and 3,500 meters with a subtype C(w2)(w)(b')ig climate, semi-cold with a long, cool summer; and c) a region with the climate subtype C(w2)(w)cig, semi-cold with short, cool summers, between 3,500 and 4,000 meters (INEGI, 2009)

Geology

Ígnea extrusiva (Extrusive igneous)

Soil

Andosol (INEGI, 2009)

Geomorphology

In the northeastern extreme of the Chichinautzin Biological Corridor there are two domes called Gloria and Tabaquillo, that resulted from the volcanic systems situated close to Zempoala Lagoons National Park (Oliver 1995).

Hydrology

The Biological Corridor has 1,300 millimeters of annual precipitation, a product of the geomorphology and the altitude (as high as 4,000 meters). This, along with the high level of infiltration (70-80%), gives the region a great deal of importance in the recharging of groundwater aquifers.

The main areas for recharging the aquifers of Morelos are located in the mountains of Chichinautzin, Zempoala and Nevada. This is an essential environmental service, necessary to cover the water demand for economic activities and domestic use in most parts of the state.

There are seven lakes, three of which have dried out, and the other four exhibit considerable water level fluctuations from November to May, due to the intense evaporation and infiltration of the water (Contreras and Cazorla 1995). The region provides Cuernavaca city with water, which certainly has contributed to the lakes' dessication, combined with reduced rainfall.²¹

Zempoala Lake. In Náhuatl the name means "twenty lagoons," which is to say, "many lagoons." It is the largest in the region, and is fed by a small river draining the southeast slopes of Zempoala Mountain. This river has water year round. The lake supports abundant plant and animal aquatic life. There are some fish species that people catch. Around this lagoon there are tourist and commercial facilities. Adjacent to Zempoala Lake is Complila Lake, which in Náhuatl means "Crown's Lagoon." It is fed from Zempoala Lake, but is almost totally dry during the dry season.

Tonatiagua Lake (that in Náhuatl means "The Sun's Mirror") is located at the base of the Ocuilan and Alumbres hills. It is fed by a small river that flows year around from the Ocuilan hill. It supports abundant animal life and is very important for local people. In general it is in a good state of conservation, except for some introduced species that are proliferating.

Acoyotongo Lake (that in Náhuatl means "Prieta," that is, "dark") used to have water during the rainy season, but it has since dried up. Quila Lake was once one of the largest. Today it is dry because water is drained off to nearby towns. Acomantla Lake used to be a swamp during the greater part of the year, but now it is dry also. Finally, Hueyapan Lake, the name of which in Náhuatl means "Lagoon" or "In the Big Water," is in the middle of the forest and provides water to the town of Huitzilac.

²¹ The National Meteorology and Climatology System stated that the drought in 2011 was the second most important in the recent history of Mexico. In the State of Mexico, had the tenth lowest levels of rains in its history, with an annual average precipitation 23.6 percent lower to the average. Milenio on line. <http://impreso.milenio.com/node/9066866>. Recovered: 07 March 2012.

Precipitation

In the Zempoala Lagoons region the average annual precipitation is between 1,200 and 1,500 mm. The rainy season is during the summer, starting the middle of May and ending the middle of October. August is the rainiest month. Rain that falls in the winter months (from December to March) contributes less than 5% to the annual total. During July and August it is common to have the rain diminish. This is the *canícula*. However, it does not negatively impact the rain fed agriculture of the area (Taboada 1995).

Vegetation

Pine forest (*Pinus hartwegii*, *P. ayacahuite*, *P. montezumae* and *P. teocote*) dominates in the region. Oak forest is also present (*Quercus barbireniis*, *Q. laurina* and *Q. rugosa*) as well as *Abies religiosa* forest. Mixed forests of *Pinus-Quercus* and *Pinus-Abies* can also be found, along with *Prunus capulli*, *Crataegus mexicana*, *Cupressus lindleyi* and *Alnus jorullensis*. Some regions have pasturelands and secondary vegetation that result from logging.

San Juan Atzingo

The word Atzingo means "in the small water" (en el agua pequeña). It comes from atzintli, diminutive of átl, water (Monroy and Escobedo, 2010). The community is located at longitude of 99° 23' 00'' West and latitude of 19° 00' 37'' North at an altitude of 2,560 meters above sea level.



Figure 20. Celebration in the main square of San Juan Atzingo and Figure 21. The Kiosk and the main square.

Delegación Indígena Tlahuica de Teocalcingo

Teocalcingo means God's house or small temple (Peñafiel, no date). It is located at W 99° 23' 03'' and N 19° 00' 24'' at 2,580 meters above sea level.

San Juan Atzingo and the *Delegación Indígena Tlahuica de Teocalcingo* are located on the La Marquesa-Chalma road, at kilometer 42. Their boundaries are: to the north with Coatepec de las Bateas and Xalatlaco, to the south with Santa Mónica, Chalmita and

Ocuilan, to the east with Huitzilac, Buenavista del Monte and the State of Morelos and to the west with Joquicingo and Malinalco.



Figure 22. Panoramic view of Teocalcingo, on the top of the hill in the middle of the image.

Roads

There are two ways to get to the town: from México City. One is via the highway that goes to Toluca, It is also possible to gain access from Cuernavaca city, via the road to Huitzilac. Their territory is between three very important urban centers: Mexico City, Cuernavaca and Toluca. Also, just some minutes from San Juan is the Lerma industrial area, full of factories. Despite all this the people of San Juan have been able to conserve a beautiful forest.

Transportation

San Juan Atzingo and La Loma de Teocalcingo are on several public transportation routes. The most used buses are those called "Frogs" (because of their green color) that travel from Santiago Tianguistenco to Chalma. Santiago Tianguistenco is the most important economic center in the region. From México City there are buses that go to Chalma. Both types of buses leave the people on the main road at the entrance to San Juan and from there, collective taxis transport people to their homes for ten pesos.

History

Álvarez (2006) mentions that in the prehispanic era, the San Juan Atzingo region passed through three periods: Otomian, Nahuatl, and the displacement of the Otomian group. The arrival of the Mexica in the valley of Toluca initiated a process of conquest that encompassed the Mazahuas, Otomis and Matlazincas. The Mexica strategy was designed to prevent the Tarascans from occupying these territories. The Aztec emperor, Axayácatl,²²

²² Mexica warrior who followed Moctezuma I and was the father of Moctezuma II (http://moctezuma.cultura-inah.gob.mx/index.php?option=com_content&view=article&id=15&Itemid=14&limitstart=9)

with the help of the Náhuas of Cuauhnahuac, forced the Pjiekakjoo from the center of Ocuilan, which was then occupied by Nahua speakers.

By the time of the Spanish conquest, during the second half of the fifteenth century, a considerable part of the Toluca valley had been invaded by Mexicas. Even after the conquest, the Náhuatl language, that was favored by the Spaniards, continued to displace the other local languages such as Matlalzinca and Atzinca.

There is little information about San Juan Atzingo during the colonial period, the 1790 census reports that most of the people were agricultural workers, who probably worked in the haciendas of the area and complemented their income working the land close to the town.

The town intensely lived the Revolution at the beginning of the XX century, which determined to a large extent the contemporary identity of the Pjiekakjoo. During this period crucial social, political and economic ties were created with the state of Morelos, ones that survive until today. During those years the main economic activities of the town were selling *pulque* and *ixtle* (agave fiber) products such as rope and textiles (*ayates*) in the surrounding haciendas; wooden shingles (*tejamaniles*) were also exchanged in the towns of Jojutla and Palpan, in the state of Morelos. San Juan Atzingo supported Emiliano Zapata's cause, while Ocuilan became a supporter of the federal forces (Álvarez 2006). The first encounter with the Zapatistas occurred in December 1911, when approximately one hundred rebels arrived in town and made off with some horses (Blancarte 1987). In 1911 Emiliano Zapata used San Juan Atzingo as his headquarters, as is demonstrated by a letter dated November 24 of that year in which he designated a local man as *coronel*. Mora (1989) noted that people used to mention that the revolution did not arrive in town until 1918, when the supporters of Carranza established quarters at the church after burning the town. Prior to that moment, San Juan was known for its animosity toward soldiers. During this time, people remember as very important the fact that even though the church was occupied by the army, the soldiers never managed to move the saints; additionally the Pjiekakjoo remember the lack of activity in the community during those days and the hunger they suffered.²³

During the Revolution the community was destroyed three times: 14 January 1912, 21 March 1913 and 20 May 1916, forcing people to hide in the forest and survive by eating roots, maguey (*Agave* sp.) flowers, *picaya* and *nopalillo* (prickly-pear cactus, *Opuntia* sp.).

²³ The food called *tsin datze* appeared during this period, see gastronomy section in this chapter.

The last time the town was attacked, animals were stolen and people detained because of their Zapatista affiliation.

Immediately after the end of the Revolution people started coming back to San Juan. The people there would not allow people from other places to come to the community, which may be the reason that it was the only place in the region where the language was conserved. Some years later, people from outside the community began buying land at very cheap prices and established stores that introduced shoes and cotton trousers to the townsmen. The Indigenous people left the center, and moved to the edges of the town, which explains why the people from the center do not know the language, "*la idioma*" (Mora, 1989). I had the opportunity of talking with Mr. Reyes, who lives in the center by the church. He told me that he did not know Tlahuica and could only understand a few words, as he was "of another 'race'," and that his parents moved into town after the end of the revolution. .

This seems to be in contradiction with the findings of Soustelle, who visited the town in 1933 and reported that the population was very heterogeneous, as people from different origins had arrived there and decided to stay. He also indicated that these new arrivals even learned the local language and that they had important relations with another ethnic group, the Nahua speakers of Morelos. I believe that both cases are possible: to have had people coming into town and learning the language and people that did not; as well as it may have been the case that the first generation learned the language but their children did not.

It is commonly understood that the people from San Juan Atzingo forfeited their identity after the Revolution and assumed the Tlahuica ethnic identity (Mora, 1989). Oral tradition holds that after the Revolution only 12 men and 36 women survived in the town, so they decided that each man would take three wives in order to repopulate the community, so it is no surprise to hear of grandparents who had up to three wives living in the same house (Mora, 1989). People associate the beginning of recent changes in the town with the arrival of the school in 1955, after which the people began to be more "open" and started to abandon traditional clothing and the Indigenous language. This latter change occurred because the school would not accept children who did not speak Spanish. The school had the clear objective of assimilating the Indigenous Pjiekakjoo into the great Mexican nation. Even more changes were to come in the middle of the 1970's with the establishments of different institutions in town, such as a CONASUPO store, a kindergarten and a rural clinic, as I have already mentioned in the first paragraphs of the chapter.

Origin stories

According to Álvarez (2006) the Pjiekakjoo affirm that the town has always existed, that it came from the "old people" (*pueblos viejos*) and that they have a "twin," which may make reference to the Matlaltzincas²⁴. They also refer, however, to more Tlahuicas that existed somewhere in the south. Muntzel (2000) recorded oral stories that tell how there was no sun, that people would live with only the light of the moon. These stories also mention that there were three brothers who started the construction in Malinalco and Chalma, and how it was after the bells rang that Christian people were formed. Based on this it has been proposed there is a mythical region that includes San Juan and Chalma, Malinalco and Huitzilac and that the ringing of the bell symbolizes Christian evangelization and the break with Mesoamerican thought.

Once more I must refer to the excellent ethnography written by Mora (1989:104--105), in which she recorded the following origin myth:

"The history of the Tlahuicas from Atzingo starts with a memory of how initially everything was in darkness: there was no light in the world, there were no people and no malice. The world was inhabited by the Teponaztle brothers who worked by moonlight, but they were turned to stone with the light of the sun. God had decided that the one that managed to light the world would be the king of the world. It is said that it was almost sunrise and there was little time left to create the light. The big star, Santiago (Saint James), came down to the world, and though he tried to set himself on fire, he was unable to do so. Between three and four o'clock in the morning, the moon said: 'I have always worked with the people, and I know the world'. But the moon was also unable to light up the world and darkness continued. Then the sun said, 'neither of the two of you could do it, so now it is my turn', and at six o'clock everything was shining. The teponaztle brothers were turned to stone, evil disappeared, people were born and the town changed. With the disappearance of evil a new epoch is inaugurated for the new God, the sun, and for humans - and it is for this reason that the Tlahuicas are considered the children of the sun, they were born when the sun light fell on the world".²⁵

LANGUAGE AND ETHNICITY

²⁴ Indigenous group also located in Mexico State in the Municipality of San Francisco Oxtotilpan. Their language, Botuna or fot'una, is part of the Otomanguan linguistic family, together with Pjiekakajoo, Pame y Jonaz. The community is located 30km to the south of Toluca, the capital of the state.

²⁵ Translated by the author.

LANGUAGE ("LA IDIOMA")

The Pjiekakjoo language is part of the Otopame linguistic family. Children are no longer learning the language and Spanish is now the main language spoken in all domains (Muntzel, 2004).

An analysis of the number of speakers shows it to be a language in process of displacement (*desplazamiento*). In 2005, the National Commission for the Development of the Indigenous People (*Comisión Nacional para el Desarrollo de los Pueblos Indígenas*, CDI) established an ethnolinguistic replacement index of 0.4912 for this language, that situates it in a state of accelerated danger of extinction²⁶.

Mora (1989) conducted a census and registered 414 people who knew the language in San Juan Atzingo, among whom only 184 could really understand, speak and use it in their everyday life. She also reported how teaching of Pjiekakjoo at the family level was not taking place and how its extinction could be predicted.

In 1990, INEGI registered 804 speakers of Tlahuica, while in 2000, just 412. It has been losing generations of speakers. The linguistic change is due to historical and economic changes: the population has had to migrate looking for jobs; linguistic unification is promoted by mass media, the educational system and governmental linguistic policies; and the social pressure represented by inequality and discriminatory practices (Sabino 2010).

There is also a variety of the language considered a ritual language, called *Tlatol*, and there are two types of it: the Small or short form and the Big or long variety (Sabino 2010). According to Mora (1989) it consists of a series of dialogues between two groups of people, visitors and hosts, the house owners, that take place during religious events. These dialogues could be long and complex, though nowadays they are shorter due to the lack of people who know the language very well. However, many older people remember when these *Tlatoledas* lasted several hours. Sadly there are no young people learning *Tlatol*, and there are only a few elders that can speak it. *Tlatol* speaks of the knowledge left by the ancestors as well as the everyday life of the people; one group leads and the other answers. Until some years ago all religious ceremonies were in part undertaken in *Tlatol*. Today most are celebrated in Spanish, though for the Day of the Dead *Tlatol* is still used. It is a very emotional language that commonly provokes tears as people remember their ancestors.

²⁶ They recorded a total Indigenous population of 1,954 with 843 speakers (CDI, 2005).

At present no one knows the long Tlatol. As part of my collaboration with the authorities, they requested I record "at least" the short Tlatol, and we did so with support from six elders (of the 13 who claim to know it), of which only two assure they really know how to "tlatolear." The authorities will play the recording over and over during the Day of the Dead celebration. They claim some young people are interested in learning it with the help of the CD. I witnessed how sad it is that there are no more "tlatoleros" when, during the Day of the Dead ceremony (November 1-2, 2009), there were only five elders to speak the Tlatol in the main ceremony of the *delegación*.

It is imperative to mention that the Pjiekakjooy have kept their "usos y costumbres," despite the fact they have lost the language. Though in many ceremonies the Tlatol can no longer be used, the ceremonies are still organized with the same solemnity, respect and enthusiasm. I witnessed also how on one occasion the mayordomo openly apologized for not being able to speak in Pjiekakjoo. The elders recognize as few as 25 full speakers of the language, all over 65 years old. The next generation understands it but is unable to communicate orally in this language.

Someone once said that the beginning of the end of the language occurred when the teachers arrived in town, as I will discuss also in a section about formal education, though certainly other factors have played an important role in the conservation and recording of the language. There are always the eternal myths, for example, how learning Tlahuica would prevent children from mastering Spanish that the kids would become confused or maintain a "funny" accent. All this is little more than a question of status; this would not be an issue if the discussion revolved around learning English as a second language.

A recurrent issue that marked my work with the language was the fact that some people complain how certain persons have a merely economic interest in it. One peculiar fact is that a woman, who used to make fun of the people speaking Pjiekakjoo -- most commonly by telling them that they talked like *pipilas* "turkeys", learned the language from some native speaking women and now claims that she can teach it. People say she learned Pjiekakjoo for economic gain, and I should mention that she was the only person I interviewed who openly asked me to be paid, explaining that she has economic needs.

The Tlahuicas have experienced that the native speakers do not benefit from the documentation and recording of their language, but rather it is academics who benefit. This work has sometimes negatively impacted these elders, such as when a non-native speaker was hired as a language teacher due in a large part to her relation with a

particular academic. One academic linguist has visited the town for years, yet the Tlahuicas have never clearly seen the results of her work, nor any benefit that it has brought to the people involved. Not only has there been no economic restitution, but no other sort of material benefit, such as a simple copy of the photographs taken, has been forthcoming. I underline this not to repeat gossip, but rather to indicate how a research project that is not properly conducted can have a negative impact on a language and on a community. Older people, who used to participate in the recording of the language no longer wish to do so because they mistrust researchers. They agreed to participate in my research for two reasons: 1) the objectives were very clear; the commitments I made with them were expressed in a written agreement (see more about this in the methodology discussion); and most importantly, 2) the sons of several of the elders, who are presently authorities, convinced their parents to participate, promising that, as authorities, they would assure that I fulfill my commitments.

Muntzel (2004) reports that the language remained unwritten until recently, when Reynoso wrote a couple of vocabularies (1998, 2002), and stories by González (2001) and Reynoso (1997) were published²⁷. The most recent work undertaken was the Spanish-Otomi, Matlalzinca, Tlahuica, Mazahua and Náhuatl Dictionary that was written with the collaboration of Reynoso as a translator and in which there is a description of Tlahuica grammatical rules and a Pjiekakjoo alphabet (Monroy and Escobedo, 2010).

Reynoso uses the alphabet designed by the General Directorate of Indigenous Education in 1982, and Muntzel uses the International Phonetic Alphabet, though she recognizes that it has symbols that are less effective for “teaching literacy.” She declares that in the workshops she has held with Reynoso, they tell the people to write it any way that they can understand it (Muntzel, 2004). Even though there is still a debate around the convenience/necessity of writing an Indigenous language for its revitalization, Crystal (2000 in Muntzel, 2004) considers written language to be one of the six elements needed to promote language use in intergenerational communication.²⁸

²⁷ When I was finishing writing the dissertation I learned of a book, called Pjiekakjoo, by Rodrigo Sosa (2008) published by the National Institute of Indigenous Languages (INALI).

²⁸ The other 5 being: 1. An endangered language will progress if its speakers increase their prestige within the dominant community, 2. An endangered language will progress if its speakers increase their wealth relative to the dominant community. 3. An endangered language will progress if its speakers increase their legitimate power in the eyes of the dominant community, 4. An endangered language will progress if its speakers have a strong presence in the educational system and 5. 3. An endangered language will progress if its speakers can make use of electronic technology (Crystal, 2000:130-141).

During the workshops that were undertaken as part of this research, it was fascinating to see the different generations relate to one another and their different approaches to the issue of conserving their language and writing it. I have been lucky to have two very intelligent teenagers who assist me sometimes. They would eventually get into debates with the few adults that have had some basic training from linguists. The young women's opinion was that it was going to be hard to get everybody the training as linguists that would allow them to read the words, so they strongly suggested just writing the words using the alphabet used to write Spanish, as, sadly, Spanish has been the first language of the Pjiekakjoo for several generations. We agreed to write the concepts using both alphabets. I really admire these young women, who were able to confront the male adults. For me it symbolizes how strict hierarchical structures are being left behind and I am glad to witness the social effects of the attendance of young women at higher levels of formal education.

Beyond the literacy of a given speech community, there are other macro-variables determined by the dominant culture that are crucial for minority-language survival, such as the attitude towards multiculturalism. Additionally, other issues have a strong influence: the strong pressure to be part of the majority culture particularly when the younger generations aspire to be part of it, the control that the dominant culture has over the financial resources required for mass publication, and the design of public policies related to language (Muntzel, 2004).

Therefore, it is urgent to work with the dominant society in order to address the external issues that affect the survival of a language. The Pjiekakjoo language is in danger of extinction which means that there is an urgent need to study it and their culture, as the latter would be seriously affected if the language disappears, since language is the medium through which the world is represented and elaborated. Thus, when a language disappears it takes with it an important part of the wisdom of that culture. Desolately, the problem of the extinction of languages is far from being local or national, but rather is much broader in scale, as the massive extinction of human languages is presently occurring in many parts of the world. Maffi (2000) mentions that more than the 90% of known languages are susceptible to extinction in the 21st century. Hunn (2008:28), referring to the Zapotec language, mentions something I believe is very much true also for the Pjiekakjoo: that it could survive by "striking a sustainable balance between the languages of global interaction and the languages of local attachment." Still for the Pjiekakjoo people the scenario is more complicated as their population is considerably smaller.

Population

Mora (1989) makes a brief historical account of San Juan Atzingo's population: in 1974 a population of 781 inhabitants was reported, and by 1984 it had almost doubled, to 1500 inhabitants. Mora did a census in which she found a total population of 1432 in 1987. She noticed that the population had dropped over the previous three years, due to constant migration to urban centers as well as to the high mortality rate present in the community.

The 2000 census (INEGI 2000) registered 466 persons as "Ocuilteco" speakers. About 90 percent of the native speakers were concentrated in the town of San Juan Atzingo. Yet Álvarez y Monterrosas (1996) determined that of this 90 percent of speakers of Tlahuica who reside in these localities, 50 per cent did not speak but could only understand the language and a very low three percent were fluent speakers who also know *Tlatol* (the ritual language).

The chart below shows the results of the 2010 Census, in which San Juan Atzingo is tallied separately from Nativitas, one of its neighborhoods, and from newly independent Lomas de Teocalcingo (INEGI, 2010). Summing up, we have a total of 2032 inhabitants for what used to be considered San Juan Atzingo, 329 of whom speak the Indigenous language (16.1% of the total population).

Table I. Total population that speaks Pjiekakjoo and the percentage they represent in each of the localities where it is present (INEGI, 2010).

Locality	Total Population (2010)	Population over 3 years old that speaks an Indigenous language	Percentage of the total population that speaks an Indigenous language
San Juan Atzingo	949	100	10.53 %
Santa María Nativitas	445	108	24.26 %
Lomas de Teocalcingo	638	221	34.6%
Total	2032	329	16.1%
San José el Totoc	491	80	16.2%
Santa Lucía	1669	80	4.7%
El Capulín	105	13	12.3%
Colonia Doctor Gustavo Baz	1077	109	10.1%
Total	5374	611	11.3%

According to the Census there are no monolingual people anymore in any of these localities. I have considered it relevant to note the sum total (611) of the people that, according to the Census, speak Pjiekakjoo, distributed in six localities (considering Santa María Nativitas as part of San Juan Atzingo). As I mentioned previously, the locality of

Lomas de Teocalcingo has the largest percentage of Pjiekakjoo speakers with 34.6%. This will be further discussed in the section in which we approach the recent separation of Lomas de Teocalcingo from San Juan Atzingo.

Family

The basic unit of the society is the family, composed of parents and children. The families are patrilocal, as the male children that marry live with their parents, forming an extended family. There is a preference for sons, as they will stay at the parents' household, while the women will move to their husbands' homes. The son's opinion is taken into account more than that of the daughters, in general, but this has been changing. For example, the opinion of a daughter that has attended university might be preferred over that of a brother with less schooling.

Leisure

The principal form of leisure is soccer, with games on Sundays. Men participate in regional tournaments, which are taken very seriously. Women may stay home or go to cheer them on. For women the most important leisure activity is watching soap operas on television, one of the few opportunities for rest they have at the end of the day.

Teponaztle

The Teponaztle is considered to have been the most sacred object for the community from prehispanic times through to today. It is treated as if it was a saint, but it is also a musical instrument made of wood from the quince tree (*Cydonia oblonga*). There is a debate about the shape, as some say it represents a jaguar and others that it represents a dog. Yet others in the community claim they do not care about the shape. A copy of the Teponaztle is kept in the church, while the whereabouts of the original are kept secret for security reasons. Mora (1989) has mentioned that it is considered to be the protector of the community and that it is used to call people to ceremonies.

It is said that the "nana" (mother) of the Teponaztle is in Tepoztlán, Morelos, and that it has a brother in Malinalco. There is a story that on one occasion the Teponaztle was set facing east, and since the "mother" resides there, the Teponaztle left, and was later found in Zempoala. Since then the people are very careful to avoid placing it toward the east.

After that the people decided to cut his two front legs to prevent the Teponaztle from leaving the Tlahuica people. Custody of the Teponaztle has become controversial because of the internal divisions within the community. At the end of 2010 the *delegados* of the center wanted to take him to an exposition in Toluca, and the mayordomos strongly

opposed the idea, causing a bitter debate. The *delegados* ended up insulting a woman who opposed their proposal, claiming that she was not a native of San Juan even though she married a San Juanero and has lived in town for more than 20 years.

The delegación of la Loma de Teocalcingo made a copy of it so they could have their own Teponaztle. I have been surprised at the lack of respect shown to it, such as in the Ceremony of the Fifth Sun (Quinto sol), during which a child was allowed to sit on it for a picture. In the past one could not even touch it. I do not know if this attitude implies that the protocols about Teponaztle are really changing or if it was permitted simply because this was a copy of the original piece.



Figure 23. Copy of the original Teponaztle that is in the Church of San Juan Atzingo and Figure 24. Teponaztle with Cempasuchil flowers.

Traditional Clothing

The men used to wear a wool trouser that was replaced after the Mexican revolution by pants made of *manta*. Women continued to use clothing that they produced themselves until the 1950's; the wool skirt called *chincuete* or *enredo* and the wrap-around belt, known as a *faja*, that held it in place (Mora, 1989, Álvarez 2006). At present these traditional items of clothing are rarely worn for day-to-day activities, though they may be worn occasionally for traditional dances. For ceremonies such as the "Fifth sun" and to interact with tourists who visit the ecotourism project, they have adopted traditional shirts made of *manta*, made in other regions of the country such as Oaxaca and Chiapas. These are now commercialized in various regions of the country.

Ethnoterritory

According to Álvarez (2006), there is a general understanding of "upside" (*arriba*) and "downside" (*abajo*) in which you can localize the four original *neighborhoods* (*barrios*) of San Juan Atzingo. The center, the "atorón" and Teocalcingo were "up" while Nativitas and

the Carlos Hank neighborhood were “down”, with reference to the center the position from which the others is defined.²⁹ This duality is also expressed in a dual territory marked by the Zempoala and Tepetzingo hills, the former to the east of the community and the latter to the west. The Zempoalteca Mountain causes the rains and is located “upside,” while Tepetzingo is on the “downside.” Zempoala Hill is considered to be a woman and is called **Pluunda muu** (hill that gives water). Zempoala is the more important of the two, considered as the base of the territory, a protector of the community and from where the “dead” come on the days they are celebrated. This is evocative of what Vogt (1970:4) found among the Tzotzil population of Zinacantan, “almost all mountains...are the homes of the ancestral gods... (that are)...remote ancestors of the living Zinacantecos.”

For the Pjiekakjoo, the territory is ordered at a cosmogonic level: on the upside, Zempoala is associated with San Juan Bautista, and on the downside, Tepetzingo is associated with the Virgin of Nativitas. This is accompanied by the necessity to preserve and defend a particular space of life, characterized by prioritizing the commonwealth over personal interests. There is a story that used to be told by the grandparents: Zempoala is more water than anything else, so if it rains a lot it can come down. This happened once many centuries ago, and that is why Tepetzingo Hill, the son of Zempoala, ended up on the south side of town.

Myths and Beliefs

In the center of this millenarian culture there are many myths that I could not resist putting on record, notwithstanding their lack of relation to the main topic of this dissertation and my own insufficient training to effectively undertake their analysis. Therefore I decided to make a miscellaneous section of some of the myths I learned in San Juan Atzingo and La Loma de Teocalcingo.

- A. The snake and the money. They say that a person who is very greedy can make a deal with the devil who appears to that person in the form of a snake. If the person sells his soul for money, he needs to feed the snake,. The snake would then deliver the money overnight in a little receptacle that is left by its side. The only disadvantage is that the person cannot have offspring, and if he or she already has, his or her child would be unable to reproduce.
- B. It is believed that not everybody can see ghosts, but rather only persons that “have shadows” (*los que tienen sombra*), so the people who lack shadows can peacefully

²⁹ As mentioned above, the town was divided into two *delegaciones* on January 2008, and it was the Teocalcingo neighborhood (*barrio*) that became independent.

cross any dark road, but those with “that luck” would see ghosts or hear strange noises.

- C. It is believed that the hair of a baby should not be cut until they walk, otherwise they will take longer to learn to talk.
- D. It is believed the corn “talks,” as it makes noises when set directly on fire.
- E. It is believed the various godparents of the child should be the same couple, at least three of them, in order to form “a cross” in a symbolic way.
- F. When a baby takes too long to walk, they put some white of an egg on its knees, ankles and feet.
- G. When you want to really thank someone in Pjiekakjoo one says, “Thanks all the way down and all the way up” (*Gracias hasta arriba y hasta abajo*). They explained to me that this is because they thank all the way from God to Mother Earth.
- H. It is believed a boy should not cover himself with his mother's shawl, otherwise when he grows up he would be teased by bulls.
- I. In 2003 lightning killed three siblings but a sister survived. Since then, when it rains a cross appears on her back. It is believed that she was given the gift of healing people. She was already “*haciendo limpias*” (undertaking ceremonies to clean or purify the spirit) but she would get sick, so now her mother will not allow her to continue until she is older.
- J. Once a child tried to sell me a little bird, it was a *maicero*. An older man got close to have his say. When I told the child the bird would most likely die because it was too young, the old man said that the bird will not die if a child feeds it. There is a belief that if children feed very young birds they pass to them part of their vitality, or...“the child gives a little bit of his life to the bird, because the child has so much life ahead”.

Subsistence Strategies and Material Life

Cultivars

Corn, beans, carrots, green peas, lima beans and oats are cultivated. The Pjiekakjoo still manage to produce corn to feed the family during the year. They say the corn that they buy tastes different and “*no rinde igual*” (“it runs out sooner”). In many cases the reproduction of the “milpa” is possible thanks to remittances from migrant work in Mexico City and the USA; corn production is definitely not commercially profitable. There are also some families that produce *nopal* (prickly-pear cactus pads).

In the year 2000, approximately, these communities started building greenhouses for the production of decorative plants that are sold in regional markets and on the main road to Chalma, especially on weekends, when many travelers use this road to visit the sanctuary and also the archaeological site at Malinalco.

In 1989 Mora reported that the production of *ixtle* from agave to make rope was no longer practiced and that very few people still knew the technique. With the loss of rope production the tools used in its manufacture, including *la tarabilla*, *la base*, *pala de Encino*, *caxiffa*, *aradito de cruz* and *maruca*, were also lost. In addition products that were once knitted from *ixtle*, for example, the *onda*, vanished as well. Few elders still know how to knit them, so they only make them by request. As a result, they command good prices.

Pulque is produced for sale in Chalma and it contributes important income for some families, though local consumption has decreased considerably as now there is a preference for beer.

Livestock

Some families possess cows, bulls, horses and donkeys, and sheep. Chickens and turkeys are the most common livestock kept. It is said that there used to be more pigs in town. Now only a few families keep these animals.

Commerce

The most important commercial activity takes place on Tuesday in the Santiago Tianguistenco market, where people go to buy their goods for the week. Recently a small market was set up on Sundays on the main square of San Juan Atzingo, but it seems not to have had too much success. In 2010 a mini supermarket was established in Nativitas, along with several small stores.

Several families live from marketing food and *pulque* at Chalma. During the mushroom season, many people collect them and sell them at different markets in the area. At Christmas time they sell handicrafts made with *perilla* (*Symphoricarpos microphyllus*) and during this season they also sell Spanish moss (*Tillandsia usneoides*) and moss for nativity scenes.

Diet

As in many other Mesoamerican cultures the basic diet is made up of corn, beans, squash and chili peppers (*chile*). Those are complemented with seasonal vegetables, and fruits of the region (e.g. apples, pears, blackberries, *capulines* [a sort of wild cherry], and figs). The consumption of meat in general is not very common, though large differences in meat

consumption exist among the families depending on their income. The diet is complemented with some *quelites* (edible vegetables from the *milpa*³⁰), a few insect species and, in season, a considerable quantity of mushrooms. Hunting wild animals was banned when part of the Pjiekakjoo Territory was declared a national park. Previously, the consumption of several species of birds and small mammals was very common. People deny deer hunting, but I heard occasional conversations about recent hunts. For detailed information about edible species see Chapter VII.

Gastronomy

Like many other components of their culture, the gastronomy of the Pjiekakjoo is impressive, notwithstanding the claim by one expert that the contribution of this group to the Toluca Valley's gastronomy has been less than that of the Hñä hñus (Otomis) and Jñatos (Mazahuas), groups that according to this author have been able to maintain their vitality and inhabit numerous communities, unlike the Tlahuicas, who are almost extinct (Romero *et. al.*, 2010). What is certainly true is that all five Indigenous groups in the valley use a great variety of animal and vegetal species that are reflected in the rich and varied gastronomy that contrasts with that of the cities. This represents an enormous potential for local development. Just to mention a couple of examples, the Pjiekakjoo prepare in various ways more than 80 different species of mushrooms. Some species have special features: e.g. those that should be peeled to avoid the food becoming unpleasantly viscous, those that can be mixed with others and those that cannot, and finally the ones that can be eaten raw and the ones that cannot. A food that I find particularly interesting is the *tsin datze*, often eaten in times of hunger during the Mexican revolution, and that is prepared with a fruit seed: the *capulín* (*Prunus salicifolia*) and *quelites* (greens that sprout up in the *milpas* and elsewhere). I have tasted the most delicious alcoholic drinks in San Juan, prepared traditionally with different fruits; of particular relevance was the "sangre de pichón" (pigeon's blood) made with blackberry (*zarzamora*: *Rubus* spp).

Housing

The traditional wood house has been almost totally replaced by cement block constructions. Some people with whom I talked recognized that this latter material is not appropriate, as the block houses are very cold and humid for the climate of the region.

³⁰ "The Mexican milpa system refers to a complex combination of agronomic practices, crop associations and rotation sequences. Ancient in origin, the system is now practiced in ways that vary widely from one agro-environment or cultural context to another. The most fundamental components of the system are a cluster of maize, bean, and squash landraces planted in association" (Birol *et al.*, 2007)

However, people build them because they are considered to be of higher status and also because wood is harder to get nowadays and legally-cut timber is expensive. The houses have bedrooms and an external kitchen, around which daily activity is organized and where lot of time is spent around the fire.

Water and Electricity

The “water forest”, as the biological corridor in which the Pjiekakjoo territory sits is known provides water for the city of Cuernavaca, yet the communities have several problems related to their own water supply. The four neighborhoods only get water twice a week. The families are obliged to have tanks to save water. In the dry season water may arrive as little as once every two weeks. The town frequently has problems with the pipes, which may be blocked by garbage. Moreover, the water that the Pjiekakjoo families receive is not drinkable. It comes directly from springs³¹ in the mountains without any chemical treatment and is contaminated. This is one of the main health issues in San Juan and Teocalcingo, as this water is used for bathing and drinking, and many families do not disinfect the water correctly so it causes skin and stomach diseases.

Ninety-five percent of the homes have electricity and those that do not are located on the outskirts of town. There is not a proper sewage system in town and most families just have their own septic pit.

Health

The diseases that have the greatest impact in the communities are gastrointestinal and respiratory infections. The 2010 census (INEGI, 2010) reported 456 people without access to healthcare services in San Juan Atzingo and 212 in Lomas de Teocalcingo. Most of the population has no access to clinics operated by the Mexican Institute of Social Security (IMSS) or the Institute of Social Security and Services for State Workers (ISSSTE), the government health care services. The former is for private sector workers, the latter for state employees. The present administration (2006-2012) launched a new health care service called *seguro popular*, for people that do not have “formal” employment, and some people from San Juan and La Loma make use of it, or go to private physicians, though this is not always affordable.

Most families must attend meetings at the public health clinic once a month as part of a federal government welfare program called Opportunities. In these visits to the clinics, health issues are supposed to be detected and treated. The main problem with this clinic is

³¹ The names of the springs are: “*el chorrillo, las canoas, el Carrizo, las Chias, El Aguacate, Tepetongo, las Tripitas, San Antonio and Puxanda* (Castaños, 2006)

that it does not employ accredited physicians, rather relying on students who must undertake compulsory social service in order to complete their degrees. These medical students change every year, preventing continuity in their work with local people, as it takes some time for the townspeople to trust each new doctor who arrives in town. This, in addition to the cultural differences between doctors and the Pjiekakjoo, makes the system highly inefficient. There are no “professional healers” (persons who make a living as healers). People say that those most knowledgeable about traditional medicine have died, so they consult the elderly for traditional remedies. During my study there was a woman said to be a healer, but her relatives claimed she does not practice traditional medicine anymore as she lacked the certificate that the government offered some time ago that would have allowed her to be a healer and given her certain legal protection in case something went wrong. Some families are left with only regret for not having learned from their deceased grandmothers.

Food and diseases are classified according to their hot or cold natures, and this is considered very important to prevent and heal diseases, as it is said that the absence of equilibrium between the two in the body that causes illness. A good example for this is given by Mora (1989): a woman after giving birth gets cold, if she is not bathed with several plants she will get sick.³² The bathing of the women after the delivery to prevent “coldness” is a very common practice among different Indigenous groups, such as the Zapotecs (Hunn, 2008) and the Tlapanecos and Zoques (Biblioteca Digital de la Medicina Tradicional Mexicana, 2009), to name just a few examples.

Once on a walk through the forest Mrs. Tuna Neri found a little piece of obsidian. She told me that when someone was sick, they use to cut their forehead between the eyes with an obsidian blade so the diseases would leave the body.

In facing the economic crisis, the Tlahuica population, as do many other Indigenous peoples, use diversified means of production: *milpa* production, home-gardens, livestock raising, forestry extraction, food sales, *pulque* production, collection and marketing of wild mushrooms, handicrafts, and labor migration (Toledo, 2003).

Religion, Celebrations and Festivities

³² For a more detailed description of some of the cultural diseases see Mora (1989). [The term “cultural diseases” can be seen as a bit demeaning, as it implies that other diseases are somehow “not cultural” and objectively existing.]

Most of the population in San Juan and La Loma de Teocalcingo is Catholic. They have not allowed the penetration of other religions, as has been the case in many other Indigenous communities. This may sound like intolerance, but it may be one of the reasons why until some years ago they were able to maintain community cohesion, at least until the arrival of the political parties. The 2010 census reports 37³³ people affiliated with “other religions,” but it does not specify which ones. There may be people that have left the catholic religion, but they neither conduct public celebrations nor have a church.

The local priests are Augustinians, based at the churches of Ocuilan and Chalma. They visit the town on Sundays and if requested for special ceremonies. Saturdays there are catechism classes that children interested in making their first communion should attend, as well as those preparing for confirmation.

Popular religious expression in San Juan Atzingo has deviated from ecclesiastical norms, as it has resulted from an historical syncretism of the Spanish folk Catholicism and pre-Columbian religions. I have found that local priests are tolerant of this syncretism but indifferent to the Pijekakjoo culture. They have not developed a more inclusive vision of the catholic religion as practiced in this particular cultural context, as has been the case in the southern part of the country in states such as Oaxaca and Chiapas (Norget, 2007).

Symbolic and religious systems have two functions. On the one hand, they integrate worldview and, on the other, they establish the organizing principles of the social and economic realms. Religion also has the economic function of redistributing goods through a ceremonial apparatus that is part of the social system. Religious practices are thus part of the social system. They also have other functions of a social character, such as coordinating leisure-time activities, the affirmation of the collective consciousness, and the development of social relations (Mora, 1989).

Social life in San Juan Atzingo is built around the *mayordomías*³⁴, the Mesoamerican civil-religious hierarchy. Although for decades it was recognized that this system represents one the main pillar of Mesoamerican towns and villages since the 16th century, Chance, (1985:2) has argued that “while a civil hierarchy and fiesta offices did indeed exist in

³³ There are 19 non-catholic persons in San Juan Atzingo, three in Nativitas and 15 in Lomas de Teocalzingo (INEGI 2010)

³⁴ For a detailed description of the Religious celebrations see Ramírez and Reynoso (2001).

highland Indian communities in colonial times, the civil-religious hierarchy was mainly a post-Independence development of the 19th century".

These *mayordomías* are not under the control of the church (Chick, 1981) and they organize the annual calendar of the communities. Each saint of the church (or virgin) had lands that the *mayordomo* would cultivate to pay for the masses, candles, *copal*, celebration and procession undertaken to honor the saint. In this way the *mayordomías* distributed individual or family economic surpluses. As the *mayordomo* would invest this money in the celebration, it was a position that gave the individual great prestige within the community (Mora, 1989). This is still the case. At present, many things are and have been changing in the Pjiekakjoo communities, but if there is a communal organization that is working effectively, it is the *mayordomías*, since they have not allowed external interests to disrupt it. An example of things that have changed is the ringing of the bells. Decades ago bells were rung at three AM and at seven PM, but this is no longer done. Sadly, there are no more *rezanderos*, the persons in charge of praying in the religious ceremonies and events, as they have died and the younger generations have not learned the practice.

Basically, there is one *mayordomo* (who is supported by his wife) per saint, and his two "arms" or *bracitos*. It is their responsibility to take care of the saint and celebrate his festivities properly. All the *mayordomías* are supervised by the "mandón" who has a "santa vara de San José de Gracia", a wooden staff that represents the authority of the charge³⁵. The *mayordomo* has to look for his successors and several visits are made to the person that has accepted and who would choose his own *bracitos*. To make the commitment formal, the outgoing *mayordomo* and his *bracitos* take a "contento" to their successors. The *contento* consists of a basket full of fruit, boxes of beer, bottles of liquor and some dried goods (*abarrotés*). The future *mayordomo* and his *bracitos* also offer a meal to family members and friends. The *mayordomo* keeps a copy of the saint in his house for a year. People comment that it is becoming more and more difficult to find successors for a *mayordomía*, as it implies a very large expenditure for the families. They mention that in the past it was totally voluntarily and there were lists of people who were waiting to get the position. Currently there are fewer volunteers and in some cases people must almost be forced to accept. However, it is undeniable that once someone has accepted, under whatever circumstances, they will invest all their money and get in debt in order to make the celebration the way it should be done: magnificent

³⁵ Physically it is like the *vara de justicia* of the delegados, and made also of quince wood, but with the difference that on this one are carved the names of all the previous *mandones*.

Nowadays I have appreciated that the cargo system is still playing a key role in the Pjiekakjoo communities, despite the economic constraints and their immersion in the contemporary world, though certainly they are organized in a different manner than in the past.



Figure 25 Example of a *contento*.

Festivities and celebrations

The life of the community is organized around festivities; mostly religious except for school graduations which are big secular celebrations and that have become an important event among several Indigenous groups (for example see Hunn, 2008). I did not count how many weeks could pass in these towns without a party for one reason or another: weddings, first communions, baptisms, "*contentos*"³⁶ of different kinds, etc. Around a celebration, there is a complex social and cultural organization for the food preparation and serving process, for flower decorations, and to get everything ready and functional.

Mora (1989) discusses the implications and consequences of these festivities, and questions if the theories of Wolf, that has at the core his concept of the closed corporate community (Wolf, 1959), and Nash (1958) apply in the case of San Juan Atzingo. According to Wolf and Nash, the cargo system is a communal defense mechanism, protecting against intrusion and exploitation from without. In economic terms it prevents persons from accumulating wealth and in political terms it promotes a "democracy of the poor" in which there is no room for either persons or groups to monopolize power.

Mora (1989) reported that the ritual sense of the festivities has lost importance and new values have brought new perspectives on the festival system. It may be due to this that few

³⁶ Traditionally a big basket full of food, mainly fruits. Nowadays the content also includes soda, beer and wine bottles, as well as canned food. It symbolizes gratitude/commitment. It is taken to a person that accepts a religious duty (by the one leaving that duty), or to the parents of a woman by the parents of the man with whom she had eloped.

people attend mass and religious rituals, as these have been replaced by bullfights (corridas de toros) and dancing to commercial bands. In my opinion it is true that this has occurred to some extent, but we do not really know if in the past the entire community participated in these rituals or just those people directly involved. I have witnessed fairly young people assuming a great deal of responsibility for these festivals, such as acting as mayordomos, and also sense the sacred quality of these rituals for local people, even 21 years after Mora studied San Juan Atzingo (1989). People in the community complain about those who ignore the original religious or ceremonial importance of the festivals, and claim they have just become a means of showing off, as Mora also noted. However, what I have seen leads me to believe that this may be the case in some families only, as important sectors of the population seem to be very aware of the importance of their cultural heritage, of social cohesion, and of the survival of the traditions that the ancestors left them. I consider the festivals to be a way of distributing welfare, as it is important for a poor family with several children if they are able to eat "for free" for a couple of days. The children will eat in the guest house the day before the festival while their mother helps prepare the food, also the day of the festival itself, and commonly the day after, as again their mother will come to help clean up.

There is a new modality that may put this solidarity at risk. There were festivals at the end of 2010 and in 2011 for which the organizers hired cooks and waiters. Though this demonstrated the purchasing power of the organizer, it upset many people, who accused the organizer of being too proud to ask for help, and who commented that, of course, the food was nowhere near as good as if someone from town had prepared it. The time people spend visiting homes, taking a bottle of liquor to ask for help, as well as the time they spend together while cooking, is very important in social terms, despite the burden it may come to represent for some families. I hope that it will continue. I agree with Mora that people should be careful that these festivals not become just another form of meaningless consumption or just a way of imitating dominant cultural patterns.

Cancian (1965) documented how the cargo system and the festivities reflect stratification within a community and how the former transformed economic rank into prestige rank, in the Tzotzil speaking community of Zinacantan, Chiapas. In another study Cancian (1967:292) concluded that the cargo system "has a tendency to level wealth, it possesses an even greater propensity to stratify the population and legitimize existing economic differences".

More than thirty years ago, Cancian (1974) also addressed the changes in the cargo system of the Zinacantecos, addressing the way the way this system was being impacted by the development of an alternative status system based on consumer goods and the increase in the population. He also stated that the boundary maintenance dependent on the cargo system was breaking down. DeWalt (1975) ranked the contact that communities had with the "outside" world looking at variables such as: amount of geographical mobility of the population; distance from a large city; economic and social ties with large cities; number of wage laborers going outside the community to other areas of the state or nation; and, types of transportation facilities available to the community. He concluded that the degree of contact is associated with the relative decline of cargo systems and recognizes that each variable has a different role depending on the community, and that "the social and economic aspects indicate a secure future for fiesta systems, although organized in a different manner than has been the case in the past" (DeWalt, 1975:102). Other authors also noted the cargo system is tied to prestige (Carrasco, 1961; Vogt 1970; De Walt, 1975) and for some years the debate took place around the notions of cargo system as a defense mechanism or as an expropriation model. Chance's (1985) historical analysis concluded that if the cargo system levels or stratifies, expropriates or redistributes, this should not be the question, as it does not capture the complexity of the institution. He proposes that the cargo system be understood as more than a category, rather that it be treated as a process.

I will not describe all the celebrations in detail, but I will mention a few peculiarities of some of them. I will start with the religious festivals as celebrated during the life cycle, then pass to the communal festivities in the order they take place in a calendar year, and end with the secular celebrations.

Baptism

Prior to the baptism ceremony, before going to church, the main godmother comes to the home of the child to dress him or her with clothes she has bought for the occasion. Then all the family and invited guests go to church where the "standard" ceremony takes place. When they return to the house, the godparents have to give the child back to the parents with speeches given in a very ceremonial way. The parents or grandparents give thanks to the principal godparents for accepting the commitment. The principal godparents return the child emphasizing that now he or she is a Christian. After the ceremony, they say the

baptized child should take a nap to “rest his or her crisma” (*reposar su crisma*)”³⁷. A formal meal follows. The other godparents may be present,, such as those who contributed to the ceremony by financing the pictures or the “*recuerditos*”... Before the godparents leave, the parents give each of them a basket full of food: a chicken, *mole*, *tamales*, rice, etc., and thank the godparents again with another speech.



Figure 26. Christopher’s Baptism. The Godmother getting him dressed and Figure 27. Godparents and parents with the child at the church of San Juan Atzingo.

Marriage

Most often, after a couple has developed a relationship for some time, the young woman is taken by the boyfriend to his parents' house. The girl's parents are not advised of this in advance, but soon after a relative of the boyfriend goes to the girl's parents to let them know she is safe and sound. Typically, a young woman will elope in this way during a big dance or celebration. This is how a couple starts living together at the man's house. Afterwards, the boyfriend and his parents must visit the woman's parents and offer a *contento* that consists of a big basket with fruit, food, beer, and bottles of liquor. During this visit a wedding date is arranged. The time between when the woman leaves the home of her parents and the wedding varies considerably, mainly depending on the economic capacity of the groom to face the substantial commitment a wedding implies. Until the *contento* is official, the woman can not visit her parents, as they are upset and it is precisely the gifts and the setting of the wedding date that would make them accept the new situation. In my experience, weddings are the largest parties organized in the community, with as many as 500 guests invited for the banquet. This is possible due to the participation of godfathers and godmothers carefully chosen to support the celebration by covering certain expenses, such as the cake or the music. In addition there are godparents

³⁷ Crisma is the oil and balm that bishops bless on holy week.

(sponsors) of rings, *lazo*³⁸ (jeweled or beaded rope) and *velación*³⁹ who actively participate in the wedding mass. When a couple is asked to be godparents they are given a bottle of liquor, usually tequila.



Figure 28 Emmanuel and Lupita's wedding (May 2011).

In a traditional wedding, the animals to be served as food are slaughtered the day before the wedding. The day before the celebration the bride is picked up by her parents to spend her last night as an unmarried woman at their home. It is in the home of her parents that she will be dressed before going to the wedding. After the mass the new wife is given to the husband and his parents by the godparents of *velación* in the presence of the most important godparents. Then the newly married couple goes to the home of the bride to light the groom's candle on the altar of the bride's family, and the bride's candle is left at the home of the groom's family.

At the wedding the groom's parents and godparents perform the Turkey dance, carrying the "chiquihuites" (baskets) with a turkey, tortillas, tamales, mole and liquor. These are given away to the godparents of the party, to thank them for their participation, and the parents of the bride and groom and all the godparents become *compadritos* and *comadritas*, one of the most prestigious and respected relations in the community.

³⁸ It is part of the ceremony, and it symbolizes unity. It is a large loop of rosary beads or a cord that is placed in a figure eight shape around the necks of the couple after they have exchanged their vows and remains in that position during the rest of the ceremony. (<http://www.weddingdetails.com/lore/mexican.cfm>)

³⁹ These are the primary godparents and they make a commitment to give guidance for the duration of the marriage.

Death

When a person dies, the family organizes nine days of prayers, usually in the late afternoon. Family members offer tea or coffee and sweet bread to those who attend, and the people give them some food in return. On the ninth day the ceremony called “levantamiento de la cruz” (raising of the cross) takes place. This cross is made with the lime that has been placed beneath the body of the dead person during the wake (velorio). It is left there for the nine days of prayers called rosaries (rosarios) that are prayed starting the first night after the person died. It is commonly believed that the soul of the person is still present and only on the ninth day leaves completely. The cross is removed on the ninth day and people attend mass, after which they go to the cemetery and place the cross on the grave. I really like this process, as it gives the family and dear ones a time for mourning while the community accompanies them. In extensive sectors of the contemporary societies the mortuary ceremonies tend to be shorter and life is expected to continue almost as if nothing has happened.



Figure 29. The Blessing of the seeds, and Figure 30. The church of San Juan Atzingo.

Table 2. Annual Calendar of Celebrations. Modified from Mora (1989) and Alvarez (2006).

Month		Festivity
January	24	Paseo (Ride)/Mojiganga
	31	San Juan Bosco
February	2	La Candelaria (Candlemas day). Blessing of seeds.
	20	Pilgrimage to the Villa of the Virgin of Guadalupe
March		Lent. Palm Sunday. Nacatamales
April		Washing of las Varas de Justicia
May	3	Festivity of the Holy Cross
	21	Fifth Sun Celebration
		Month of the Virgin Mary
June	24	San Juan Bautista (Saint John the Baptist)
July		Graduation parties from kindergarten to high school
August	6	San Salvador
	17-21	Thursday. Pilgrimage to Chalma
September	8	Festivities of the Nativity Virgin
	10	San Nicolás (Saint Nicolas)
		Pilgrimage with the Virgin of the Conception
October	18	San Lucas. Festivity for the animals involved in farm work
	29	San Miguel. "Cuelga a las milpas". Holding of branches of <i>pericón</i>
November	1,2	Day of the Dead
December	12	Festivity of the Virgin of Guadalupe. "Combate": the owner of the milpa throws a party for the workers who helped in the harvesting
	19	Posadas



Figure 31 and Figure 32 San Juan Bosco's celebration day at the Church of San Juan Atzingo.

Mojiganga/Paseo (Ride)

The Mojiganga is organized to invite the inhabitants of the surrounding localities to the festival celebrating the patron saint of the town (January 31). It involves decorated cars,

clowns and men dressed as women, called “*las locas*” (the crazy women). They walk through town and other nearby towns, dancing and throwing candies to the spectators.



Figure 33 and Figure 34. Mojiganga in San Juan Atzingo (2010).

Holy saturday

On Holy Saturday the “*varas de justicia*” are washed in the home of the first *delegado*. They are washed with an herbal infusion made from *trébol* (clover, *Trifolium spp.*), *cempasuchil* (marigold, *Tagetes spp.*), *cabellito* and *heno* (*Tillandsia usneoides*) all taken from a *Tejamanil*⁴⁰ that is made on the 3rd of May. They are washed with a new *jícara* (cup or bowl made from a gourd) and dried with a new cloth.



Figure 35 Doña Lina holding a Tejamanil (see footnote 24).

⁴⁰ A cross of wood covered with plants and flowers.

Easter Sunday

The *varas de justicias* are taken to mass and similar staffs are blessed and given away by the *delegados* to all the people. It is believed that they can be burned in case of a natural catastrophe to slow or stop it. The *delegados* offer "*nacatamales*", that are special as they include meat, the first that is eaten after holy week. They therefore represent the end of Lent.



Figure 36. Delegados and Figure 37. Easter Sunday at La Loma de Teocalcingo (April 2011).

May 3rd, Day of the Holy Cross

On this day the people climb to the top of Zempoala, where there are three wooden crosses made to ask for rain. These crosses are decorated with flowers. Copal is burnt in the incense-holder. Originally people spent the night there, setting off fireworks and praying for rain, but at present they tell some stories and get drunk. There are similar celebrations among the Zapotecs and Chatinos (Hunn, 2008).



Figure 38. Day of the Holy Cross at the top of Zempoala (May 2007). Photo by Emmanuel Felipe Neri

September 10th, San Nicolás

Besides the typical mass and the meal offered by the *mandon*⁴¹, during this celebration small loaves of bread are blessed, then given away. This bread may be kept for later, and it has the capacity to heal people. These loaves are also used to form a cross in the *sincolote*⁴², before putting the corn there, a propitiation rite to assure that the corn lasts longer.

October 18th, San Lucas, Bull's day

On the day of San Lucas (Saint Luke), animals involved in farm work are celebrated. The first activity related to the celebration is a visit to the milpa, to bring back some corn. This corn is used to make *tlazcales*⁴³, a type of thick, sweet tortilla. They are made with sugar and cinnamon. After passing the incense burner over garlands made with *cempasúchil* flowers (*Tagetes erecta*) and four *tlazcales* are strung into them, the flowered necklaces are placed around the necks of the bulls (they may also be made for donkeys and horses) and then the incense burner is passed over the animals. Mole or a special meal is prepared and, of course, there are fireworks.

Some years ago, a family would choose a godfather for the animals, who would pay for the food and flowers, but that tradition is no longer in use, nor is the tradition of taking the animals to mass.



Figure 39. Baskets with cempasúchil flowers for the San Lucas's celebration and Figure 40. The Blessing of the livestock.

⁴¹ There is one *mandon* for each of the saint's images at the church. He is responsible for taking care of that image and organizing the celebrations around it.

⁴² Traditional structure made of wooden bars in which the harvested corn is kept.

⁴³ Type of tortilla, but a sweet one that is prepared with sugar and cinnamon. It is also important to use very tender corn (*elotes*) for its preparation.



Figure 41. The celebration of San Lucas at Nativitas (October 2007).

Archangel San Miguel

For the celebration of Archangel Saint Michael (Michaelmas), crosses made of pericón (*Tagetes lucida*) are hung on external walls of the houses, the four corners of the *milpa*, cars and trees. These are set out on September 27 and 28, so that they will flower by September 29, the day of San Miguel Archangel. The Pjiekakjoo celebrate that this saint caught the devil, but as the devil was free in the days before his capture, the crosses are needed to scare him away, aided by the setting off of fireworks. The crosses have an aesthetic appeal. They are left in place the whole year. It is possible that this celebration dates from prehispanic times, and that the missionaries just added the saint's celebration, as in some regions of Morelos state it takes place without any association to the archangel (Bock, 1980).

Furthermore, it is on this day that the people go to the *milpa* to harvest the first corn (*elotes*).



Figure 42 Pericón cross (*Tagetes lucida*), hung on a house on the day of San Miguel Archangel, to protect the house from the devil.

Pilgrimage of the Virgin of the (Immaculate) Conception

On September 8th the Virgin of the (Immaculate) Conception is celebrated. The image of the Virgin in San Juan Atzingo is taken to Tenancingo every year. They leave on the

afternoon of September 7, spend the night in a house, then take the image to the church the next day. Finally on September 9 they come back. Like the other images, the image of the Virgin has a *mayordomo* who is in charge of organizing the pilgrimage.

Day of the Dead

The Pjiekakjoo, like many other Mesamerican cultures, celebrate the Day of the Dead. It is believed that dead ancestors and dear ones come back for a couple of days at this time. To welcome them an offering of their favorite foods is set out. The Celebration starts on October 28, when an offering is set out for people who have died in accidents. On October 29 an offering for dead children is made, and finally, on November 1, another is set out for the adults. The offering includes a path of *cempasúchil* flowers to guide the dead. Food preparation usually starts one day before, when elaborate dishes, such as mole and *tamales*, are prepared, while candles, bottles of liquor and flowers are purchased in preparation. The offering should be made at noon on each of the corresponding days, as that is the time when the souls begin to arrive. The offering is left in place until November 2, when the people say they "walk" the dead back to the cemetery, carrying the candles that were part of the offering. It is believed that the dead take with them only the aromas of the food and drinks that are offered to them. The people who died in the previous year are not allowed to come. They must stay and take care of the doors of heaven, and must await the following year to visit the people that are alive. It is believed that the dead stay until the *pizca*, and it is only after they have helped to harvest that they leave. This is the reason why in the offering *ayates* should be included

People remember that some years ago everything that was in the offering had to be new. Even today some women embroider new tablecloths especially for this celebration.

The setting of the offering is a highly emotional ceremony. I had the opportunity to attend one in the *delegación* of Lomas de Teocalcingo. It is hard to watch these hard working men talking with their ancestors, first to their past authorities and then to their relatives. Some even cried, which caught me totally unprepared. The first thing they put on the table of the offering was the "*varas de mando*" of the *delegados*, then two elders started putting out the food and the bottles of liquor. The food was taken from the baskets brought by the wives of the *delegados*. They were covered with beautiful hand embroidered napkins.

On November 2, *compadres* and *comadres* are visited in particular but also the extended family and friends. Food from the offerings that is given away to each person is called “the rabbit.”



Figure 43 and Figure 44 The Day of the Dead celebration at La Loma de Teocalcingo Indigenous *delegación* (November 2010).

Fifth Sun celebration

According to the Mesoamerican myth of the Fifth Sun, the creation of the world and of humanity has passed through five stages, each under the regime of a particular sun. These stages encompassed numerous 52 year cycles, each sun of a different length but all ending with a natural catastrophe. Presently we are living in the fifth sun called “4 Movement” (Ollin in Náhuatl). It is believed that during this sun there will be earthquakes and hunger.

The Pjiekakjoo hold a ceremony at the spring solstice during which they light a new fire that represents a new cycle, give thanks for the past harvest, and request help for a good harvest the coming year. The ceremony that I observed took place in what seemed to be an archeological site, on the top of what they claim is a pyramid, located about 40 minutes from San Juan Atzingo down a dirt road. The guests of honor received a necklace of *cempasúchil* flowers (*Tagetes erecta*) and were asked to come to the front. After

several speeches and brief presentations by children about the origin of the Pjiekakjoo people, Alejandro Ramírez, the Supreme Tlahuica Chief, conducted the ceremony. He offered prayers to the four cardinal points before setting the new fire, represented by a bonfire. After this, we all went down to eat food that families invited by the *delegados* had brought.

For me the Fifth Sun ceremony shows how, even though the group has been assimilating for centuries to the dominant culture, they play with new elements borrowed from the colonizing culture. There remains certain continuity in their worldview, practices, and ways of organization that reinforces their identity.

In 1987, the government of the State of Mexico started organizing the Fifth Sun festival in order to attract tourism and, at least in their discourse, to recognize the importance of Indigenous cultures. The Pjiekakjoo participated for several years, but then decided not to continue as they consider unfair that some of the organizers would make a good business out of it, with profits that were not shared with them. The Tlahuicas complain that on some occasions they even ended up investing their own money to participate in the event.



Figure 45 and Figure 46 The Fifth Sun Festival (May 2011).

Graduation Ceremonies (Clausuras)

In recent years graduation ceremonies have acquired a great deal of significance in the community. It seems not to matter the level of the grade obtained. Parties are organized for children who finish kindergarten as well as for students finishing High School. First there is a ceremony at the school, where, after honoring the national flag and singing the national anthem, students perform, mainly dancing - though some may recite a poem -, and of course the graduating students dance "the waltz." The graduating students dress up in sumptuous attire, particularly the girls in long dresses with crinoline. Graduation godparents are selected for this event, and they should bring presents and flowers. After the ceremony

at the school, the family invites the godparents and the extended family for a meal. In July 2011, I had the honor of being the godmother of Daniel, who finished kindergarten. I especially liked the dances in which even mothers and teachers participated and that everyone ate a meal together, due to the small number of graduating students. As I told my new compadres, it was a nice way of reinforcing the communitarian spirit. Therefore we may witness some changes in the communities, but some essential values, such as cultivating communitarian interaction, prevail.



Figure 47 and 48 Graduation day. A) at the Kindergarten (July 2011) and B) at the Primary school (July 2010).

Civic celebrations: Independence day and the day of the Revolution

These two civic festivals are of particular relevance in these towns. For Independence Day, September 15, they have their own ceremony where the first delegado “da el grito”⁴⁴. Afterward, the delegados organize a dance and serve food to those who attend.

For the Day of the Revolution, November 20, a parade is organized by all the schools. The delegados walk in front, shouting cheers (vivas) to the revolutionary heroes and to the nation while the students walk behind, with their bright and shiny uniforms, or in some cases, their costumes.

I am critical of these events, as I do not believe that they make the students sufficiently conscious of their history. In one celebration I attended, there was dancing to American songs, cheerleaders, and other acts totally unrelated to the historical event being celebrated. At one point, a person tried to read a document signed by Emiliano Zapata, but the crowd dispersed and the audience paid no attention. The show was over. These events then fulfill their objective of reinforcing the communitarian life but totally fail in

⁴⁴ A Mexican tradition, in which the president shouts cheers (vivas) to Mexico and to the Independence heroes.

making their inhabitants more aware of the importance of their role in the regional and even national history.



Figure 49. Parades at San Juan Atzingo on the Day of the Revolution and Figure 50. "El Grito", on Independence day.

Harvest

If during the harvest someone finds four *elotes* together, that person is designated as the godfather/godmother for the decoration of the *sincolote*. This celebration takes part some days after the harvest, when they put all the corn in the *sincolote*. These godparents have to adorn it with flowers and colored paper while the godmother passes the incense burner around it, besides, of course, preparing a meal. Before putting the harvest inside the *sincolote*, they place four sanctified loaves of bread from San Nicolás' day inside of it, forming a cross, and fireworks are set off.

Traditional Dances

There used to be traditional dancing called *Las Pastoras*, but it is no longer performed. Another common dance in community celebrations is that of the "apaches," but nowadays there is just one person in La Loma de Teocalcingo who dances with the "apaches," who now come from other communities to the celebrations. In San Juan they have *Chinelos* and *Arrieros* groups that dance for hours during the main religious celebrations and are formed by volunteers of all ages.



51



52



53



54

Figure 51. Arrieros, 52. Chinelos, 53. Concheros and 54. Little chinelos.

Pjiekakajoo's participation in the national and international level

Mass Media and Telecommunications

Television is the most commonly used medium, but there are very few open access channels, only the commercial ones can be viewed clearly. Women are big fans of the famous Mexican soap operas, and men of the football games. In the first half of 2011, cable television was introduced, which gave the town access to several additional national and international channels. The closest place where you can buy a newspaper is Santiago Tianguistenco. There is no access to regular mail service in San Juan Atzingo.

As of July 2011 the communities were without an Internet connection. In order to use it young people go to Santa Martha, a small town twenty minutes away by bus, on the road to Chalma. The townspeople say that Telmex, the Mexican company that has a near monopoly on internet and, in general, phone service, has punished them. The story goes back a few decades, when trucks came into their territory to install antennas. The technicians did not ask permission of the authorities, who, once they noticed the presence of the telephone workers, demanded money from them for permission to install the antennas. Repeating a fairly common practice in Mexican Indigenous communities, the authorities would not release the technicians until they had paid. In the end the company did give the authorities some money, but the Pjiekakjoo claim that they were punished because of this incident and now they cannot have an internet connection and it is very difficult to have phone service installed. Many of the families use cellular phones instead, but the signal has not been very good until recently, when another antenna was installed (April 2011). The middle school has internet service, but only for teachers. I have used a broadband connection there and I am under the impression that others can do the same, but it is expensive because charges accrue according to the amount of information downloaded. Though few families have fixed phone lines, the use of cell phones is becoming very common, mainly to receive phone calls from migrant relatives.

Though some national as well as regional radio stations can be heard, the “*delegados*” use loud-speakers, to call people to the “*delegación*.” As I mentioned before, a communitarian radio project working with several loud-speakers located in different parts of the town had been started. It was promoted by some students from the Intercultural University of the State of Mexico and a woman, born in town but raised in Mexico City, who has been embracing her identity as Pjiekakajoo and working to promote cultural survival in San Juan Atzingo. The project was boycotted and the cable was continually cut. The cabin of the radio was named “Emiliano Zapata.” An uninvited agent from the Interior Ministry appeared during in the opening of the station (April 2007), requesting that the students change the name of the cabin, as it could be associated with the modern day “Zapatistas.”⁴⁵ The students responded that there was also a kindergarten named “Emiliano Zapata” and that did not mean that the kids attending it would become Zapatistas. In the end the students were allowed to keep the name. Sadly this project did

⁴⁵ Making reference to the Zapatista Army for National Liberation (*Ejército Zapatista de Liberación Nacional*, EZLN), that declared war on the Mexican government on January 1, 1994. Mostly composed of Indigenous people from Chiapas, it is considered to be a revolutionary movement that has made Mexican society realize that there are contemporary “Indians” that live in difficult conditions.

not survive, despite the funding received from the Mexican Institute for Youth (Instituto Mexicano de la Juventud, INJUVE).

An informal but perhaps effective form of communication appears in town from time to time (about once or twice a month). Papers detailing "gossip" have been appearing on the streets. The papers are left in a plastic bag (to protect them from rain) and carefully clamped shut. The writing is often offensive, discussing the personal lives of various local people, though the papers also sometimes question local authorities, challenging their decisions and their management of economic resources.

Once again, notwithstanding some limitations, the Pjiekakjoo manage to make use of some technological advances. For example the Ecotourism Project has its own web page. The youth go to the nearby town of Santa Mónica where they can access the internet. As part of my collaborative research with the present authorities of Lomas de Teocalcingo, we plan to establish a webpage for the community as a way to get more people to know and learn about the Pjiekakjoo culture.

Schooling

The two communities in which this research was undertaken have enough schools for what is considered basic schooling for the population. In San Juan Atzingo, there are: 1) a School of Initial Indigenous Education Lázaro Cárdenas, 2) two kindergartens (Emiliano Zapata in Nativitas and Ignacio González Guzmán in the center), 3) a federal primary school, Cuauhtémoc, 4) a Escuela Secundaria Técnica Agropecuaria No. 22, Belisario Domínguez (that dates from 1985) and 5) a Centro de Educación Media Superior a Distancia (EMSAD), since 1988.

In Teocalcingo, there is a federal bilingual kindergarten "Justo Sierra" and also a primary school named after J. Trinidad Tiburcio Santos. In theory in this school the children have a bilingual education, learning in Spanish and in Pjiekakjoo. The story of this school is of special interest, as it was built by the community with money from a contest they won for the reforestation work they had undertaken. Construction is still in progress as they did not have enough money to finish it. The school has only four classrooms which thus far are sufficient because the school has one teacher per two grades. However, the people hope the school population will grow enough to justify one teacher per grade. Therefore they want to build more classrooms and a library.

The levels of schooling have risen considerably in recent years. In 1989 the levels of schooling were as follows: 776 people who have finished or are currently studying in

primary school, 87 in secondary, and 14 in high school⁴⁶. In that year no one in the community had attended university (Mora, 1989). This has changed, as now they have their own high school and each year approximately 30 students graduate from it. As of July 2011, there were nine students who finished courses at the UIEM (Universidad Intercultural del Estado de México), and another two attending that institution. It is very difficult for the students to be accepted at the larger and more prestigious universities, but still some manage. In 2011 one young man, the first to attend one of the principal universities in Mexico City, is finishing his second year in the engineering program at the UAM (Universidad Autónoma Metropolitana). There are a few students studying at state universities. A few more attend small private schools that have emerged as a response to the specific demands of rural students who wish to attend university and whose parents can support them in these efforts.

Table 3. Schooling statistics according to the 2010 Census (INEGI, 2010).

Locality	San Juan Atzingo	Nativitas	Lomas de Teocalcingo
Population 15 years old and older that has finished primary school	89	42	55
Population 15 years old and older that has finished secondary school	179	72	100
Population 18 years old and older that has some post-basic education	93	59	53
Average number of years of schooling	7.03	7.08	6.61

Teachers no longer punish students for speaking in their mother tongue. This has been abandoned along with official racism, but the impressive patrimony of the Pjiekakjoo culture is still dismissed by the formal educational system. School programs are far from considering what is valuable to learn from the Pjiekakjoo, beyond the occasional item of folklore. Bilingual schools are an exception. The local kindergarten has a teacher who is a native of San Juan Atzingo who encourages her students to appreciate their Indigenous language. The primary school case is complex and discouraging, as the General Direction of Indigenous Education has not given teaching positions to native Tlahuica speakers, claiming that there was no candidate with the required schooling. This may have been true in the past, but no longer, as there are several students in both communities who have finished their courses in the Language and Culture Department at the UIEM who would be able to fill the positions. Presently, some teachers do speak an Indigenous language, but it

⁴⁶ In the USA the middle school would be the equivalent to the *secundaria* and the junior high schools to the *preparatoria*.

is Hñä Hñu (Otomi) rather than Tlahuica. Obviously, despite the enthusiasm of the teachers, local education is far from being “bilingual.” While the presence of the Hñä Hñu teacher is important, as it promotes a positive attitude among the students toward their linguistic heritage, it would clearly be more beneficial to have a Tlahuica speaker in the classroom. The *delegados* and the supreme Tlahuica chief have been trying to get at least one position in the primary school for a Tlahuica speaker.

The schools were the instruments through which post-revolutionary education arrived in many Indigenous communities, with the aim of homogenizing all the populations as Mexicans. The same institution, the school, should – I would say must - be the instrument through which the surviving generations of Indigenous groups learn the value of their cultural heritage. Just as school encouraged replacing certain traditional elements with new ones, such as Spanish for Pjiekakjoo, liquor for pulque, commercial music for traditional dances and music, polyester for wool, plastic for ixtle, and for clay and wood (Mora, 1989), I believe that now it's the duty of formal schooling to promote the value of cultural diversity and to work for its conservation.

Migration

The approach to Pjiekakjoo migration in my present research aimed to leave behind the still predominant idea of “Indigenous” as life in the “wilderness,” far from Western civilization (Aldrete 2005). Because of this idea, urban Indians and the Indigenous Diaspora⁴⁷ in general have not received adequate attention. The migration of Indigenous people challenges the ideas that prevail about them as fundamentally rural people related to a stable territorial community, who resist change and are immune to the demands of modernization: that is, cultural and ideologically conservative people (Varese, 2005).

Clifford (1997) wrote that the rural and traditional village can be considered as a transit room, and that it represents the world order of mobility, of histories of detachment. This is precisely to some extent the case for the Pjiekakjoo communities. The reality of the Pjiekakjoo demands the construction of an anthropological ethnography with an inherent multilocal focus that encompasses the multiple connections that its members have to

⁴⁷Diaspora concept by Varese (2005:13):“ ...geographical dispersion of a people and therefore, as a concept that defines people who live far from their ancestral territories. The notion of diaspora includes the connotation that the residence in territories distant from their own is not voluntary but in part is the result of pressures from people, communities or classes different from their own”.(Translated by the author).

several places, times, and spaces. In order to stop “de-localizing the cultures,” it needs to be recognized that tribal groups were never simply “local,” as they were always attached to specific landscapes within regional and interregional networks (Clifford, 1997). I assume from a historical point of view that the Pjiekakjoo communities have been intensely immersed in networks of commerce due to their geographical position, and have for many years participated in the regional, national and international labor market. Pjiekakjoo people participate in complex networks that exceed their own cultures and nations. I consider San Juan Atzingo and La *Delegación* Indígena Tlahuica Teocalcingo to be transnational communities with significantly different modalities of inside-outside connection, remembering that travel, or displacement, can include forces that cross spaces: TV, radio, tourists, merchandise, movies, music, etc., Due to this, even without moving from their place of origin, people have access to other ways of living and diverse cultures. As Clifford (1997) asked: How are the subjects culturally located? Marcus and Fischer (1986) addressed this question with their proposal of multi-sited ethnography to do justice to the transnational political, economic and cultural forces that crisscross and help constitute local and regional worlds. The question for me would be, Do we need to move across different geographical spaces to make multi-sited ethnography?

There are no ethnographic studies of Pjiekakjoo migrations and transnationalism, despite the key role that they have played in the social and cultural reproduction of this ethnic group. Therefore I decided to approach it as a way of contextualizing my research about TEK and to study the essential resource that it embodies in the creation of a “transnational sense of place” (Pieroni and Vandebroek 2007, Mares and Peña 2010).

In the Pjiekakjoo communities there is circular migration, essential for the communities' survival for the cash that urban and transnational migrants bring to it. I have already mentioned in Chapter 2 how remittances make it possible to continue to cultivate corn⁴⁸. Families and communities seem to have achieved a balance, connected to personal and economic interests. Some members leave and some stay to continue with the peasant life, often subsidized by the migrants. The migrants in return are able to maintain their citizenship and their identity, their roots in the community and home territory.

The Pjiekakjoo have been migrating for decades to Mexico City and to the U.S. People do not know exactly when this began, but they mention that those who have been outside

⁴⁸ Rivermar (2004) also commented how remittances subsidize the agriculture activities in Xoyatla, a Nahuatl community of Puebla.

longer first migrated around 40 years ago⁴⁹. In the 1970's many young women migrated to Mexico City to work cleaning houses. The main concentrations of Pjiekakjoo people in Mexico City are in Chalco and Ciudad Netzahualcoyotl (or Neza, as it is commonly called), both poor areas characterized by a lack of services and the prevalence of migrants. Nowadays there are also some Pjiekakjoo families in Toluca and Cuernavaca. The men may work in the construction industry or as merchants. And women work cleaning houses or selling food or other merchandise, but there has not been specialization in certain jobs; they have very diverse occupations.

Pjiekakjoo people migrate not only for labor reasons, but also for education. In the last decade the number of students who managed to attend university has increased. They attend some of the regional universities but also some in Mexico City. San Felipe del Progreso, where the Intercultural University of Mexico State is situated, has also become an important destination for Pjiekakjoo students.

Castaños (2006) mentioned that according to community authorities the percentage of people outside San Juan Atzingo was of around 9% of the population.

The phenomenon of migration is very familiar to the community. An interesting ethnographic episode that I experience was at the bilingual primary school. When I was explaining to the students the purposes of my visit in town, I told them I went there to learn something I could not learn anywhere else, and I wanted them to guess. I was thinking about their language and their environmental knowledge, but as they were unable to guess I asked them where else I could find Tlahuicas. To my surprise they started naming several places in California such as San Francisco, Sacramento and Los Angeles and places in Mexico such as Cuernavaca and Mexico City. In that classroom there was a child wearing a cap with an image of the Virgin of Guadalupe set between U.S. and Mexican flags. Another episode involved a five year old child, who told his mother that he is going to sell his bike in order to get the money to migrate to the U.S. When his grandmother tries to teach him some Pjiekakjoo he gets mad and claims he wants to learn English, not Pjiekakjoo.

There are several patterns of migration. The urban pattern tends to be more permanent, but there are also some people who go to cities only to work for a few weeks and then

⁴⁹ There are a few cases of people who have more years of migration. There is a man they say who was already living in the U.S. in the 1960s. An interesting case is that of a woman, working as a housekeeper in Mexico City, who migrated with the family with whom she was working, but she came back to town to deliver one of her babies.

return to their community to stay with their family, others commute from Monday to Friday, spending the weekends at their hometown. Others leave and raise their children in the cities. They commonly make frequent visits to their families in the home community.

Most migrants to the U.S. go for several years, save money and then come back home once they have built a house in the home community and/or saved enough money to start their own business.

A few Pjiekakjoo families have earned U.S. citizenship and have settled down in the U.S. To be able to cross the border legally facilitates their visits to their home community once a year or every few years. Some of these families include the migrants who support the so-called nostalgia trade. Some of the products they take with them to their migrant destinations are: *jumiles*, *chapulines*, *habas*, *chilacayotes*, *metates*, *anafres*, and *cazuelas*. Some of these migrants come in December for the "posadas" and stay until the town's patron saint celebration at the end of January. People commented how some years ago, even some of those who crossed the border illegally would come home for Christmas, but that after September 2011 crossing the border has been more difficult, so they no longer come.

According to Castaños (2006), the primary places where Pjiekakjoo migrate in the U.S. are: Sacramento, San Jose and Los Angeles (California), North Carolina and Washington State. According to some of the migrants, you can find people from San Juan and Teocalcingo in California at Santa Ana, Costa Mesa, San Jose, Oakland, Bakersfield, Sacramento, Cambria Park, Modesto, Las Vegas and San Francisco; in Washington at Okanogan, Forks, and Olympia; in Oregon and to a lesser extent in other states, such as North Carolina, Virginia, Georgia (Atlanta), Idaho, Illinois (Chicago), Missouri and New York.

Though there is a major concentration in California, the Pjiekakjoo have spread all over the U.S. They do not necessarily stay within a Pjiekakjoo community abroad, especially the younger migrants; I have learned of several who met other Mexicans and then started travelling and living with them.

Many of the migrants who work in the agricultural sector have not settled down; especially those who do not have family in the U.S. They follow the cycles of the harvest of different products. They may work harvesting blueberries in Idaho, then go to work on the potato fields in the same state, then follow the wheat harvest in Montana. Afterwards they may go

to pick mushrooms in Forks and Olympia, Washington, and finish in the same state harvesting nectarines, plums, apples, cherries and pears.

They are organized in "*cuadrillas*" (teams of workers) of 12 to 14 people who travel together throughout the year.

There are different versions of the Tlahuica community in the U.S. Some people noted how some migrants have a football team and that they get together for celebrations. Others claim that relations of solidarity among "*paisanos*" and even among family members are adversely affected, as everything turns around making money. Some migrants organize to send money. At a community celebration in January 2007, in the middle of the dancing, they thanked the migrants in Sacramento for their economic support. However, they do not participate in any big transnational/trans-ethnic organization such as has been the case with Mixtecs and Zapotecs.

A process that has been widely reviewed in the academic literature is the complexity of the migration process. I met a couple who migrated at a young age to Mexico City where they raised their children. After their children grew up they decided to come back to San Juan Atzingo. One of their sons decided to migrate to the U.S. for several years, after which he came back to the town. So migration is not a linear process, to Mexico City or the U.S. Some people have lived in several places during their lives. There are many cases of migrants who, after having lived 20 or 30 years outside the community, come back. You can find different patterns of migration among a single family. Another challenge for social scientists is to consider migration circuits rather than linear migration, as Clifford (1997) suggested: "...instead of asking where are you from?, we better ask between where and where are you?" Rouse (1991) documented "transnational migrant circuits" between Aguililla (Michoacán) and Redwood City, California, and showed how these two geographically separated places have become a single space through the continuous circulation of people, money, merchandise and information.

Besserer (2004) and Besserer and Kearney (2006) have proposed the concept of *transnational topographies* and a methodology to study them. This concept emphasizes the fact that transnational communities are multicentric, multidimensional and multidirectional.

At the national level there is a tendency to emphasize the economic impact of migration and of remittances for Mexico⁵⁰, while the socio-cultural impacts of migration are frequently overlooked. It is not my intention to make such an analysis for the Pjiekakjoo but I would like to briefly comment on some of the main consequences I have noticed.

The impact of migration is a difficult issue with which migrants and non-migrants have to deal. I have heard housewives and children claim that they would rather have less money but have their fathers at home. Children feel the paternal absences and the women are left with all the responsibility, not only for the family, but also for cultivating the land and taking care of the cattle. Mora (1989) commented on the impact of migration on local agricultural practices.

Sometimes things get even more complicated for the women, when their spouses in the U.S., get involved with someone else and eventually establish another family. Then women in the town are really left alone, as they are left with neither economic nor moral support.

One migrant told me how he decided to come back after almost seven years of living in the U.S. He was looking at some pictures of a relative who had come to visit from San Juan Atzingo when he recognized that the picture of young men sitting on a bed was taken at his house. He got angry and asked who those guys were. To his total surprise he was told that they were his sons. He told me that that night he decided to come back, as he realized he has not seen his sons growing up. He was shocked to realize that he could not even recognize his own sons. The ages of children when the father left is one of the most common memories for many women: "He left when my son, who is four now, was a new born".

Some women described the predicament they faced when their husbands wanted to take them to the U.S., leaving behind the older children in charge of the younger ones. One said no, as her youngest son was two years old and she considered that he needed her. The husband told her she could come with him, and later they could try to get the child to cross the border with fake papers. She started to consider it, until she remembered the story of a child who was permanently damaged by the drug that the people in charge of taking

⁵⁰ For the impact of migradollars in Mexico see Aldasoro (2005) *Migradollars*. The Oxford Encyclopedia of Latinos and Latinas in the United States. Edited by Suzanne Oboler and Deena J. González. A new edition is in press.

them across the border used to make him sleep, as the dose was too strong. She thought there was no need to put her youngest son's life at risk⁵¹.

Mothers and elderly people frequently complain that their children are all scattered. For example, a woman told me that of her eight children, three are in Mexico City, four in the U.S., and only one left in town. She asks how this could be possible. Another grandmother told me she cannot understand how it is possible that she has grandchildren whom she has never met and that she likely never will meet. She suffers, always wondering how they are doing so far away from their hometown.

One sad story is of an old man who was taken to the U.S. when his wife died. Some years have passed, he has grown old, and he wishes to die in his hometown, but none of his sons want to come back to keep him company. There is only one son left in town, and he is the only one who understands his father's wishes to return. Another sad part of migration are the cases of migrants who die in the U.S. and the pain for their relatives when only a corpse returns.

Men participating in the administration of the new *delegación* of Teocalcingo, claim that there is no need to migrate if one works hard. They accuse some migrants of enjoying being away just for the adventure of traveling. They say that migrants can save capital quickly, but only if they are very disciplined in saving money and willing to sacrifice. One ex-migrant told me, "You leave everything behind, your family, your house, your land....that is not good". He stayed for only two years, then came back. By contrast, his brother migrated 30 years ago with his entire family and has come back to visit the town very few times. Most of the people interviewed recognize that since the border is now more difficult to cross, many migrants are not coming back; those already in the U.S. do not come to visit unless they have saved all the money they intended to and plan to stay in Mexico. Migrants of the younger generation are aware that each time it is more difficult to cross the border and that they risk their life in doing so. Still some young men dream of going to the U.S., even when their families have the economic resources to support their education in Mexico. One man complained bitterly how he paid for his son's high school (*bachillerato*) but that the son left as soon as he finished. His younger son wants to do the same, while he had dreamed that they would study at the university.

The few young women I met who have migrated, experience the migratory experience as a way to gain independence from their parents' households, which is frequently full of

⁵¹ For a review of the impacts of migration in gender relations see Barrera and Oehmichen (2000).

restrictions. While they are abroad, the women enjoy earning their own income and having more freedom. Several women migrated with older siblings who took care of them, but the siblings did not apply the strict rules that the parents had back in the hometown. It is very hard to return and to once again be under the parents' rules, unable to make their own decisions, such as whether to work or not.

Migration could be a process of empowerment for Indigenous groups that may help them work towards the conservation of their biocultural heritage. I consider that the migratory experience of Teocalcingo's inhabitants has been one of the most important factors in determining their decision to gain independence from San Juan Atzingo (see Chapter VII for details). After people have migrated, their expectations change. They realize that reality can be different and that they have the power to change it. Three out of four of the new *delegados* at Teocalcingo, the first elected since the towns separated, are migrants; as well as more than half of their working team. They stress how being outside their community and their country showed them the importance of their language and their identity as Pjiekakjoo. It is this re-valorization of their cultural heritage that allowed us to work together. When I explained the project, they did not doubt the importance of their TEK and the value of its documentation. I noted the greater importance given by transnational immigrants to TEK compared to non-migrants and national migrants also among Ñuu savi (Mixtecs), while conducting a pilot project of multi-sited ethnography about ethnozoological knowledge in Santiago Nuyoo (Oaxaca), Tijuana (Baja California Norte), Santa Maria (California), and Hillsboro (Oregon) (Aldasoro, 2007).

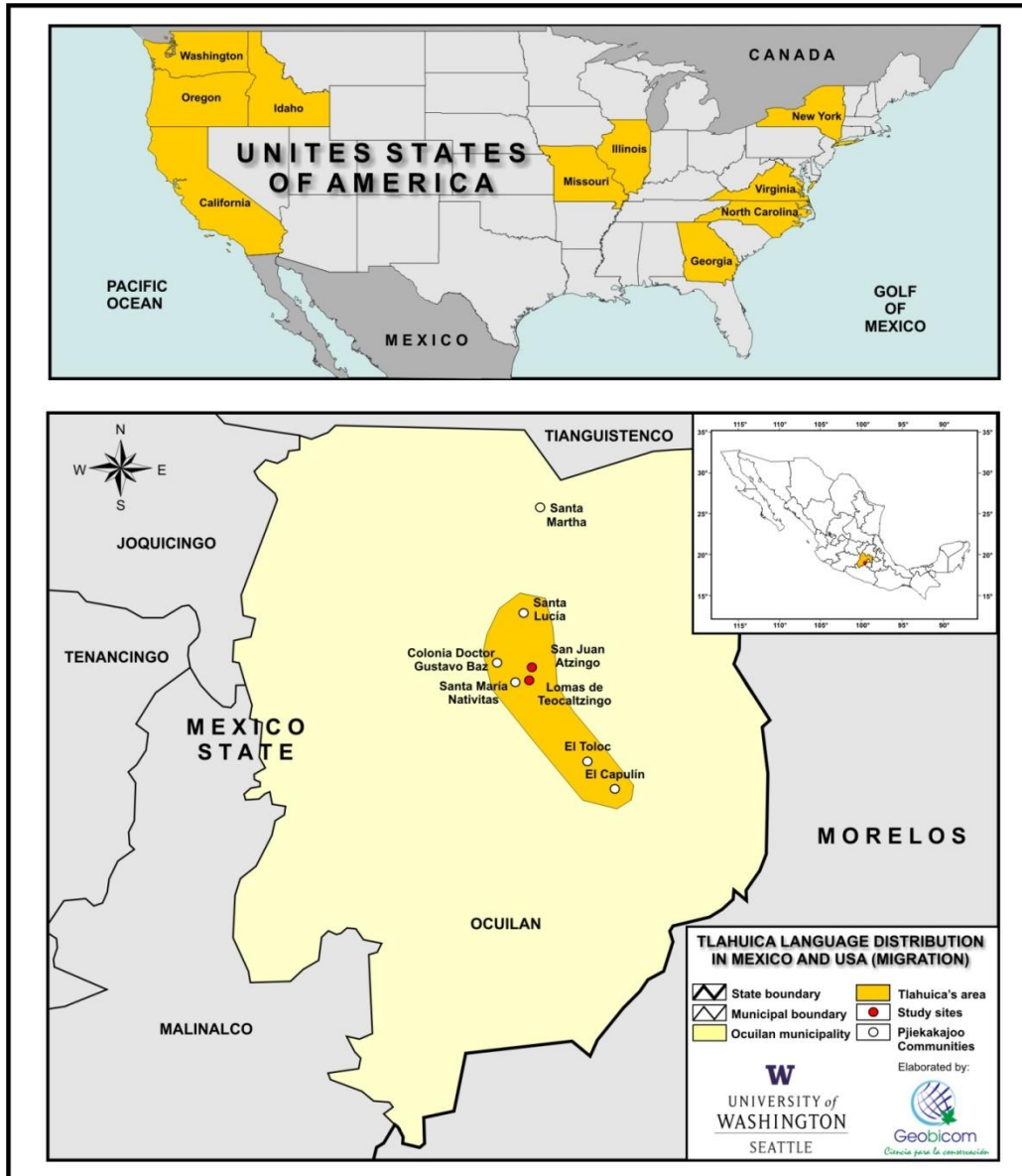


Figure 55. Map of the Pjekakjoo communities in Mexico and the U.S.

This should not be generalized. A transnational migrant from San Juan I asked about his experience as an Indigenous migrant in the U.S. excluded himself from the category of Indigenous people. He spent several years living in Mexico City before migrating to the U.S. and he does not speak Pjekakjoo, which may have given him a different identity. He said, “Yes, there are some people who speak their language; I met some from Puebla and Oaxaca.”

Needless to say the migratory experience is a highly complex phenomenon. The present research just documents some of its facets.

Final Note

It would not be fair to just give a brief description of San Juan Atzingo and La Loma de Teocalcingo *Delegación* Indígena Tlahuica, without briefly mentioning some of the most worrisome issues that are present in these communities. In several realms of communitarian life, there are needs, some of them more urgent than others, but all of them important. Before mentioning them, I would like to emphasize that, despite these problems these people have an impressive cultural and natural heritage and that in some sense their quality of life may be equal or superior to that of many people living in urban areas. I am particularly concerned about two issues that I believe are essential for a better quality of life in these communities. The quality of the health and education services should be improved drastically. If people have health and a better education, then a better world may be possible. Alcoholism and malnourishment are health issues that should be urgently addressed, and in relation to education, it is the minimum investment that the state should make for the Pjiekakjoo youth, not only in formal education, but also in that needed for the conservation of their cultural heritage. The money directed to the communities must be used in more efficient programs that have real impact in the improvement of the quality of life of the Tlahuica people. Sadly, in the beginning of 2011 I learned that some young men were involved in criminal activities. This is predictable when options for the future are so few and unappealing. There is an urgent need to create better alternatives.

IV. Land struggles a National Park and Communitarian Ecotourism

One of the main aims of the present inquiry was to contextualize Pjiekakjoo (Tlahuica) knowledges; therefore in chapter IV I depict the scenario of the Pjiekakjoo culture in relation to their land struggles, the National park that occupies part of their territory, the project they have been developing of communitarian ecotourism and some of the actors involved in the area. I hope that through the reading of this chapter it would be clear what the impacts of these elements are in the everyday life of the communities; and therefore the crucial role that they play in the preservation of the part of the Pjiekakjoo's cultural heritage that embodies their relation with their land and their forest.

Political and Judicial Organization

The cargo system, the *faena* and the management of communal territory are the central factors of communitarian social capital, understood as the conditions that allow problems to be solved (Merino 2008). Therefore the community and social scientists should work together in order to fortify these communitarian institutions, especially in a time when powers outside the community would work to weaken them, in order to gain more control over natural resources.

It has been a struggle for the Pjiekakjoo to maintain the exercise of civil power in their own institutions and procedures in the face of efforts by the state to take on much of that power (Bonfil, 1986). There are four *delegados*, chosen by assembly, one for each neighborhood⁵², and every month there is a rotation in the position of the principal authority (*primer delegado*) among the four. The *delegados* serve for three years. Their duties are to keep the peace and maintain order and to complete the paperwork needed to improve services and living conditions in the community, such as, electricity, water, education, etc. They are the highest local authority. The *delegados* name their "comandantes," who are in charge of giving citations to people or bringing them to the authorities when they violate communal norms. They may visit a person in his house if, for example, that person failed to perform communal work (*faena*) and ask him to appear before the delegation. If he fails to do so, he is taken by force. Officially, they represent the authority of the *H. Ayuntamiento Municipal* (Honorable Municipal Government) of the

⁵² At the new *Delegación Indígena de Teocalcingo*, though there are not four barrios they still elected four *delegados*.

town, though in practice they are not conceived of as such, but as an independent authority with autonomy to make their own decisions.

The *delegados* are in charge of protecting the "*varas de justicia*", staffs made of quince wood tipped with silver that represent Indigenous justice. There are four of these, each in the shape of a walking stick. They are tied with black ribbons representing mourning for authorities who have died. Only the authorities can touch them, and *delegados* are extremely careful when they move them, as people believe that if they were to touch each other, or fall, or be moved carelessly, problems would result in the community. The "*varas de justicia*" are the symbolic representations of power. The *delegación* also includes eight *comandantes*, one president of the collaboration committee and one *consejero de obras*.

The other important authority is the *Comisariado de Bienes Comunales*, the control of which has developed into a terrible struggle among different political factions of the communities.

A basic institution in the Pjiekakjoo communities is the "*faena*" or communal work party. Citizens must participate in diverse work projects for the communal benefit, such as fixing roads, planting trees, and building and repairing schools. If someone does not participate, the authorities fine them.

Mora (1989) provides an interesting account of the elections of July, 1988, and how she considered there was a total lack of political consciousness in town, as the people would vote with the majority, not knowing the political proposals of the candidates. Most of the people voted for Cárdenas from the PRD (*Partido de la Revolución Democrática*), with the exception of the *delegados* and people working for the government, who were forced to vote for the PRI (*Partido Revolucionario Institucional*, the party in power) in order to keep their jobs.

The Partido Acción Nacional (PAN) now controls the federal presidency (since 2000 and until the next presidential election in 2012), and the *Comisariado de Bienes Comunales* claims to be very grateful to this party, because it was under their government that the Pjiekakjoo have been given land title for part of the territory that they dispute with neighboring towns. They proudly comment on how Vicente Fox (president 2000-2006) met with them several times at Los Pinos (the presidential home). They deeply believe that if the PRI had continued to control the presidency that they would never have received their

land titles. The PAN did it, in my opinion, to gain some support in the State of Mexico, which has been a *Príista* bastion. The *Pjiekakjoo* have had a very tense relation with the *príista* governments of Mexico State as they suspect they are related to the illegal logging against which they have been fighting, so if the federal government would be still *príista* there certainly be few chances for them getting their land titles.

First they were *PRDistas*, but when the *PANista* governments started supporting them with federal programs, they changed loyalties. However, there remains a hard core of *príistas* in the center. Because of this, they are very worried that if the strongest candidate for the 2012 presidential elections, the *príista* Enrique Peña Nieto, the present governor of Mexico State, should win the presidency, it would be like going back to the past in relation to their rights and their agrarian conflicts.

A common opinion in town is that the introduction of the party system for elections divided the town. The traditional system was fundamentally different. It was considered an honor to be an elected authority and to work for the people. In the party system, the people claim that gaining power depends on having economic resources that permit gift-giving in exchange for votes, that the candidates want to get into office only for their personal benefit and not for the common good. This will be broached also in chapter III, as it has important consequences for the conservation and management of natural resources in the region.

Another authority is the Supreme Tlahuica Chief, who since 2000 has been Alejandro Ramírez. Originally this position was created by the government of Luis Echeverría (see footnote 2, in chapter IV) and had no moral authority inside the community (Mora, 1989), but at present he has some, and is supposed to be responsible for preserving and promoting Indigenous culture. Alejandro Ramírez has been working closely with the *Comisariado de Bienes Comunales*.

Land Tenure

There are two forms of land tenure: private and communal. Communal property represents a vital resource for many families that depend on these collectively held resources controlled by the *Comisariado de Bienes Comunales*. According to documents from the *Archivo General de la Nación (AGN)*, it was the Spanish crown that in 1752 granted the communities their present territory (Mora, 1989). There has been an ongoing historical struggle with the "*cabecera municipal*" (seat of municipal government) since the eighteenth century over this territory.

The land and Commons Institutions

The Agrarian Struggle

The Pjiekakjoo have been defending their territory and their forest for centuries, as much in environmental as in judicial terms. They have managed to keep their communal property regime, in contrast with other communities that have lost it, where private property became the dominant regime.

Documents that date from 1749 make reference to a land tenure conflict between the Indigenous people and the *Colegio de San Pedro y San Pablo de la Sagrada Compañía de Jesús* (Mora 1989)⁵³.

Zamora recounts how the agrarian struggle with Ocuilan started in 1945 and how the first generations of *delegados* were ignored by the Colonization and Agrarian Department, as it was then called. The situation did not change until they got advice from the *Confederación Nacional Campesina* (CNC)⁵⁴ that gave free counsel to common land groups (*ejidos*) and communities. San Juan Atzingo's first lawyers were from this institution. Later the CNC started coordinating with the recently founded *Instituto Nacional Indigenista* (INI). Zamora describes how San Juan has always fought with hope in the law and justice. For some years the situation was frozen, but in 1961, Ocuilan benefited from a presidential decree from Miguel Alemán in which all the lands were given to that community.

The people of San Juan did not learn about this decree until 1969, and proceeded immediately to file an appeal (*recurso de inconformidad*), under the leadership of Librado Neri. This appeal was not accepted, so in 1974 they filed another that was also rejected, as in those days Ocuilan was very powerful⁵⁵.

J. Trinidad Tiburcio Santos⁵⁶, as the president of the *Comisariado de Bienes Comunales*, promoted a revision with the Supreme Court of Justice. Sadly, by then there were already people in jail, such as Luis Hernández. In those days it was a common practice to invent crimes that the people participating in the defense of their lands had supposedly committed. Those were hard times as men were often absent from the town and many

⁵³ Zamora reported that they have had agrarian conflicts since 1753.

⁵⁴ It is fascinating how Ildelfonso Zamora declared in an interview that when they were working with the CNC it was not part of the PRI as it is now. Though the CNC was originally created in the thirties by the Partido Revolucionario Mexicano (PRM), which would become the PRI in 1946, Zamora's comment was clearly a means for him to reject any relation with *priístas*.

⁵⁵ To see all the details of the judicial actions and expedients see the article "Tala sin castigo," in *Proceso*, 24th June 2007.

⁵⁶ He was also Tlahuica Supreme Chief, before being part of the *Comisariado de Bienes Comunales*.

people were so afraid of the people of Ocuilan and their power that they would not accept being *delegados*. It was difficult to go to Toluca or Tenango to visit the people in jail, where they were badly mistreated, even beaten up by the town authorities and the police.

They won an *amparo*⁵⁷ in 1979, but the demarcation of the territory did not take place due to the death (perhaps by assassination) of the first president of the Supreme Tlahuica Council: J. Trinidad Tiburcio Santos in 1979⁵⁸ (Mora, 1989). The death or assassination of J. Trinidad Tiburcio Santos has become part of the legends of the community. He was hit on his head in a party fight, so he was taken to the hospital to get stitches. He did not appear to have any other health problems, but just suddenly one morning he died. The townspeople claim that the person in the next bed reported that in the very early morning someone gave him an injection, and he died shortly after. They believe that he was assassinated, as that morning while they were coming to visit him, they saw people from Ocuilan around the hospital.

It was not until 1992 that the Agrarian Reform Secretary gave land titles for 14,000 ha to Ocuilan and 25,000 to San Juan Atzingo, but Ocuilan presented an appeal to the Unitarian Agrarian Tribunal. In 1996, 38,000 ha were recognized as being part of Ocuilan, but San Juan Atzingo requested a judicial review (*recurso de revision*) and the decision was not executed. In 2000 Ildelfonso Zamora became the president of the *Comisariado de Bienes Comunales*. He continued the defense of the land, now against the 2001 resolution of the Unitarian Agrarian Tribunal that gave the land titles of 41,000 ha. to Ocuilan.

Zamora continues the fight and he and his colleagues pursue every legal means possible to resolve the conflict at the National Agrarian Register, where the land limits of each community were recognized. They protest because the Unitarian Agrarian Tribunal has misplaced these papers. The *Comisariado* is convinced that this bureaucratic "accident" happened as the result of corruption in order to benefit Ocuilan.

Finally, on February 15, 2009, the Mexican federal government granted the community official title over a hereditary commons of 18,321 ha⁵⁹. In November 2009 the community

⁵⁷ It is a legal action that reestablishes any constitutional right that may have been denied or not respected. It may be translated as "Constitutional action".

⁵⁸ In 1977 they suffered another loss, as Luis Hernández Aguilar was also murdered and others were beaten up by people from Ocuilan.

⁵⁹ Information in the web page "Achievements of the *Procuraduría Agraria* (Federal Agricultural Attorney): http://www.pa.gob.mx/paweb/conoce_la_pa/logros/logros%202006-2010.pdf

requested that at least 1,000 commoners be recognized as community members and therefore with rights to the collectively held land, as only 648 are officially recognized at present. The extension of land requires the total commoners to be recognized due to its large extension, as they possess 18,321 ha, which includes more than 10,000 ha of forest. They still have agrarian conflicts with Huitzilac over 4,000 ha; San Nicolás Coatepec over 6,000 ha; Ocuilan, over 2,000 ha, and lastly with Joquicingo with regard to 460 ha. Zamora considers they will not get 100% of the lands back, but at least 40% of the 13,000 ha in dispute.

They are hopeful, since the *panista* governments of Vicente Fox and Felipe Calderón have paid attention to the Pjiekakjoo demands; the *Comisariado* states they have been heard and, though they acknowledge they have not resolved all the issues, at least they have been received in the official presidential residency at "Los Pinos" where they were advised about which institutions they should consult. Certainly the *panista* government has given the *Comisariado* some funding and temporary employment programs. .

The cost of defending the forest: Aldo's Assassination

The costs that the Pjiekakjoo have incurred for the conservation of their forest are an excellent example of the link that exists between the conservation of biodiversity and the forms of land tenure (Betancourt y Cruz 2009). A significant portion of San Juan Atzingo's land has been "no man's land" due to agrarian conflicts, complicating its conservation and management. Resolving these land tenure issues implicates the power struggle with the illegal loggers and important economic interests in the region.

The president of the *Comisariado de Bienes Comunes* emphasizes how much work is required to conserve and take care of the forest. They have to organize the reforestation campaigns, defend the lands, take care of the forest and all of the natural richness. This has cost much time, even lives. There are fights within families, as not everyone agrees on the necessity of eliminating illegal logging and the importance of defending the communal institutions. A few men argue that the forest represents a lot of money and that it should be extensively exploited. In one interview I was told that outsiders benefit from the illegal logging instead of the people of the community, who should make extensive use of the trees in the forested areas.

Zamora describes how difficult is it to survive as a member of the *Comisariado de Bienes Comunales*. They receive no salary and must go into debt if they get sick, or pay to have someone plant their fields, and may lose everything if the weather conditions are bad. Nevertheless, he argues, they have to go ahead as they have the confidence of most of the people in the communities.

The defense of their territory has cost lives. In 1998, three people were killed fighting a forest fire; the people comment that they died there as guardians of the community as they died on the border. People consider this highly symbolic; they say that those who died established this border of their territory, as it was one of the borders under dispute.

The town of San Juan Atzingo became sadly famous on May 2007, when Aldo Zamora (21 years old), the oldest son of Ildelfonso Zamora, the president of the *Comisariado de Bienes Comunales* of San Juan Atzingo, was killed and his brother Misael (16 years old) injured. Aldo was killed by illegal loggers as a consequence of the campaign of denunciation that the Tlahuica authorities had been conducting since 1998, but with greater intensity since 2006, when they organized a march to denounce illegal logging.

This terrible event was a national scandal, and the issue of the illegal logging and its impact in the National Park was on television programs at the national level for several weeks. This was possible to a large extent thanks to the collaboration that the people of the *Comisariado* have with Greenpeace, an organization with which they collaborated in making public the terrible threat that the illegal logging represented for the forest.

Aldo was working with Greenpeace to videotape the illegal loggers and to present the video as evidence to the judicial authorities. Notwithstanding, the judge would not accept it as justifying arrest warrants for the criminals, even after the *Comisariado de Bienes Comunales* and the people that support it made formal denunciations repeatedly in 2005 and 2006, with names and addresses of the criminals. Aldo was cooperating with people from Greenpeace in measuring the logged trees, but the judge claimed they did not report the quantity and quality of the trees that were cut down in 3,000 deforested hectares. This again suggests corruption in the judicial process.

The problem worsened as the illegal loggers started perpetrating yet more violent criminal acts, such as raping, stealing cars, kidnapping and murdering people after assaulting them.

The illegal logging is a very complex issue caught up in networks of power and corruption. Zamora has complained that he has been threatened by the municipal delegate of the PRI. The *Comisariado* made public that in 1996, under the protection of the delegate, illegal logging increased dramatically, and that he was the *compadre* of the Municipal president of Ocuilan. The townspeople said that in those years one could see police cars escorting the logging trucks with the illegally obtained wood. The situation grew worse in 2006, when Barrón became the PRI candidate to be the next municipal president. During his campaign he would go to the non Indigenous towns of the municipality, and promise to exploit the forest. He openly threatened Zamora. He told him that, "He had better support his candidacy or he would hit him where it would hurt most." Zamora never supported him, and Barrón lost the election. A year later Aldo was murdered.

Because of the lack of results from the authorities in apprehending Aldo's assassins, Zamora threatened to cut off the water to Morelos state, as it is taken from their territory. If the authorities were not able to do something about the assassination, the community would react. The assassins still have not been caught four years later, and Zamora continues to affirm his position against illegal logging. To calm things down, the Mexican president and the state governor visited the Zempoala Lakes in July 2007. In June 2007, Zamora received the ecological merit prize from SEMARNAT.

The conflict for their territory has unified the people, as they have had to defend their land, a struggle that has caused lots of problems and deaths. This has been one more reason why their relation with the forest has become such a keystone of Pjiekakjoo identity. Several people, elders and youths, expressed the deep sadness they felt when they heard the chainsaws everyday cutting trees. They complained that the criminals left their garbage behind in the forest, adding insult to injury. They emphasized that this illegal logging also affects their mushroom harvests, as the fungi will not grow in the places that had been devastated by logging.

It was only after Aldo's death that the federal and state authorities undertook several *operatives* against the loggers, and though only some of the criminals were apprehended, people were pleased, as they believe that many of the criminals who escaped arrest have left the country to become illegal workers in the U.S.

The issue of illegal logging in the region is multifaceted. For example, someone told me that there are illegal loggers within the community. People may know who they are but they protect and even defend them from the outside authorities. They might work all night, returning to town at four or five AM. It is said that when the army comes to detain them, the community of San Juan Atzingo demands their liberation, demonstrating their power to take those arrested away from the army before they are brought to jail, though I have not witnessed anything like this personally. People may strongly disagree about illegal logging. However, the cohesion and solidarity among community members prevails, and the general feeling among the people is that the community authorities are the appropriate ones to punish illegal loggers and not external authorities.

On the other hand some complain that the authorities have jailed people who were only using a few pieces of wood (for example, two beams) for their own use and that the authorities would invent accusations in order to detain them (e.g., that the person had a chainsaw), while the big illegal loggers go free. This is like Cam's (2009) account of an Indigenous community in Vietnam, where as a result of new forest management policies Indigenous people are considered forest thieves. However these Indigenous people consider themselves just "*little forest thieves*," while the bureaucrats and traders from outside their villages are the "*father of the forest thieves*." This describes the Pjiekakjoo's case. While some people from the communities do use the protected natural resources, this should not be equated with the exploitation of the illegal loggers and the politicians who protect them, who are the "*father of the thieves*."

Other complaints from certain sectors of the community (mainly men from the barrio of the center where Priísta influence is strong) are 1) that only the Pjiekakjoo people are following the law, while the inhabitants of other towns nearby are taking advantage of the forest and 2) that it is useless to have won the agrarian struggle if the people do not have a job or a way to feed their families, therefore these men are in favor of logging. The exploitation of the forest as such is prohibited; however, some trees may be used after obtaining the permission of the *Comisariado*. It is around this issue that some people may be dissatisfied.

They complain that the permissions depend on having good personal relations with the *Comisariado*.

A commercial exploitation of the lands was done in the past, in the 1950's that Ocuilan rented San Juan's lands to the Loreto y Peña Pobre company, which hired most of the population to work for them cutting down trees for 30 years, until the company left town (Mora, 1989). At the community level Mora (1989) reported that the exploitation of the forest was done individually, in large or small amounts. She classified the people involved into three categories, a) those with few resources who get small amounts and sell this wood at the Santiago Tianguistenco market, 2) those who rent trucks to haul wood to urban centers, and 3) those who own trucks to transport the wood to timber companies in Mexico city and Morelos. The wood is also used for their own necessities, as building a house and as firewood. Mora calculated that since chainsaws were introduced, as many as 20 trees were cut every day, without a reforestation program or ecological consciousness. Older people show their concern about this in popular songs (Mora, 1989).

Reforestation

Mora's information (1989) contradicts what the authorities told me in 2008 about the history of local reforestation campaigns. They claim they started reforestation in the early 1970s, over 30 years ago. I had the opportunity to visit a hill which according to the owner was reforested around 35 years ago. The trees appeared to be all of the same age and fair sized. It is fascinating to see how in this little piece of land, surrounded by grassland and *milpas*, there were mushrooms growing. Although there is not much diversity, the few edible species we detected were abundant.

Since 2007 when I arrived in San Juan Atzingo, they have had a reforestation campaign every year during the rainy season. This is part of the national campaigns organized by CONAFOR. They have a powerful impact, as I have witnessed: supported by Greenpeace, UNAM CRIM, and other organizations and schools. I do not know the results of these reforestation efforts. The one time I participated there were no instructions given about how to plant the trees, e.g., at what depth or the distance between them. Nor do they have data about the number of trees that survive, or at what rate they grow. There was an issue around what to do with the black bags in which the trees came. Some said they have to be buried next to the tree, while others asked to put all of them back so they could be reused. Someone told me it was useless, as they reforest the same region every 10 years and the trees do not grow, that it was just to follow the government's game of the number

of trees planted without following their development. According to Greenpeace (2009) less than 10% of these trees survive.

Reforestation activities would have more positive results under a better and more organized framework; one that guarantees the coordination and communication between and within levels and that takes into consideration the ecological, economic, and bureaucratic factors involved in the reforestation process (Trac *et. al.*, 2007).

I am critical of these reforestation campaigns given the lack of technical advice as well as the political reasons behind them. They seem to be just part of the national discourse that celebrates the number of trees planted per year without really caring about anything else. The reality is that "a policy, decided upon at the national level was implemented unsuccessfully at the local level, but reported back to the top as being a success" (Trac *et. al.*, 2007:13).

What is quite obvious to me is that the Pjiekakjoo people have been taking care of their forest and have not destroyed it. If the Pjiekakjoo communities had been cutting trees at the rate of the illegal loggers, the Pjiekakjoo would have no forest left today.

Turning the Tables on the *Comisariado de Bienes Comunales*

Ildelfonso Zamora and his collaborators have had to fight to keep control of the *Comisariado de Bienes Comunales*, as there have been attempts by the state government to impose outside authorities. Also, the representativeness of the *Comisariado* has been questioned inside the community.

After the *Comisariado* won title to some of the disputed acreage at the beginning of 2009, pressure to change the *Comisariado* membership has increased drastically. Their political opponents from the central barrio⁶⁰, most of them *príistas*⁶¹, have been trying to remove Zamora and his collaborators. The *Comisariado* did change some of its members, but Zamora remained as the president. At the end of 2010, the Federal Agricultural Attorney (*Procuraduría Agraria*) tried to recall members, but the supporters of Zamora did not allow it. The situation became violent and they confiscated the federal bureaucrat's vehicle. In February 2011, the *Procuraduría* issued a subpoena, but the members of the *Comisariado*

⁶⁰ Most of the members of the *Comisariado*, including Zamora are from the barrio of Nativitas and Teocalcingo.

⁶¹ They are affiliated to the PRI, Partido Revolucionario Institucional, the party in power in Mexico for 70 years and the dominant one still in Mexico State.

chose not to go, following their lawyer's advice. I witnessed Zamora's request for support to the members of the new delegation from La Loma de Teocalcingo, who formed a commission to go with the *Comisariado* to the Federal Agricultural Attorney to let him know how their political enemies have offered money to some town inhabitants to get their vote.

The meeting took place on April 27, 2011, in a rather violent environment. An important antecedent was the burning of two vehicles that were in the forest on October 2010. In the general assembly the people of the center appeared to have defeated the *Comisariado*, but afterwards they discovered fake "*cartas poder*" (letters granting "power of attorney" for the purpose of voting) supposedly signed by migrants. In addition, Zamora and his collaborators argued they had *amparo constitucional*⁶² so the assembly was illegal. Later they claimed that the Supreme Court had supported them so they were still the *Comisariado*. The day of the assembly also ended in violence. There were shootings in the town and some people were injured, but none fatally.

It was interesting to hear the opinion of a man who has held different *cargos* in the community and who therefore has moral authority. He had just heard on television that the people should rule, not the government (*que el que manda es el pueblo, no el gobierno*) and that this was precisely what the Pjiekakjoo people want and will fight for and that neither the *Comisariado* nor the authorities of Teocalcingo would allow a "foreign" non-communitarian institution to intervene to decide who should rule in the town. Nevertheless, the Supreme Court determined in October 2009, that the Indigenous people cannot choose their agrarian authorities by their *usos y costumbres*. The Court declared that in relation to agrarian issues Article 27 has precedence over Article 2 in which certain *autonomy* has been given to the Indigenous people⁶³.

The resistance of the communal organization against the government's efforts to gain control over the Pjiekakjoo's forest is very important considering the trends of globalization and neoliberal government. These trends promote institutional and constitutional reforms to reduce welfare programs, a growing pressure for the privatization of the productive

⁶² Judicial remedy for violation of constitutional rights

⁶³ "Si bien las comunidades indígenas tienen derecho a decidir sus formas internas de organización, entre otras, social y económica, lo cierto es que al decidir por el ejido o por la comunidad de bienes comunales como sus formas de organización interna, las cuales han sido establecidas por la propia Constitución, se debe atender a lo que ésta señala en cuanto a su organización y funcionamiento", concluded the *Primera Sala* of the Court. *Semanario de la Suprema Corte de Justicia y su Gaceta* (2010) (See Appendix IV).

infrastructure and of the Indigenous communal and common lands, annulment of agrarian loans and the detachment of the state from social development programs. These have resulted from the modification of Article 27 of the federal constitution to encourage the commodification of land and other communal resources. Despite these constitutional changes, the privatization of the communal land of Indigenous and peasant communities has not happened as expected. Against the economic, structural, and political changes and pressures that the Indigenous communities are facing, most of them have responded by embracing even more closely their communal property and reaffirming their communal Indigenous citizenship, based in the collective possession of the territory and the right to communal jurisdiction over it (Varese, 2005). This is what has been happening in the Pjiekakjoo communities, where the *Comisariado* has been struggling to keep control over their communal property.

Communitarian Institutions under the Magnifying Glass

It is undeniable that the *cosmovisión* and mythology of some Indigenous groups have allowed them to fight against the depredation and irrational use of their resources. These, together with their survival strategies, a certain level of autonomy, and the internal control of their territory have played an important role regulating the use of the resources and stopping their depletion (Paré and Judith 1996). It is in this context that I want to address the issue of the status of Mexican communitarian institutions as some of them are in crisis, as is the case of the *Comisariado*. Traditionally in many Indigenous communities, it is said that people assume the "cargo" duties to "serve the people" (*servir al pueblo*) as a personal investment of resources and time, more than for personal benefit. People are expected to respond to the community. This would include presenting reports regularly, including financial reports. I am afraid this has been one of the weak points of the *Comisariado*, of which their enemies are taking advantage. Most of the people from the Loma de Teocalcingo support them, but there are also some people from other barrios questioning their work. Some people have told me stories of the *Comisariado* asking for significant amounts of money in order to intervene in a problem, or not giving complete financial reports of all the wood that is found after the illegal loggers leave. A story accuses them of keeping the money earmarked for reforestation, to pay people as "*empleo emergente*", and just inviting volunteers from outside the communities, the civil society. People criticize the use of many vans and the lack of identifying signs, so people could know which governmental office gave them to the community. They recently obtained two new ones, to replace those that were burned and to give one to the newly formed delegation in

Teocalcingo. The consumption of alcohol is another big problem. I have had to deal with this, since if I would not get to talk to them early enough, I would find them already drunk.

Zamora has been having health issues so he does not drink but he has been accused of being addicted to power. He has been questioned about his finances and his personal life. It is especially difficult because the people serving in these capacities receive no salary while they do have significant expenses. They need to use cell phones and they spend lots of money in transportation and food as they have to travel continuously to Toluca and Mexico City. I consider the only way to avoid at least to a certain extent all these accusations would be to deliver reports frequently, of activities as well as finances. As one young man told me, the saddest thing is that the two groups struggling for control of the *Comisariado de Bienes Comunes* and therefore of the forest have lost credibility inside the community. So some people propose that a third group should emerge to take over, which is not likely as they lack the political experience and the resources to oppose the other factions. Zamora and his companions gained recognition despite everything when they won part of the lands disputed in the agrarian conflict. Still some people wonder if they would have had a better authority if they had removed him from his position some years ago. As with the rest of the men in town, it took some time for Zamora to pay attention to me, but I have to say he has always treated me very respectfully and he has always been willing to answer my questions as well as to cooperate in the project of documenting Pjiekakjoo knowledges. The members of the *Comisariado* have to travel a lot as they have to go to several government agencies, so they spend a lot of time outside the community which limits their availability. This sometimes causes problems with the people who need to address issues with them.

Also, there are recurrent complaints from the wives, how when their husband collaborate with the *Comisariado* they get drunk more frequently, earn less money and spend too much time away from the family. So they prefer that they stay away from the *Comisariado*.

When the *Comisariado* was preparing for a general assembly held in April 2011, I was present for a *faena*⁶⁴ called by the new delegation. There, an older man openly raised the issue of how people did not trust them, and noted the stories that were told about them in the community. Zamora just replied that they can accuse him of whatever they like, but that they have to prove it; they cannot just verbally accuse them.

⁶⁴ Communal work, synonymous to *tequio*.

The last situation I will comment on is one that I did witness. The others are rumors and stories I cannot prove. Some weekends the *Comisariado* invited people to record traditions of the town, so they needed to ask some of the elders to support them. The *Comisariado* told the elders that they needed to record this in order to demonstrate that the Pjiekakjoo still exist, as that was being questioned by the government. The people were outraged, so they agreed to participate. On one occasion we were working in a workshop for my project when the men from the *Comisariado de Bienes Comunales* arrived. Fortunately we had just finished, in a bit of a rush, so the elders and I went with them at their invitation. A woman proceeded to videotape the elders. On a break, I spoke with the camerawoman who, it turned out, was from an ecotourism network. The *Comisariado* had asked them to record the session in order to design publicity for the Ecotourism project.

I did not like the fact that the *Comisariado* had misled the elders and the *delegados* about the true reasons for the videotaping, misinforming them that they needed the recording as evidence for the government of their cultural survival. I am an advocate for honesty in any type of project, and I am afraid the *Comisariado* knew that if they told the elders and the *delegados* that it was just for publicizing the ecotourism project, the elders would not have participated so eagerly, especially when they were not directly involved in nor were they receiving any economic benefit from the ecotourism project⁶⁵.

Furthermore, the elders later complained to me that they never got to see the tapes, nor to get a copy of them. They would compare how I had been careful to return results and pictures. It bothered me how the elders and the *delegados* were unable to demand from the *Comisariado* to see the videos or to get copies of them. This raises the question again of establishing protocols for research/documentation in Indigenous communities, as it is not always done by outsiders or insiders.

These stories about corruption and mismanagement of economic resources should be compared with other stories that support the opposite position. The community may be fighting internally but will show cohesion against external threats. There is a story of how a few years ago some *judiciales* (judicial officers) came into town to take Zamora with them, perhaps intending to "disappear" him. The people learned about it, and in very few minutes there was a crowd to prevent this from happening. There were no more "*judiciales*" coming to town after that.

⁶⁵ I used to give them what we called "economic aid" (*apoyo*) from the Jacobs Fund for each of the workshops.

On another occasion, in July 2010, we were holding a workshop, when the *delegados* and other adults suddenly left. When they came back an hour later, they explained to me that they were sorry to leave so abruptly but they had received a call from the *Comisariado*, requesting their support, as the municipal president had organized an event in the Lagoons without their authorization, and they were not going to allow that to happen. It is their territory and they would defend it no matter what.

It is important to understand the political structures in which the Indigenous systems of common property are situated, as these may determine their viability in the future as well as their potential contribution to natural resources management (Smith 2006).

It is important to mention a communal institution that is working: the new *Delegación Indígena Tlahuica de Teocalcingo*, founded in 2009. Their *delegados* are people with a high sense of communitarian responsibility, with new perspectives and ambitious plans to develop. They have legitimacy among the population and have been working very hard. During their three year terms they have and will accomplish important things, starting with gaining their independence from San Juan and finishing the construction of their own *delegación* (town hall) and church. They have achieved this by ask for construction materials those who fail to fulfill the requirement of participating in the assemblies or in the *faena*; a very wise decision that avoids misunderstandings about money. I would like to mention that there have been tensions in the communal organization due to migration that has eroded the system. This makes evident the contradictions between the obligations that the cargo system imposes and the private needs and interests of the commoners. This new delegation is a very good empowering experience for the Pjiekakjoo who have lived marginalized even inside San Juan Atzingo, their own community.

As in a Foucauldian analysis, there is a very complex exercise of power inside the community itself and of course from external actors also. Power struggles as well as the heterogeneity of opinions and perspectives inside the Indigenous communities should be acknowledged and addressed in the work for the conservation of biocultural diversity. The *usos y costumbres*, as well as the communitarian institutions, have to recognize the differentiated citizenship as a resistance mechanism and at the same time confront it. This is desirable, as there are people who reject certain rules and the inertia of the system requires adjustments. It is relevant to keep in mind that the strength or weakness of communitarian autonomy depends on the proper functioning of the communitarian institutions.

Public Policies and The Zempoala Lakes National Park (NPZL)

The decree establishing the Zempoala Lakes National Park dates from September 27, 1936 (See Appendix IV), during the presidency of Lázaro Cárdenas. An extension was made in June 1947, leaving an area of 4,790 ha., of which 3,965 ha. lies in Mexico State and 825 ha. in Morelos. According to CONANP (without date) the park's creation met the requirement of resolving agrarian conflicts in the region. This did not happen as properties were expropriated but never paid for. Therefore the owners have kept their land rights, despite the decree (SEMARNAT, 1995 in CEAMMA, 2007).

The National park became part of the Biological Corridor Chichinautzin (CBCH) in 1988. This corridor covers 37,302 ha. plus the 4,790 ha. of the Zempoala Lakes National Park and 24,000 ha. of a second park called El Tepozteco, for a total of 66,092 ha. under protection. The corridor was created to link these two parks, guaranteeing the continuity of biological processes in the region, besides forming a natural frontier for the population growth of the cities of Mexico and Cuernavaca. The CBCH is a key region that contributes to the capitation of water⁶⁶ and the regulation of rain in Morelos and the Federal District; moreover it helps to improve the air quality.

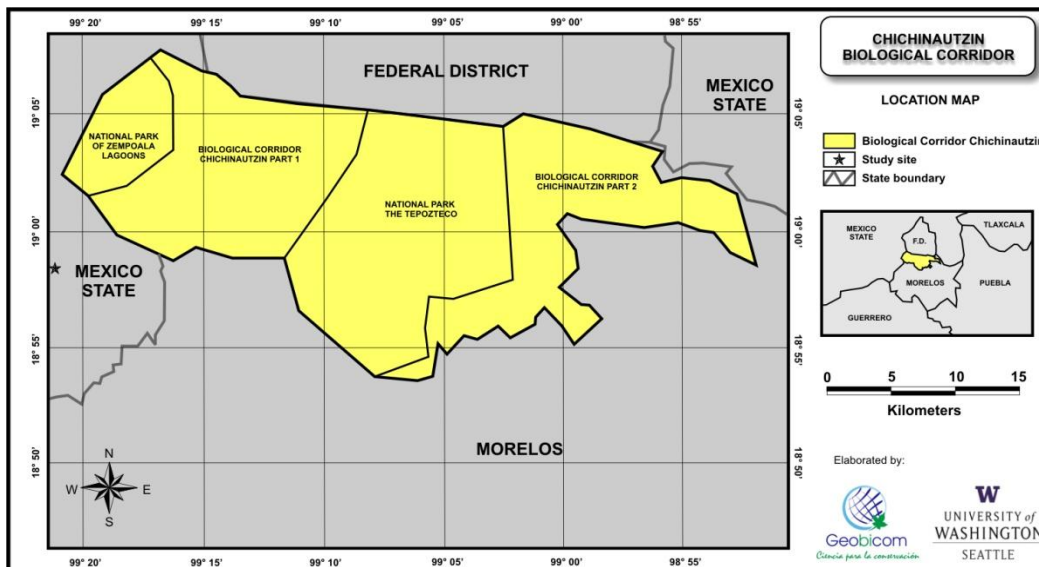


Figure 56. Map of Zempoala Lakes National Park in the Chichinautzin Biological Corridor.

⁶⁶ Greenpeace considers that the Corridor provides three quarters of the water needed for Mexico City and 100% of the water used in Cuernavaca city.



Figure 57. View from the Tonatiahua Lake, where the Communitarian Ecotourism Project was launched.

The problems

According to the Morelos' CEAMA webpage (*Comisión Estatal del Agua y Medio Ambiente*) the National Park faces serious problems in regard to the conservation and rehabilitation of the water, soils and biota. It reports as the main problems: contamination by solid wastes, illegal logging, and deforestation and poaching. The website also reports problems with the administration and organization of the area, and it reports a lack of signs, information centers, sociocultural activities and a program of environmental education. It claims these issues are due to agrarian conflict over land between communities from Huitzilac, Morelos and Ocuilán de Arteaga, State of Mexico (SEMARNAT, 1995 in CEAMA, 2007).

Ongay and Peña (1995) in a report on the socioeconomic situation of the Chichinautzin Biological Corridor, of which the National Park forms a part, also broached several issues such as illegal logging, the extraction of soil and the expansion of the agricultural frontier⁶⁷ on the one hand and the expansion of the urban centers on the other; all of which result from bad political, economic and educational public policies.

It is under this framework that the efficiency/viability of the Zempoala Lakes National Park should be questioned: to what extent has it actually contributed to the conservation of biocultural diversity and benefitted society, including the Pjiekakjoo communities? It is important to recognize that the protected natural areas have not become the center of

⁶⁷ They reported that between 1970 and 1980 the agricultural surface increased 524% in the Chichinautzin (Monroy y Colín, 1999 in Ongay and Peña (n.d.) despite the fact that the corridor is intended to be used solely for forestry .

development that they were supposed to be, and they are exposed to environmental destruction as much as the zones that are not under protection (Paz, 2008). This park could certainly be considered a failure of conservationist policies, as pointed out by Paré and Judith (1996). Certain regions were included in the national system of protected areas without completing the territorial ordinance plan. The actions that for decades have been taken in the Zempoala Lakes have been inefficient and top-down, they frequently ignored local cultural realities and they did not achieve the social development intended.

I have already mentioned that culture should be considered as one of the bases for any project, but to do so, it is necessary to recognize the agency of the local inhabitants and/or the beneficiaries of the project. They must be considered social actors capable of making decisions on the basis of their knowledge and experience, and of acting effectively (Paz, 2008). If this first step is taken, then it would be feasible to achieve the next one: that the projects be designed and carried out according to the necessities and expectations of the population, whose different actors should participate in the management and design of policies that should be directed to improve their life conditions (Paré and Judith 1996). It should be mentioned that 60 years after the Park's creation, Cazorla (1999 in Ongay and Peña, n.d.) reported that the quality of life of the Ocuilan de Artega and Huitzilac municipalities were below the state and national averages, and Chávez *et. al.*, (1995 in Ongay and Peña, without date) reported that 97% of the people in the area of the Zempoala Lakes have not even heard about the Natural Protected Area. It has been reported that the general lack of knowledge of the basic aspects of the decree and even of the decree itself allows local authorities and promoters to facilitate illegal activities at the same time that they take advantage of being in a Protected Natural Area. (Ongay and Peña, 1995). Even though this was done twelve years ago, I still find that people are unfamiliar with the legislation related to the Park.



Figure 58. One of the cabins that was burnt next to Tonatiahua lake.

Other actors: Greenpeace and Naturalia, A.C.

The *Comisariado de Bienes Comunes* has been involved with different actors from the government and civil society. In the public sector they have worked closely with the people of the CONANP, and also to a considerable extent with the CONAFOR. Even though it has not been one of the main objectives of this dissertation to identify and analyze all the actors involved in the NPZL and their agendas, I decided to mention two of them that were present in the communities in recent years due to the relevant role they have played and the implications of their presence.

The international conservationist association Greenpeace has been supporting the *Comisariado* in their denunciation of illegal logging in the park since 2007⁶⁸. They played a crucial role in taking this issue to the national and international level, as well as disseminating the news about the assassination of Aldo Zamora.

The second organization is Naturalia A.C. They arrived in 2009 and managed to acquire important resources from the Green World Organization. According to its webpage they have supported San Juan Atzingo in their 2009-2011 campaign for a co-sponsored micro-enterprise tree nursery that supposedly was going to create sustainable, ecologically sound livelihoods that included a waste management enterprise and ecotourism, centered on the restoration of a local lake⁶⁹. Through Naturalia A.C. the *Comisariado* was also collaborating with the HSBC Bank that donated the money for the construction of some cabañas and ecological restrooms.

The relation with Naturalia A.C. ended in 2010; a member of the *Comisariado de Bienes Comunes* told me there was a dispute, as the staff from Naturalia A.C. wanted to give trees from the nursery to the people from the barrio of the center, their political enemies. They considered it unfair, as they had taken care of those trees, even before the organization provided economic help. The organization was trying to work with two political opponents, but was unable to deal with the situation. Finally the *Comisariado* decided to end the collaboration. After the break up, Naturalia A.C. ended up not working with any faction in San Juan Atzingo. Some people also commented they suspected there was a misuse of the money, as they presented a final report listing activities that were never carried out, but the costs of which were included in the financial

⁶⁸ The *Comisariado de Bienes Comunes*, with Ildefonso Zamora as the president, started making judicial demands in 2005 (Balboa, 2007).

⁶⁹ For more details see: <http://greenworld.org/where-we-work/mexico>

statement, for example, a trainee to improve the production of handicrafts made of *ocoxal* (pine needles) and the production of maguey⁷⁰ honey. The *Comisariado de Bienes Comunales* has continued working on the nurseries.

Descola (1985) mentions how the convergence between NGOs and Indigenous people frequently encounters limits, as the former do not have patience for cultural particularisms. Despite superficial similarities and common strategic interests, their attitudes in relation to nature are totally different. Two of these organizations, as I have documented, have no interest in the Pjiekakjoo cultural heritage, they only visualize them as the key stakeholders of an important ecological region, and their approaches are far from being biocultural.

Despite these flaws, the collaboration between urban environmentalists and village leaders offers promising possibilities for environmental justice. Tsing (1999:395) considers that “Collaborations are hopeful edge of a political project. Not useful condemn a project, more useful to judge the political valence of it by the promise of remaking the world of the collaborations it has engendered “Under this framework it is essential to understand how the rapid ecological and social changes have influenced the Pjiekakjoo's conceptualization of the forest and nature, to consider that it has been affected by the type and intensity of the relationships with non-Pjiekakjoo people and how these have been dealt with (Ellen, 1999). This is now occurring at higher intensity but to some extent it has always occurred.

As was mentioned at the beginning of this section, besides the NGOs there are also public institutions in the region. I would like to comment about the perspective of one of them to cite a very representative example of the way the Pjiekakjoo's natural resources are perceived. I had the opportunity in November 2007, along with some of my students from the UIEM, to be present, by chance, at a talk given at the high school. An activity had been organized with the students about biocultural diversity and we decided to sit in. The talk was about Sustainable Forest Development and was organized by the state delegation of the SEMARNAT. Throughout, the speaker approached the forest at the NPZL and the region in exclusively environmental terms, ignoring all the cultural and political aspects. The students were annoyed with the mismatch between the presentation and the concepts they were studying to obtain a degree in sustainable development. One of my students objected strongly to the fact that the presenter said all the natural resources belonged to the government, under the control of SEMARNAT and CONAFOR. My student

⁷⁰ Different species of the genus *Agave*.

said that that was not the case, that the forest belonged to San Juan Atzingo (in those years the only delegation) and therefore their inhabitants should make the decisions about it, in collaboration with the institutions mentioned. At the beginning the speaker showed a certain reticence to accept this fact, but after overwhelming arguments, he ended up accepting it. I was very proud that my student dared to question a governmental official, but also was worried that if we had not been there all the high school students would have been trained to accept this idea of the forest belonging to the government and that they, the real owners, are just passive spectators, in the best of the cases, and at worst, criminals who threaten the conservation and appropriate management of the forest. The reality then being that they would end up victims of the policies of the Mexican state (Paré and Judith 1996).

Some proposals

Merino (2008) states that different perspectives about natural systems have generated different proposals for strategies and policies for their management and conservation. She identifies mainly two, both of which can be related to Hardin's "Tragedy of the Commons" (1968) and his suggestion for increasing state power and regulation (1978): a) those who vote for the privatization of the territories, systems and natural resources and recommend the *parcelación* (division) of the territories, the adjudication of individual property rights in them and the reliance on market dynamics for its management and conservation; and b) those who favor centralized control by the state over territories and natural resources in the interest of "conservation," given the public value of the environmental services that they generate. There is a third possibility, that the sustainable use of natural resources is the consequence of self-determination and the governance of local peasant and Indigenous people. It is based on their knowledge, customary law and common property regimes. To have this heritage threatened by conservation policies that consider neither traditional knowledge nor the necessities of the local people is unacceptable (Lauriola and Moreira, 2006).

Communitarian autonomy has been frequently identified as a viable strategy for the regulation of the use of land and natural resources, a strategy for the conservation and sustainable use of communal and public lands. Self-determination should be guaranteed for the issues of conservation to be treated efficiently. This would end the cultural domination in which decisions are handed down from outside the communities. Communitarian autonomy could be considered the most elaborated proposal. Some of the most important precedents is Halfster's proposal (1984), which elaborated a

“Mexican version” of the biosphere reserve concept requiring the involvement of the local population in its management as an indispensable requisite for the adequate function of the reserves as regional development poles. Communitarian participation helps the project succeed, due to the approval of the owners and users of the resources. It is an axis for the development and establishment of adequate rules appropriate to the local social and environmental conditions, to design spaces for conflict resolution and to establish systems that are relatively efficient and of low cost. The important role of the local communities fortifies their governmental capacities over their territories and resources (Merino 2008). Moreover, this mechanism avoids having projects based on neoliberal criteria that contradict the collective historic dynamic of the Indigenous communities, imagining them to be private profit-seeking actors under the logic of the market (Ramos-Delgado, 2004). The main goal of any initiative must be to endorse social justice, through confronting social conflicts and the expansion of Indigenous rights. One should avoid what has been reported for other places in the country, such as the Mesoamerican Biological Corridor, where projects focused on development and social justice have been replaced by natural parks in which at the same time that nature is “conserved”, *latifundios* (plantations) are protected, and - even worse - new *latifundios* are created under the protection of local power brokers. This ends with transnational capital owning the place (Betancourt 2009)⁷¹.

The hypothesis of the community forestry literature is that to the extent that communities have control of their forests, more ecologically sustainable forestry will be developed. This is based on the inefficient job that governments have done in managing forests (Colfer 2005a in Charneley and Poe, 2007), as they do not have the resources or the political will to allocate resources to implement management plans and strengthen regulations (Ascher 1995 in Charneley and Poe, 2007).

It is important to promote shared responsibility for decision making and mechanisms for the solution of conflicts, supervision, training and the development of a democratic culture for the management of the NPAs (Smith, 2006; Paré and Judith 1996). To achieve this, the participation of different actors is required. Ecological systems and natural resources are perceived and valued in different ways by various actors and social groups.

⁷¹ This same author denounced the World Bank’s supranational project, National System of Protected Areas of Mexico. According to him it would have converted large areas of Mexico into parks under international supervision (Betancourt 2009).

They have different types and levels of knowledge about those resources as well as different degrees of dependency on them and of access to power. This implies different possibilities of participating in the formulation of the rules and policies for their management (Merino 2008). The term “participation” may be and is interpreted in different ways which have different consequences, so it has to be clearly defined. The participation of the different actors implicated in the NPZL, as in any other NPA, demands constantly changing strategies. The space for this needs to be created and afterwards maintained under continuous adaptation, as the management of resources, due to the different interests, must be relentlessly negotiated based on the various proposals of the different actors according to their contrasting perspectives, necessities and knowledge (Paz, 2008). The creation of these allows passing from an abstract discourse about participative management of natural resources, to the construction of platforms of social, economic, cultural and political negotiation: the regulation of power relations and struggles. This implies the recognition of the heterogeneity and complexity of the power relations, and therefore avoids the marginalization of certain sectors (Charnley and Poe, 2007). I hope that the regional sub-council that the NPZL created, as part of the Chichinautzin Biological Corridor, can represent this type of structure. It is formed by politicians, academicians and representatives of local organizations. As head of the *Comisariado de Bienes Comunales*, Ildelfonso Zamora is a member, according to their website⁷². It is through this type of organization that we can achieve what Merino (2008) defined as the functional articulation between the participation of the local, the state and other actors (private and academicians), and which is essential for sustainable resource use.

There are other considerations that should be taken into account. Paz (2008) proposed that the concept of natural region should give way to a broader one, that of a social and historically constructed region. In Mexico NPAs are one of the most important instruments of conservation. They are conceptualized as spaces where ecosystems have not been altered substantially by human activities, thus they are submitted to regimes of protection, restoration and development (established in the Ley General de Equilibrio Ecológico y La Protección al Ambiente (LEGEPPA) through a decree in order to guarantee the conservation of biodiversity as well as of environmental services. Many policy makers and academicians theorize the NPA's as environmental regions only, a concept that should be redefined to consider them at the same time as diverse social,

⁷² <http://chichinautzin.conanp.gob.mx/index.php>

cultural and political regions that regularly present a heterogeneity that has been largely ignored. Reductionist versions of these complex realities should be left behind. In the concrete case of the Zempoala Lakes National Park (NPZL), it should be fully acknowledged that it is in an Indigenous people's territory with a rich cultural patrimony based on and around it. This makes this territory an anthropic place to a considerable extent, in which the Pjiekakjoo have contributed to the transformation of its ecology.

This questions the bases of many conservative conceptualizations, as modern anthropocentrism is incompatible with the concept of NPAs as anthropic territories (Descola, 1998). The conventional western conceptions of nature are now unacceptable, as they are usually based on an idea of an unaltered Other, of wilderness, and on conventional views of Indigenous peoples as inhabiting forest margins and biotopes⁷³, of tribes benignly exploiting pristine ecosystems (if not at the other extreme, considering traditional peoples the main threat to the conservation of the forest). Scientists have new data that probes the ways in which humans dependent on a forest actively change it. The NPZL forest is the result of many generations of selective human interaction and modification (deliberate or inadvertent), optimizing usefulness and enhancing biodiversity, the outcomes of a co-evolutionary process for which human populations are crucial. Truly particular patterns of forest management are considered as integral to their sustainable future. The prominence of an intentional human influence rather than a serendipitous one has been expressed in the creation of the term "managed" forest (Ellen, 1999). The Pjiekakjoo's forest is far from being a pristine natural system and their project of ecotourism has the potential to go beyond just providing facilities for the urban middle class, one of the concerns among many others, of some academicians (Belsky, 1999; Young, 1999; West and Carrier, 2004; Butcher, 2007). The Pjiekakjoo approach looks to help people to gain awareness about not only biological but also cultural diversity.

It is essential to include the expectations and needs of different actors with regard to conservation and management of natural resources in a general project that considers the different public, private and collective interests. In order to achieve this, some conceptions and prejudices need to be addressed and left behind. NPAs are regularly under ejidal or communal land tenure, therefore the inhabitants are the owners of the territories and the resources. For some authors and policy makers, this fact *a priori*

⁷³ "A biotope is an area of homogeneous environmental conditions providing living space for a specific assemblage of organisms. Biotope is almost synonymous with the term habitat, but while the subject of a habitat is a species or a population, the subject of a biotope is a biological community" (Amils et al., 2011: 209).

represents a problem, as they have to take public interest into account, such as the preservation of environmental services and the other needs and interests of those populations that own and use the resources by tenure right (*derecho de tenencia*). In the case of the NPZL and the Pjiekakjoo I have found that the national and collective interests of the local people are not necessarily opposed. Most of The Pjiekakjoo are very interested in the conservation of their forest, though they may not express or define it in the same terms as would a traditional conservationist, but that is different than saying their interests are opposed. One should not expect to find Indigenous people considering the very western concept of "do not touch anything" conservation principle, as they have been depending on nature for generations to obtain food, construction materials, medicines and even toys! This fact does not preclude them from having a behavior oriented to conservation (Hunn *et. al.*, 2003; Toledo, 2003). In fact it is in part this dependence on nature for subsistence activities, and the emotional relation that comes with this dependence, that motivates this behavior. Many Indigenous people are aware that if they destroy nature, there would be nothing left for succeeding generations. If we accept the very narrow and reductionist theory of conservation of Smith and Wishnie (2000), to wit, "to qualify for conservation, any action or practice must not only prevent or mitigate resources overharvesting or environmental damage, it must be designed to do so," we would be forcing all cultures to fit into a very Western standard, not only of conservation but of the perception of nature, the relation with it and even livelihood strategies.

On the other hand, as several authors (Descola, 1998; Paré and Judith, 1996; Paz, 2008) have pointed out, despite the fact that the media, some academicians and ecological organizations find inspiration in Indigenous people's *cosmovisión* and represent Indigenous people as symbols of harmonious relations with nature, it would be difficult to find an exact equivalent to concepts such as "mother earth" or "sacred nature" in these cultures. Their cosmological conceptions are too complex and diversified to be formulated in such a simplistic code. In fact, romantic representations of Indigenous people as nature lovers are a problem, as they misrepresent the cultural-social-economical-political and environmental reality.

Therefore there are two extreme poles in the theorization of the relation of the Indigenous with so called "nature." In one they are praised and in the other condemned (Tsing, 1999). In both cases, the Indigenous group that may be described deserves all our

respect and therefore a closer view of their reality, which is at neither of these two poles. Each Indigenous culture has peculiar characteristics, perceptions and practices, some of which may be ecologically sound, and some of which may not be. I like Paz's (2008) argument: she chose to consider the management of natural resources as part of processes of appropriation that have been built through time in a locally differentiated manner, which depend as much on internal as external factors. Nevertheless, I strongly disagree with this author and others who argue that this process is the same among Indigenous populations as among peasants. It is not to defend a *priori* Indigenous cultures, because you always need data to sustain whatever you are affirming, but it is about respecting and recognizing the deep relation that Indigenous people have developed with their landscapes. This relation cannot be trivialized as a reaction to what may be considered as romantic but false premises. I have had the opportunity to work with Indigenous and peasant communities, and in all cases the complexity of the relations that hold with their surroundings (nature, "mother earth," etc.) is considerably greater among Indigenous communities than among peasants. How could you compare a mestizo population⁷⁴ that may have 50 or 100 years in a region, with the populations that have been there for a thousand years? How would it be then explained that of the 233 areas of major biodiversity identified by International Conservation and the World Wildlife Fund, 80% are inhabited by around 3000 Indigenous groups? (Delgado 2002).

It is essential to fully acknowledge the cultural particularities of many Indigenous cultures and the extent of their cultural heritage, which is precisely what makes them different from the mestizo "peasant" communities. The latter in the process of becoming *mestizo* frequently have lost a considerable part of the heritage of their Indigenous culture of origin.

For many Indigenous communities, sustainability is an issue of biological and cultural survival, as they are very aware that their future generations (in the short and long term) depend on it (Charnley and Poe, 2007). Thus it is essential to integrate their traditional conceptions and practices with new institutions and norms for future planning for the

⁷⁴ Of course again there should be considered differences among mestizo populations as they vary greatly. A mestizo community that migrated to the jungle to colonize land would not be the same as a mestizo community that had inhabited the same place for generations. This diversity should also be considered among Indigenous people, as it is not by default that they have a deep connection with the environment, there are also Indigenous groups that have migrated and are relatively new in the places they now inhabit, or Indigenous communities with cultures that have been severely eroded.

conservation and management of natural resources, plans that guarantee that coming generations may live in the world they inherit from their ancestors (Paré and Judith 1996).

Indigenous rights are an essential foundation for the sustainable management of forests, and their recognition requires cooperation between Indigenous people, the state and the institutions in charge of the management of the forests (Smith 2006).

Tlahuica Communitarian Ecotourism, a National Park and the Pjiekakjoo Culture

Ildfonso Zamora, the president of the *Comisariado de Bienes Comunes* (2000-2011), narrates how in 2001 they began to consider using Lake Tonatiahua for ecotourism without affecting the natural environment. The place was abandoned and being used as a garbage dump. When they went to the CONANP for support, CONANP told them that due to the agrarian conflict in the community they could not help them. In 2002, without having solved the agrarian issues, the *Comisariado* told the CONANP that they were not asking for permission, just telling them that starting the next Sunday they would be cleaning up Lake Tonatiahua to get ready for the ecotourism project. Within this framework the CONANP supported them. They first needed to clean the site, and then in 2004 they obtained the first economic support for workshops to make a diagnostic study of the natural richness of the area and to define what type of project they wanted to develop. They chose to create a concept that would not harm the natural environment and develop an integral management plan for the region's natural resources. Thus the project was born.

Zamora relates how the concept of ecotourism was unknown in the region. The project started operating in 2006, during Holy Week, after building hiking trails and developing courses to train local people as field guides. In this process he recognizes that support from the director of the Zempoala Lakes National Park (NPZL) was crucial, and he regrets that the ex-director now is working in another natural protected area.

The beginning was very difficult, as they had not yet solved the agrarian issues. After an open invitation, 52 people got involved, of those only 10 are still working on the project, but as they have new people involved in the *Comisariado de Bienes Comunes* they hope to recruit as many as 28 new people to work on the project. The central problem is that participants want immediate profits, and this is not always possible.

The *Comisariado de Bienes Comunes* and the people involved in the ecotourism project built two large beautiful cabins but these were burned down and signs destroyed. The

authorities say this vandalism was motivated by envy though it is not clear who is responsible, their political opponents from San Juan Atzingo or their rivals who operate a project on another lake, a project that is not for ecotourism. It has been an important challenge for the Pjiekakjoo to deal with their competitors who are operating on an adjacent lake, with an entrance at most 500 meters from the ecotourism project entrance. The people have been working there for decades and do not like the Pjiekakjoo proposal. On the other lake there is no consideration for the environment. The *Comisariado* and the people dislike how this place encourages the noise of motorcycles, alcohol consumption, and sexual activities, among other things. This made them consider a different project.

In the beginning local organizers had to face unexpected problems, such as a fallen tree that blocked the entrance road and an epidemic of influenza that kept city people at home.

In 2009 they received economic support in the amount of \$325,000 Mexican pesos as part of the seasonal work (*empleo temporal*) program. With this money they fixed the hiking trails and bought some playground equipment. The CDI, CONAFOR and CONANP have all offered resources, with the last named the most supportive.

Ildelfonso Zamora and his team do not know how long they might stay in the *Comisariado*. So they have decided to form a Civil Association, so that they can retain control of the project. Zamora told me in November 2009 that they were hoping to achieve this in the first six months of 2011.

Despite all the challenges and limitations, they imagine becoming one of the more successful ecotourism projects in the country compared to others they have had the opportunity to visit in Oaxaca and Michoacán. They are confident that it is an investment for a better future, that even if they do not get to see it, their children will.

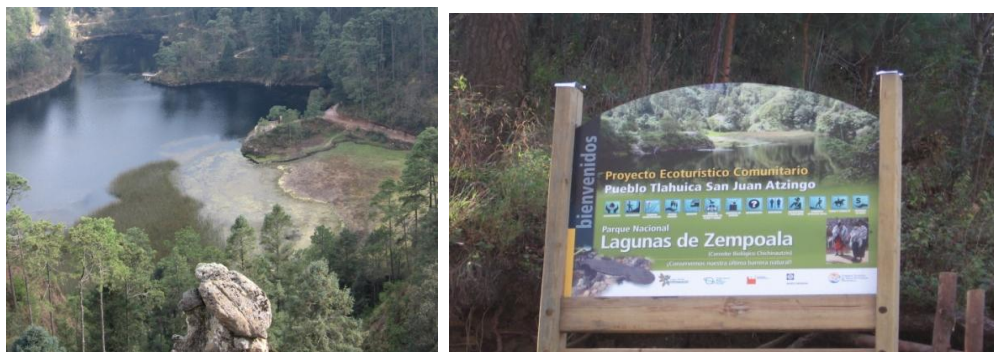


Figure 59. Tonatiahua Lake (Laguna Tonatiahua) where Figure 60. The Communitarian Ecotourism project has been established.

So far the *Comisariado de Bienes Comunales* considers the project to have been efficient. In the first year they got back their investment plus \$3,000 pesos; likewise in the second year. In the third year, with the influenza epidemic, they neither gained nor lost money. In 2010 they will receive economic support to build a warehouse, so they can safely keep all the material they use, such as the kayaks, life vests, tables, chairs and kitchen utensils.

One of the issues they face is that when the government institutions give them money they have to get receipts for it, as if they were buying material, when in reality they use the funds to pay people to fix trails and maintain the playground. In order to avoid the problem of obtaining receipts they have opted to not accept money under these conditions.

They distribute the economic profits evenly among those who work with the visitors; they divide it between the field guides and those who prepare food. In some cases they would save some money for future needs, and in others they would just distribute it all. If there is a large group visiting, they may get \$200 pesos for the day's work, compared to the \$120 pesos (10 USD) that is the standard payment in the region for 8 hours of work⁷⁵.

Even though the project is called *Ecoturismo Comunitario Tlahuica*, the biocultural perspective should be reinforced. When I had the opportunity to interview Idefonso Zamora, about the project, I asked him what was the advantage of this project compared to other similar emerging ecotourism projects in the center of the country. He mentioned the easy access and its location close to three big cities (Mexico, Toluca and Cuernavaca), besides, of course, it's gorgeous landscapes. He did not mention the cultural heritage that they could share, such as local food and local knowledge, plus all the symbolic relations they have with the forest. This is reflected in other factors; one that caught my attention was the way they designed the field guides, T-shirts, posters and cups for the project. They said they did it together with the advisor from the National Commission of Natural Protected Areas (CONANP). The names of plants, animals and mushrooms in Pjiekakjoo were not included, only the common names in Spanish and the scientific names. In the field guide they made no reference to their culture; only briefly writing about the Tonatiahua Lagoon and the fauna before continuing with the pictures of some of the most representative living organisms of the region. The only places where names in Pjiekakjoo were included were on the signs for the interpretive trail.

⁷⁵ The Minimum Federal Wage in Mexico for February 2012 varies from \$59.80 to \$62.33 (less than 6 USD), depending on the Geographic area.

It was disturbing for me, of course, because it is my subject, but it did surprise me, considering that when I presented the project to the *Comisariado de Bienes Comunales*, they were very enthusiastic about it, precisely because the documentation and systematization of the information was going to be very useful for the *Tlahuica Communitarian Ecotourism Project*. I just told them that in the future I would highly recommend that the names in Pjiekakjoo be included, especially considering that I had already delivered to them a Pjiekakjoo vocabulary with all the names of the plants, animals and fungi we have recorded, some in workshops with the *Comisariado de Bienes Comunales* and then verified in the workshops with the elders. The reaction of Ildelfonso Zamora was to call two of his main collaborators, Benito Ruperto and Alejandro Ramírez (the former was Supreme Chief of the Tlahuica and the latter currently holds this position), and asked them why the Pjiekakjoo names were not included. They did not know what to say but that they will ask the people who helped them design the material. My impression is that this was simply a mistake rather than done on purpose to avoid negative prejudices. Among the Pjiekakjoo communities there is definitely some self-stigmatization, but I do not consider that this is the case for the *Comisariado de Bienes Comunales* and its team, as they emphasize in their discourse the importance of being Indigenous people.

This situation made me question how the Pjiekakjoo people involved in the project as well as their advisors want to include the Pjiekakjoo cultural heritage, considering that once more the Pjiekakjoo knowledge has been ignored and denied. Ecotourism is now the fashion among certain sectors, so if they do not take advantage of this opportunity to share not only their natural but also their cultural heritage with visitors, they will have even fewer possibilities in the future. However, we must remember that the region has had important issues of security that made the promotion of the project difficult, even preventing them from working on the project every weekend, as they did for some time. The fact that the women cannot stay at the lake alone complicates everything. It is a region that has been used by criminals to dump bodies, and in the contemporary era with the mass media informing the whole society, such incidents scare people away. Therefore, the people involved must be very patient and persevering.

In relation to their cultural heritage, key issues include how much of their culture they are willing to share and/or which elements are convenient to include and which ones are not. This is a discussion I hope they will have eventually. For example, an issue emerged when I visited the project as a teacher of a high school group. The students were annoyed because they could not understand the explanation in the field guides about the

Teponaztle (Discussed in Chapter I). I had to intervene, with this and other issues, because I had the necessary information, but I question the scenarios they may face on their own. The *Comisariado de Bienes Comunales* and the people involved in the ecotourism project have had training to be “field guides,” but not what I would call “biocultural guides”. I have talked to them about the necessity also for them to decide what of their cultural heritage they want to share, which parts of it are they willing to talk to visitors about, and what should be kept only for the community. This would gain importance as the flow of tourists increases as it has in other places. The interchange of ideas with tourists brings their own particular discourse to the Park and eventually may influence their ethnic identity (Blumenfield, 2010).

The project faces significant and diverse internal and external challenges: social, technical and economic. In an open-ended interview with one of the two women in charge of the ecotourism project, she complained of the lack of support from the *Comisariado de Bienes Comunales*, as they are very busy with the land struggles and with the continuous attempts to remove them. The women have started going every weekend to sell food, but they earn very little economic profit. Moreover, it is a problem for the women to get someone to drive to take them all the way to the lake, because even if the *Comisariado* might lend them a car, they cannot drive, this added to the insecurity in the region.

She also shared with me how there has been a struggle around the core concept of what the project should be; mainly the men are questioning the model. Some of the men involved in the project consider that the lack of visitors is because of the restrictions they have established, such as the ban on the consumption of alcohol, and other rules, for example, to discourage sexual activities and that they will not rent motorcycles or horses, nor allow noisy music. All these rules are clearly explained to visitors when they arrive at the lake. The women defend the restrictions, perhaps due to the fact that they have attended the training more consistently, so they have a better and deeper understanding of what an ecotourism project is.

The wider context of this project is that it is located closed to the area called La Marquesa, through which people going to the Zempoala Park must drive. Here businesses include horse and motorcycle rentals and the consumption of alcohol is very common. This represents competition, but at the same time represents an advantage for the Pjiekakjoo project, as it is the only ecotourism project in the region. Considering its proximity to Mexico City, Cuernavaca and Toluca, it should be feasible to attract a clientele interested in this particular approach.

The term ecotourism was created by the Mexican architect Ceballos-Lascurain⁷⁶, and since then several definitions have appeared, all having in common the principle that ecotourism should meet three critical criteria: provide for environmental conservation, including meaningful participation; being profitable; and self-sustaining. Along with these criteria, ecotourists look for conservation, low impact, sustainability, meaningful community involvement and environmental education (Subramaniam, 2008).

In Mexico there is a non-compulsory Mexican Ecotourism Norm (NMX-AA-133-SCFI-2006) for those interested in sustainable development and efficient practices of ecotourism. It establishes the requisites and sustainable specifications for anyone carrying out an ecotourism project.⁷⁷ The Norm not only works for the certification of ecotourism projects, but also to encourage benefits from various support programs of the federal government. The certification as such represents another whole topic of debate that I will not address here but that should be acknowledged.⁷⁸

An important technical issue they must solve is the lack of a road that would allow cars to approach the lake. Now people can access the area only on foot. They are thinking of ways to get people to the lake without having to walk all the way from the entrance, which is difficult especially for elderly and handicapped visitors.

There is another ecotourism project being developed by some other commoners of San Juan Atzingo and La Loma de Teocalcingo. It is located south of the communities in a place called "La Ciénega." They have built there a few cabañas and they are cultivating trout. They mainly offer a food service. As with the first project, they have training programs for ecotourism project personnel, such as water and garbage management and the type of activities that can be carried out in the place.

The limitations that result from economic constraints are several. They need more infrastructure, such as cabins for people to stay overnight, a kitchen, and even a museum.

⁷⁶ Ceballos-Lascurain's definition is one of the most prominent, as he is considered to have made the first conscious use of the term: "we may define ecological tourism or ecotourism as that tourism that involves travelling to relatively undisturbed or uncontaminated natural areas with the specific object of studying, admiring and enjoying the scenery and its wild plants and animals, as well as any existing cultural aspects

(both past and present) found in these areas'" (1987:13 in Lück, 2002)

⁷⁷ In the webpage of the Secretaría de Turismo (SECTUR):

(http://www.sectur.gob.mx/es/sectur/sect_8416_normas_mexicanas_nm) it is specified that this norm has been published as a project (Recuperated 11 February 2012 12:00am).

⁷⁸ For more information see: <http://www.planeta.com/ecotravel/tour/certification3.html> (Recuperated 29 February 2012).

They complain about the lack of support from governmental institutions, with the exception of the CONANP. The project needs to be advertised and promoted; otherwise it is hard to see how it will survive. They need to get groups from school or families, so that they make a real economic profit. The Tlahuica Communitarian Ecotourism Project has been making alliances in order to strength their project. They belong to the *Red Indígena de Turismo* (RITA) that encompasses around 150 Indigenous tourism projects carried out by Indigenous people. In this alliance we can appreciate the blurred line between ecotourism and what has been called ethnic tourism and what I proposed to call “biocultural tourism.”



Figure 61. Ildelfonso Zamora in a rehearsal of one of the trainings to become field guides and Figure 62. My students from the junior high school of the Universidad del Valle de Mexico visiting the Ecotourism Project.

This *in situ* exploitation of the natural resources in a protected natural area may be questioned, as some critics state it can have important impacts on the traditional inhabitants should they be presented as folkloric elements of the landscape or as servants for the visitors (Betancourt and Cruz 2009). This would not be the case with the Tlahuica Project, as they themselves have developed the proposal. They were not inserted into the landscape in a fake manner. Rather, they have been there for generations. It is important to emphasize that at least at this point of the project, the activities as field guides do not preclude them from continuing with some of their traditional activities, such as cultivating corn or collecting wild edible mushrooms. If the project is carefully designed, they may keep control of their forest while gaining needed economic income and educating visitors about Indigenous culture.

My experience with the students I took to visit the project is instructive. In their essays they wrote such things as: “*I am glad I went because it was the first time I got to see Indigenous people!!*” This is an assertion that is not literally true, but the truth was that it was her first time to meet someone who identified themselves as an Indigenous person. In my opinion

projects like this can help change the views or even worse the absence of views that the mestizo population has about Indigenous cultures, especially that of the Pjiekakjoo, since it is so close to important and growing urban centers.

The Tlahuica Ecotourism Project represents what Escobar (1999) calls the "hybridization of nature and culture," with new narratives of gender and biodiversity emerging from the collective practice of social movements and communities, despite difficulties and contradictions and against remarkable probabilities. Beyond the academic concepts and romantic perspectives, projects like this -- *hybrids between organic and capital nature*, -- have the potential to contribute to resolving some of the issues Pjiekakjoo people face in their everyday life.

If they keep control of their ecotourism project, it could improve their quality of life while at the same time promoting the valorization and preservation of their culture.

Conclusions

The Pjiekakjoo People (Tlahuica) need to gain real control over their territory, in order to guarantee the biological conservation of their forest, as well as their cultural survival. For this to become a reality their land disputes should be resolved, and they should get effective support from the state in their struggle against the illegal activities taking place in the area and for the conservation of their natural resources.

It is urgent to solve the intra-communitarian conflicts as they weaken communal institutions, such as the *Comisariado de Bienes Comunes*, and facilitate the influence of foreign actors and economic interest (e.g. the political parties) on community affairs.

The immense cultural heritage of the Pjiekakjoo represented by their knowledge about the environment should be taken into consideration when designing public policies, as this cultural heritage is an important tool that can improve the adequacy of such policies and therefore determine their success or failure. In order to protect the Pjiekakjoo biocultural heritage those involved in activities in the region should be respectful of the communitarian institutions as well as of communal property rights.

The Communitarian Ecotourism project represents a good opportunity for the community to gain economic benefits without harming their environment and one that takes full advantage of their biocultural riches. They should be supported in their efforts to continue improving the feasibility of this proposal.

V. An introduction to Biocultural Diversity and Traditional Environmental Knowledge

Since its appearance 20 years ago, the concept of biocultural diversity has gained relevance in different fields of social and environmental science and it is of particular interest in a country as Mexico. In chapter V this concept will be approached as well as its relation to what has been called in the academy Traditional Ecological Knowledge (TEK) and which I propose calling Contemporary Indigenous Knowledge (CIK). As the core of the dissertation is precisely the Pjiekakjoo's CIK, before presenting all the data that was documented (in next chapter) it is needed to explain the concept prior to approaching some of the implications of TEK in different realms such as development projects, the questioning of the hegemony of Western science, the dialogue of knowledges (*saberes*), biological conservation, common property systems and Indigenous people's rights.

In 1992, Nietschman proposed the biocultural axiom that defines the concept of symbiotic conservation. It states that biological and cultural diversity are mutually dependent and geographically coexistent. Many countries have high biological and cultural diversity. Mexico is considered fourth in the world in terms of its biocultural diversity, after Indonesia, Australia, India, and Brazil (Toledo, 2003).

On one hand Mexico occupies second place in the world because of high biodiversity: ninth number of reptiles, the fifth in species of amphibians, the third in mammals, the eight in birds and the fifth for vascular plants (Llorente and Ocegueda, 2008). Mexico encompasses a mosaic of ecosystems, a gift of its intricate geography, where Nearctic and Neotropical ecozones meet. It is considered one of the earth's 12 megadiverse countries⁷⁹ that harbor the largest numbers of species and endemic species (Toledo, 2003).

Culturally speaking, according to the catalogue of national Indigenous languages, Mexico is home to 68 Indigenous languages that have 364 variants (INALI, 2008). Mexico is sixth in the world in terms of the number of spoken languages and is one of 7 countries⁸⁰ that together possess half of the languages spoken in the world (Toledo, 2003). Each language represents a particular way of viewing and organizing the world. To this cultural diversity - mainly embodied by the Indigenous cultures-, the country has other components that

⁷⁹ The others are: Brazil, Indonesia, Colombia, Australia, Madagascar, Perú, China, the Phillipines, India, Ecuador and Venezuela.

⁸⁰ Papua New Guinea (820), Indonesia (742), Nigeria (516), India (427), México (297), Cameroon (280), Australia (275) and China (241).

enhance its cultural richness, including the immigrants it has received and the different urban and peasant cultures that have developed through the years.

Toledo (2003:80) based his proposal of biocultural diversity on four main points:

- a) The geographical overlap between biological richness and linguistic diversity.
- b) The overlap between Indigenous territories and regions of highest biological value.
- c) The recognized importance of the Indigenous people as the main inhabitants and managers of well conserved habitats.
- d) The certainty of a behavior oriented towards conservation between Indigenous people, the result of their complex knowledge-practice-beliefs of premodern character.

The biocultural category integrates the deep division between nature and culture that modernity has established. Such a division, in Latin America comes also from the Christian dichotomy between the spiritual and the material world (Machuca, 2009). However, in many Indigenous cultures the perception exists that living and non living things, as well as the social and natural worlds, are intrinsically linked. This represents the reciprocity principle (Toledo, 2003). This principle is a tool for researchers to make evident the interconnection between the biological and cultural realms and the key role that Indigenous people play in both of them.

The new biocultural synthesis presents hope and also challenges, as it demands a more holistic comprehension of issues such as the management of natural resources, development and the conservation of cultural and biological diversity. To fail in the development of a new approach leaves us with fragmented knowledge of biocultural diversity that limits our comprehension and impedes understanding of environmental and social crises. The different components of this diversity (cultural, biological, social and historical) require different epistemological strategies, in which the objects of the social and biological sciences are carefully articulated into a novel type of inquiry (Escobar, 1999).

Recognition of the relationship between biodiversity and cultural diversity represents an opportunity to use a creative combination of Western and Indigenous knowledge (Rabey, 2005) for the improvement of living conditions of Indigenous people and the simultaneous conservation of biological diversity. These issues have become a priority as biocultural diversity is considered to be in danger. The threats to biodiversity have been extensively documented, as have been the rates at which species are disappearing as a result of the

destruction of their habitats and, in the last few years, also to climate change (Wilson, 1989; Reaka-Kudla, 1997; Thuiller, 2007; Thomas et. al., 2004; Hampe and Petit, 2005; Heller and Zavaleta, 2009). Less well documented and recognized has been the parallel historic trend of the massive extinction of human languages. Ninety-seven percent of the world's population speaks only 250 languages, while the other 3% uses the remainder of the 7,000 languages known to have been spoken around the world in recent times. Over 90% of all human languages are seriously threatened with extinction during this century (Maffi, 2000).

Cruz (2009) lists the phenomena that are endangering the symbiosis of Indigenous people and biodiversity:

- a) New forms of capitalist exploitation
- b) Emergence of new policies for the appropriation of natural resources promoted by international institutions such as the World Bank, the International Monetary Fund, and the World Trade Organization, as well as transnational companies
- c) Impacts of diverse environmental and conservationist discourses of an exclusionary character
- d) The dynamism of biotechnology, bioprospecting and ecotourism, sectors that appropriate Indigenous knowledge and labor because of their high profitability and low price.

"I believe the gravest threat to Indigenous peoples, traditional societies, and local communities is ignorance and indifference. The ignorance and the indifference corrode the vitality of Indigenous cultural traditions and reinforces policies destructive of traditional communities. The real value of Traditional Environmental Knowledge is not as a commodity.

Its best use is not as a tool of power but as a tool of understanding, used to educate and inspire all people to appreciate the value of Indigenous perspectives and to respect

Indigenous rights"

Hunn, 2002

Traditional Environmental Knowledge (TEK) or Contemporary Indigenous Knowledge

One concrete object of study through which we can get to know and appreciate the different realities that compose our heterogeneous world, from the point of view of all human groups that inhabit it, is their environmental knowledge. Appreciating other people's knowledge allows us to respect and value it, and hopefully also to preserve it.

Indigenous knowledge systems have characteristics that differentiate them from the knowledge that is taught in the "scientific" school (Pacheco 2010):

1. Different types of communitarian knowledge arise from group experience compared to discoveries by a single individual.⁸¹
2. They are orally transmitted; each generation makes a selection of the ones that will be transmitted.
3. Their presentation is in diverse cultural forms as legends, customs, etc.

The knowledge that human cultures have of their environment is an essential part of their reality, as the plants, animals, mineral components and climate phenomena are an essential part not only of their territory and livelihood but as well of their myths and symbols. Moreover the perceptions, ideas and Indigenous knowledge about nature provide the conditions for the production and reproduction of the material and spiritual conditions of their social existence, through the management of the natural resources and ecosystems of their homelands (Cruz, 2009).

Therefore, much of the extensive cultural heritage that Indigenous peoples possess is embodied in their Traditional Environmental Knowledge (TEK). This knowledge has been defined as "the cumulative body of knowledge, practice, and belief, evolving by adaptive mechanisms and handed down through generations by cultural transmission about the relationship of living beings with one another and their environment" (Berkes, 1999:8). In Mexico the following terminology has been used: popular knowledge, local knowledge, folklore, Indigenous science, native science, peasant knowledge, and traditional ways of knowing or systems of Indigenous wisdom. In other locations it has been called science of the known, popular knowledge, the people's science, emergent science and more recently local epistemology, or alternative epistemology. In the English language literature, it has been called Local and Indigenous knowledge systems and Non western knowledge. In the environmental literature it is referred to as traditional ecological knowledge and environmental knowledge. In medical literature, the terms are Indigenous medicine, traditional medicine, herbal medicine, folk medicine. In agricultural literature it is called peasant knowledge, local farmer knowledge. In many cases, the idea persists that it refers only to the survival of ancient systems (Pérez and Argueta, 2010:33). In the present research I have used the term Traditional Environmental knowledge (TEK) as a recognition to the

⁸¹ In fact western science discoveries are also the result of the work of the scientific community, but the difference is that they are claim to be of only one person or certain team of research.

academic research that has been done in this topic for decades, but under the understanding that the term tradition does not imply that this knowledge is static.

In order to reflect the dynamics of TEK I propose that it be called Contemporary Indigenous Knowledge (CIK). Under this label it would not be necessary to specify that these systems of knowledges are based on Traditional knowledges but in a permanent change and adaptation to the new realities of its heirs. Also, TEK encompasses more than environmental/ecological information, therefore it is more adequate to give it a general name as CIK.

Stevenson (1996:280) addressed this topic:

“Dene, Inuit, and Metis in Canada's North possess knowledge that is not just “traditional,” but contemporary. In fact, it can be argued that all knowledge is contemporary, for it is given meaning and value from a frame of reference that is continually being updated and revised”.

But Stevenson only proposed to use the term Indigenous Knowledge (IK). He states that under this view it is recognized that it has two sources traditional and non traditional knowledge, and it also acknowledges the fact that Indigenous people

“also possess knowledge and experiences not grounded in traditional lifestyles, spirituality, philosophy, social relations, and cultural values and that Indigenous knowledge is the articulation, and frequently the dialectic, of traditional and nontraditional knowledge”.

The debate about the significance of TEK or IK to contemporary issues such as development and biological conservation has been occurring for years (Warren, 1996; Sillitoe, 1998; Ohmagari and Berkes, 1997; Agrawal, 2002; Barnhardt and Kawagley, 2005).

I do consider it is important to include the term Contemporary on the label at least in the Mexican context, in which there is still a prevalent ignorance about Indigenous populations and the richness and importance of their immaterial cultural heritages in the present world.

Therefore I will also be using as a synonymous of TEK, the term CIK but also the word *saberes* that recognizes the diversity within these systems and also making reference to the concept of “*saberes*” (Argueta *et. al.*, 2011), that do not have an accurate translation in English. The term “*saberes*” recognizes that the Indigenous People do not only “know” the environment in which they live, but that their knowledge encompasses also practices as well as spiritual and religious beliefs. In this sense it is considered that “*saberes*” were

originated much earlier than "knowledges", as the latter are considered as such until the appearance of "science" and scientific societies (Toledo, 2012).

Ethnobiology is the science dedicated to studying the variety of relationships established between human beings and nature, from the utilitarian to the symbolic, including resource management, taxonomic classification and knowledge of behavior. Its subject matter includes how people classify, use, conceive of, analyze and interact with the biotic and abiotic elements of their environment within their particular world view and considering the symbolic relations that humans establish with the tangible and intangible elements of their environment (Cano et. al 2009:108).

Toledo (2003) considers that the repertory of ecological knowledge that societies have is characterized by being local, collective, diachronic and holistic; it represents a cognitive system that is transmitted orally, that becomes the memory of and one of the most important intellectual resource for Indigenous people. Toledo has proposed that ecological knowledge is formed by a corpus (knowledge), praxis (practice) and cosmos (belief). The cosmos represents all the beliefs, myths, ceremonies and rites; it is on them that tradition is based. It regulates the interaction with nature, as it reflects the conception of nature. The corpus is formed by all the knowledge that is inside the individual or collective minds about the environment and their perceptions of it. And the praxis encompasses all the practices (extraction, aquaculture, hunting, recollection, housing, water, medicine, handicrafts, fishing, agroforestry, forestry, livestock, agriculture and others) through which nature is appropriated (Toledo 2001).

These components have been previously observed and defined from a different perspective. López Austin (2001) mentioned that the particular environment in which a human group lives and the natural phenomena that occur in it, influence in a relevant way the formation of the thoughts of the group (López Austin 2001 in Cano et. al., 2009), giving origin to a Nature-Cosmos continuum. This continuum establishes the norms of human participation as there is a constant flux and reflux between the main principles of the world view and practical activities (Peláez 1996; Cano et. al., 2009).

Considering Broda's (2001a) definition of *cosmovisión* as the "structured vision through which the members of a community combine in a coherent way their notions about the environment in which they live and about the cosmos in which they situate human life" (in Cano et. al., 2009:87), the relevance of Traditional Environmental Knowledge can be appreciated in its full sense.

The inclusion of the social, the natural and the sacred as cohesive elements has been identified as the factor that establishes the limits of the identity of human groups. These elements give meaning to each other (Cano *et. al.*, 2009).

TEK has been tested and proven in specific territories⁸², and has accumulated across generations. TEK is about the production of food, the conservation of health and the maintenance of social organization. This type of knowledge conceives the environment as the result of multiple interactions in which phenomena are perceived as multi-causal, where human activity plays a key role.

In Indigenous cosmogonies it is impossible to set apart the elements of nature as isolated entities. Natures express the whole group of interrelations of all the elements in which the human is one more element, never the most important nor the determinant, however necessary (Pacheco 2010). TEK represents detailed knowledge not only of organisms and ecosystems elements, but of environmental processes as well. It includes structural, dynamic, relational and utilitarian aspects of nature (Toledo, 2003).

For many Indigenous peoples, nature is not just a resource. They perceive it in a different way than is characteristic of capitalist perceptions in which nature exists solely to be appropriated and used. For many Indigenous peoples nature is considered sacred. From nature arises the rights of humans to harvest ecosystem goods and services and recognition that there is a limit to how much can be extracted which consequently also affects human reproduction (Toledo, 2003; Pacheco 2010). According to Toledo (2003) in many Indigenous world views, nature⁸³ is the main source of life that nourishes, sustains and teaches the humans. Nature is not only the source of productivity, but the center of the universe, the main core of the culture and the origin of the ethnic identity. This is the reason why the world visions of Indigenous people have been studied as regulating mechanisms for the use and management of the natural resources.

The study of TEK allows a deeper understanding of how Indigenous people use, manage, perceive and relate to the environment. The analysis of TEK is intricately related to issues in the environmental, economical, political, and cultural realms. Documentation of TEK has crucial implications for the conservation of biological and cultural diversity (Haenn 1999,

⁸² And beyond the specific territories in the case of Indigenous people who have migrated and taken with them their knowledge which has proven to be useful. This issue will be approached in chapter VII.

⁸³ It is important to clarify that the use of the term "nature" does not imply a culture-nature dichotomy, regularly absent among Indigenous people. Here it makes reference to the environment.

Etkin 2002, Maffi 2002, Pacheco, 2010, Franco and Burrola, 2010), and is linked to issues of control of land, management of natural resources, design of culturally appropriate and environmentally sustainable development projects (Dewalt 1994; Berkes and Folke 1998; Berkes 1999; Sillitoe 1998, Sillitoe *et. al.*, 2002; Pottier 2003), survival and revitalization of Indigenous cultures, their property and intellectual rights, and prospects for self-determination and empowerment (Agrawal 1995, 2002; Agrawal and Gibson 1999; Benz *et. al.*, 2000; Brown 1998; DeWalt, 1994; Gragson and Blount 1999).

The context of the production of Indigenous knowledge is characterized by a special relationship with nature, outside the nature/culture dichotomy and the recognition of people as part of a larger community that includes the ecosystem as well as their neighbors (they are not merely individuals). This gives a feeling of belonging that is part of their personal identity and their ancestral foundation. The knowledge of Indigenous people is produced, operated and socialized through collective practices. It is the group of cultural practices that produces the identity of each Indigenous group; each Indigenous group is the result of the relationship of its own practices with the environment (Pacheco 2010) as well as their interactions with other cultures.

TEK is more than practical information; it consists of a sacred quality and a systematic utility (Pacheco 2010, Machuca, 2010). TEK has immense symbolic value as part of the cultural diversity of humanity, as it conceptualizes the environment differently than the way modern societies do (Hunn, 1999). Particularly the capitalist system just perceives nature as a source of raw materials for production, its relation with nature is exploitative. Beyond the particular way in which each Indigenous culture conceptualizes the environment, in general the economic rationality of many of the Indigenous systems imply an economic rationality of the process of social production and reproduction. They are regulated by practices and factors qualitatively different from the ones that regulate the market economy and they frequently enhance biodiversity. It has been documented in different parts of the world that Indigenous practices tend to be sustainable and based in an ethical-moral code in which the protection of the natural environment is a priority (Cruz, 2009).

Several Indigenous groups have developed multiple efficient strategies for the use and management of biodiversity; these strategies manage to conserve spatial heterogeneity and biodiversity (Toledo, 2003; Cruz, 2009). Indigenous households practice a non-specialized production based on the principle of the importance of biological diversity and practices. Through the combination of different strategies (agriculture, gathering, forestry

extraction, agroforestry, fishing, hunting, livestock and handicrafts), these practices generate a large variety of resources (Toledo, 2003).

For example, among the Maya people of Yucatán, Toledo (2008) identified 6 different components or spatial units (*milpa* and other agricultural systems, home gardens, secondary jungles, mature jungles, managed jungles and aquatic elements). The Mayas use as much as 50 species and varieties of plants in their “milpa”; in their home garden as many as 387 species have been documented in some studies, they have beekeeping and “meliponikeeping”, they gather different type of edible and medicinal plants and wood (as many as 250 species from the jungles); they also hunt and fish.

Observation of the elements and other natural phenomena form part of a common practice. Among many Mesoamerican cultures, observation is always to obtain information about and interact respectfully with nature, in a non merely exploitative logic. This interaction is the basis of many aspects of life in the social, economic, religious, and other senses. It produces a type of culture that is represented through symbols and rituals whose goal is to act as an intermediary between natural forces and humans thus creating a link between the sacred and the human (Nuño 1996).

The conservation and revalorization of traditional environmental knowledge and the practices attached to it are the guarantee of the social reproduction of the communities and the sustainable management of the ecosystems. Potentially, TEK represents an opportunity for survival of Indigenous populations with a better quality of life without having to be displaced. It is through TEK that families manage to supplement their diets and treat their health problems.

TEK should be protected as a common resource from biopiracy and privatization. To do this, communities need awareness of the potential economic potential value of it, in addition to the intrinsic cultural one, and of ways to use it and simultaneously take care of it (Lauriola y Moreira, 2006) (See chapter VIII for further discussion).

Hopefully the new, more holistic perspectives that have appeared in recent years for the study of TEK will make this possible. This new perspective considers epistemological, legal, and environmental problems, as well as the biodiversity and the social actors involved in a framework that values diversity and that questions monocultural perspectives created from positions of power (Pérez y Argueta, 2011).

TEK and Development

From the 50s until the early 70s, development paradigms tended to be technocratic, centralized and contemptuous of local knowledge and cultures (Pottier, 1993:13 in Finnis, 2004). The identification of problems, the determination of research agendas and the implementation of interventions were done by outsiders without consideration of local knowledge. This had a considerable negative impact on traditional knowledge as frequently the development projects represented a model of thought antagonistic to those of the Indigenous people; moreover the classical development proposals accelerated change dramatically, modifying local knowledge with scientific perspectives (Bicker *et. al.*, 2004). This is only one of the mechanisms that Western civilizations have used, as the dominant ones, to try to impose their models of production-consumption, belief system and their forms of social organization. For this they have applied a lot of pressure on the autochthonous groups that persist around the world, in a vain but strong objective to homogenize cultures destroying them, in order to incorporate them even more in the market economy that is favorable for the interests of economic powerful nations and hegemonic groups (Cano *et. al* 2009).

In the early 1900s, a paradigm shift resulted in valuing TEK as a research agenda with the aim of using TEK for development projects. Scientists wanted to develop strategies for empowering local communities to incorporate their own beliefs systems into their self-determined development (Inglis, 1993; Williams *et. al.*, 1993; Bicker, *et. al.*, 2004). It is very important to emphasize that TEK has an intrinsic value, as part of the cultural heritage of Indigenous people, and only because of that should be registered and valued. Hunn (1999:25) has repeatedly explained that "there are more compelling reasons to preserve TEK than the contribution of the knowledge gained thereby to the advance of Western Cultural enterprise". He considers its primary value to be as a living tradition, a monument to our common humanity. Hunn proposes that TEK systems are to the evolutionary future of our species what biodiversity is to the future of life on earth. Finally he alerts us about the danger that may arise from the loss of TEK; we may be left with just one way of knowing, the global capitalist consumer society.

The cultural importance of TEK does not preclude its use in research linked to projects whose objective is to improve the economic conditions and quality of life in general, of marginalized people.

Pacheco (2010) proposes considering traditional environmental knowledge as an endemic knowledge, that embodies the human proposal to live on and use a certain

territory, reason for which it can/should/must be used for regional development, as it can be used to design culturally appropriated projects (Pacheco 2010).

To approach the intersection of TEK and development represents a real engagement with Indigenous people and challenges notions of identity, power, and agency (Bicker *et. al.*, 2004).

Some critics blame anthropologists for mystifying traditional knowledge and exaggerating the difficulties associated with making it more widely accessible, particularly for economic development and environmental conservation (Vayda, *et. al.*, in Bicker *et. al.*, 2004). There is some truth to this assertion and it is fundamental that traditional knowledge be accessible but it is worrisome to not fully consider the role that Indigenous people should play in this issue, as the protagonists. The accessibility of traditional knowledge and its, in theory, needed demystification should be determined by its owners and inheritors. Furthermore, it has been pointed out that the western scientific system and its representatives such as UNESCO, value the valoration and persistence of traditional knowledge that is compatible with and supports of the type of development and the market logic implemented by the neoliberal logic of globalization (Pérez and Argueta, 2011). A middle ground needs to be found between the two extremes of having the scientist approach traditional knowledge exclusively as a cultural heritage or in seeing it merely as a tool for development projects. An integrated view would be aware of the relevance of TEK as part of the culture and identity of Indigenous people, and also because of its potential to improve life quality among its owners.

To include TEK in development projects implies deep changes and embracing new perspectives. This is possible if perspectives such as the one proposed by Leff (1995, 1986) are considered. It consists of creating a new environmental rationality that weaves together regime-specific cultural, ecological, and technoeconomic productivities. This implies understanding the ecological needs in biological terms, but immersed in cultural and economic practices.

TEK and the Western Science Paradigm

Several years ago, Levi-Strauss approached the clash between so called "savage" and scientific thought. He explained that they do not correspond to superior and inferior stages of human development, but to the different strategic levels in which nature is comprehend by the two types of knowledge. Savage thought is characterized as being based more on perception and imagination, linked to sensibility and concepts full of images, myths and

symbols in contrast to modern thought where images, data from the senses and the imagination are subordinated to concepts and theories (Maya *et. al.*, 2009).

Throughout history the Western paradigm has been unable to assume this view, and instead it has denied the possibility of knowledge to Indigenous people and has kept for itself the privilege of producing valid knowledge. Knowledge of Indigenous people was labeled as practices, belief and superstitions, without technical value, and therefore invalid as knowledge. Despite the fact that certain aspects of Indigenous knowledge were suppressed in different ways, it has not completely disappeared. The challenge now goes beyond critiquing colonialism and documenting how the subordination of knowledge occurred, to liberating traditional knowledge that was previously suppressed (Pacheco 2010).

The clash of science and Indigenous knowledge remains constructed around the interests of science (Smith, 1999). Documenting TEK and disseminating its importance represent the possibility of accessing other forms of knowledge and therefore access to different futures. In this way we can end the monopoly of the West on knowledge production. The existence of alternative forms of producing knowledge challenges the inevitability of the imperialism of modern reason as being the sole producer and user of knowledge (Pacheco 2010). Science and traditional knowledge should not compete with each other; they are different way of understanding the world. If any competition has emerged between them it has been created by the people that want Western science to substitute all other forms of knowledge (ICSU-UNESCO, 2002). We should keep in mind that in the end both TEK and Western sciences represent the human intellect and different ways of thinking about reality.

Establishing social conditions where traditional knowledge can be developed is a challenge scientists need to assume, and work to get other groups such as politicians, policy makers and civil society in general, committed and involved in conserving traditional knowledge. Traditional Knowledge is an invaluable component of Mexican gravitas and it can be transformed into a resource for the whole country under the condition that it be recognized as valid (Bonfil 2006), and that its immediate inheritors have a voice in how it are used.

Another point to consider is the participation of Indigenous people in Western science. Indigenous people are interested not only in developing ethno-sciences but in the new possibilities that arise from the application of science to matters of their particular interest

such as environmental and resource management or biodiversity conservation (Smith, 1999).

TEK and Dialogue

Traditional knowledge alongside existing Western knowledge can be extended in today's societies; the two types of knowledge complement each other and have the potential to be an excellent tool for planning and decision-making around several issues.

A condition for this to happen is to have Indigenous knowledge recognized as a valid and equal form and method of knowledge which can interact with Western science on an equal footing in a horizontal way (Pérez and Argueta 2011). As these authors have stated, building capacity for the horizontal dialogue of knowledge requires the collaboration of different sectors (communitarian Indigenous, Indigenous migrants, Indigenous leaders, the Indigenous scientists and intellectuals, the educators, the non-Indigenous scientists and academicians, the state government, the federal government, the legislators and policy designers, the critics and evaluators as well as the international agencies). It is important to mention that to the degree that the dialogue between these different sectors is not translated into public policies that permeate the whole society, we will commit frequent mistakes such as intellectual endogamy and nicely elaborated discourses that do not really result in the improvement of the quality of everyday life of Indigenous communities.

To establish a dialogue we need to leave behind biocentrism, economicism and anthropocentrism to advance towards the articulation of knowledge that manages to integrate different spheres (biological, cultural, economical and technological) involved in diverse phenomena (Leff, 1999). Besides this, the ethical, institutional and political contexts for dialogue should be constructed to facilitate this interaction (Pérez and Argueta 2011).

Pérez and Argueta (2011:47) identify three main options in proposals of intercultural dialogue: a) including knowledge in the scientific systems thus implying expropriation, b) hybridizing knowledge systems to generate something new and universally valid and c) fortifying and developing Indigenous knowledge systems so that dialogue is equal and horizontal leading to solutions to specific problems. This last perspective has clearly stated that in order to achieve its goals it is essential to empower not only traditional knowledge systems but to also solve the structural problems of subordination, exploitation and discrimination that their owners face and to openly acknowledge the power imbalances that dominate México. A fourth option may be developed, a one that include option b

and c. I do not consider these two points need to be necessarily exclusive. Indigenous knowledges can be fortified and also can be hybridized (in fact I believe they are already hybrids in some way or another), and this is not bad as long as this hybridization does not be a condition necessary for Indigenous knowledges to be considered valid. More than anything, it is important to avoid falling into demagoguery, folklorization and the expropriation of traditional knowledge. It is essential that Indigenous people's rights are respected so that they can make decisions and keep control over their biological and cultural heritages. Maybe then we can build a real and tangible epistemological pluralism.

TEK and Conservation Biology

Work needs to be done with the more conservative sectors of policy makers and politicians so that they gain at least a minimum comprehension of the biocultural paradigm.

Biocultural diversity cannot afford to have important sectors of the academy and the conservation organizations acknowledging only the importance of biological diversity, ignoring and dismissing the cultural aspect. It is still sometimes assumed that to preserve biodiversity in Natural Protected Areas, it is necessary to keep people out or (Hunn 2008) even worse to kick people out.

The notion that the environment is a product of human invention, and its humanized nature and landscape, regulated by culture, has not been widely accepted (Figeroa 1996). "The same that way even in the deep parts of forests and jungles we can determine the distribution and destiny of certain species that have been protected as their use has been known for centuries, the animals have changed in order to adapt to the human presence. There are ways of scaring away, of hunting, of attracting the wild animals that, practiced constantly during centuries have affected their natural distribution and have changed the magnitude of their populations" (Bonfil 1986). For many scientists, Nature long ago stopped being natural; it is instead a humanized landscape.

The dichotomy of nature-culture or nature-human is one of the myths of Western culture, along with others such as modernity-progress, civilization- nature, pure ecosystem-traditional/Indigenous cultures (Figeroa 1996). This dichotomizing perspective has been constantly questioned, but the dichotomy of modernity and tradition ends up being superseded by the fact that Indigenous knowledge has an importance for capital (Machuca 2009).

The ideas presented above are part of one perspective among scientist, there are others, especially among proponents of biodiversity conservation who have questioned the fact that Indigenous people have the will and knowledge to conserve the biological diversity

present in their territories, and that is the heredity for the new and future generations. It has been suggested that the evidence published so far is sparse, scattered and can be interpreted in a different manner (Smith and Wishnie 2000). As Hunn asks: "Is it random that the places with high levels of biodiversity are the ones inhabited by Indigenous people?, or is there a chance that they have "actively husbanded those biodiverse lands, forests and waters with an eye to the interests of their posterity?" (Hunn 2008). There is a third option, which is that Indigenous peoples have not particularly managed their landscapes for biodiversity, but merely tried not to wreck them or alter them severely, and the result has been the preservation of biodiversity (Smith and Wishnie,2000). In my opinion, this option is egocentric, it only accepts its own definition of conservation; for me what matters is the status of the environment, under whatever label. This topic is approached in the present research; I superficially explored what is Pjiekakjoo thinking about the status and conservation of their biological heritage. In general I found a strong concern about the conservation of resources for future generations. There is no doubt that important sectors of the communities consider their forest as indispensable for the survival of the younger Pjiekakjoo. When confronted with the idea of "modernizing" their community (for example I have asked several people what they think about cutting the trees, paving everything and building tall buildings) there is a strong rejection. They immediately make the comparison with Mexico City, a place they may like to visit, but that do not like in general. They say it is very hot, there are very few trees and their eyes and nose get irritated after a visit. Once again I have to clarify, this is what I have heard from different people in the communities, but we cannot talk about "the Pjiekakjoo" opinion. With the globalization processes the population is interconnected to the modern world and its proposals and values have permeated some community members more than others; there is intra-communitarian heterogeneity.

TEK and Common Property Systems

Under the Common Property regime, the possibility of the appropriation of the goods and services of nature is a group decision.

Theorists of common property systems have widely accepted the importance of the contribution of TEK and the Indigenous regime systems. This contribution has not been accepted by other social and political systems as the ones of public policies, the environment and education, for example (Lauriola and Moreira, 2006).

Even though research on common property regimes of Indigenous systems of natural resources management has proven their sustainability, it has focused on their internal characteristics and aspects. However these regimes and the knowledges that sustain them do not exist isolated from the nation-states in which they are located. On the contrary, the Indigenous systems of common property are highly influenced by the political frameworks in which they exist, a factor that can fortify or reduce their viability in the long term and their potential contributions to other contemporaneous natural resource management proposals (Lauriola and Moreira 2006).

The Pjiekakjoo's territory nourishes the cultural structure; it is an extremely relevance symbol of identity. People have died in the struggle to defend it from forest fires and from the municipal authorities. The territory is not just one more of the symbols of the Pjiekakjoo identity: it is an essential one, one of the most valued. This is why they have defended it; they are aware that in order to guarantee the production and reproduction of the landscape and culture they must keep, as much as possible, political control over their territory, and the autonomy they have to make decisions about it (Figueroa, 1996; Lauriola y Moreira 2006). It is a constant negotiation that has strong economic, social and political implications, and it is exhausting (see Chapter IV).

Some international tools have been proposed, such as the Convention for the Promotion and Protection of Communitarian Resources, which hopefully will increase the respect for cultural diversity through the application of a standard protection protocol (Gibson, 2006).

The extent to which the Indigenous people, in this particular case the Pjiekakjoo, are able to control their territories and the resources they contain, it would become possible to guarantee the permanence of subsistence activities, and considering Hunn's (1999:30) elucidation about its concept and its implications: 1) subsistence should be understood as a long- term relationship between a community and its land and resource base, rather than as a strictly economic activity; 2) subsistence is dynamic, rooted in past practices but of necessity adapting to technological, demographic, economic, social, and political changes; 3) subsistence activities are integral to the life of families and communities, an aspect of their identity and continuity; and 4) the meaning of subsistence is different for each community, varying with the ethnic histories of communities and their component families.

TEK and Indigenous People's Rights

Indigenous Peoples' Rights frequently are not granted, despite the growing emergence of Indigenous people as social actors (Toledo, 1992). Various demands they have made have been achieved only partially, starting from the right to bilingual education, the recognition of their knowledge systems and ending with the proposal for an intercultural national political project.

After 1994 and the appearance of the Zapatista Army, certain sectors of the Indigenous people have gained a political presence, but this sadly has not been reflected in better conditions for the everyday life of most of their people, even less so in the acknowledgement of their knowledge.

Today racism towards the beliefs, Indigenous knowledge and practices is still a constant in governmental policies and social practices. Such pressures affect Indigenous communities undermining the value of their customs and languages.

Historically, the dynamic that has existed has been one of an incessant struggle of the dominated groups to conserve and amplify the ambits of their own culture in the face of the intentions of the dominant society to amplify and consolidate their own cultural spectrum (Bonfil 1986). At the larger national scale, it is true that some achievements have been made and it is important to recognize them, but also shameful that some things keep occurring, for example, in the mass media; some racist attitudes are unacceptable and should be stopped and prohibited. While some of us discuss and demonstrate the detailed knowledge of Indigenous people and the crucial role they have in the creation of a better future for the country, some television programs continue to make fun of people that are part of an Indigenous culture, and the stereotype of having Indigenous people as servants is as alive as it was twenty years ago. Sometimes I have felt like there are two parallel worlds: in one we have the official campaigns against discrimination and the TV spots using Indigenous languages, and in the other the television program where an Indigenous woman is a mix between a naive and stupid servant. The last poll (2010) from the CONAPRED (Consejo Nacional para Prevenir la Discriminación) confirms the terrible state of racism and prejudice in large sectors of Mexican society⁸⁴.

I do not want to sound fatalistic and cynical; I present these arguments to emphasize that ethnobiologists, and social scientists in general have a lot of work to do, and responsibility, beyond the academic spheres.

⁸⁴ <http://www.conapred.org.mx/>

There is a tendency to think about Indigenous peoples' knowledge as just the remains of ancient systems and moreover this tendency dismisses traditional knowledge because of its link to the religious realm and not to the objectivity of the western science. "These ideas cause the disaggregation and disarticulation of the local knowledge systems, propitiating the appropriation and validation of them by western disciplines" (Pérez y Argueta, 2011: 33). Many of the authors that have fought for the systematization, registration and valuing of Indigenous knowledge frequently forget that in this process, knowledge may be expropriated (For details see Chapter VIII).

The notion that research about local knowledge is socially neutral must be abandoned, because it is far from being neutral. It necessarily involves consideration of intellectual property rights and other regimes concerning the protection of traditional local knowledge (Bicker *et. al.*, 2004). As is discussed in chapter II, the methods employed have the potential of facilitating theft of knowledge or protecting the people from unfair exploitation if they are taught the tools to defend themselves and are empowered enough to do so. The traditional knowledge systems are part of international debates not only for the property issues, but for their larger prominence in relation to the dignity and cohesion of the communities (Gibson 2006). In the contemporary world, the practices and techniques of Indigenous People, along with their culture and traditions, have the potential to become an act of political resistance and an environmental alternative (Cruz, 2009). The scientists working on its documentation should be careful that their activities do not become a tool for a system of cultural control. This control has existed for centuries in Mexico, and has already reached some of the cultural elements of Indigenous people, those that according to a different historical moment were of interest to the dominant society (Bonfil 1986).

In the late 80s, Posey (1988) in his "The Declaration of Belen" was already advocating about the moral responsibility ethnobiologists have with the people with whom we work, usually marginalized people. As researchers and considering that "...by our appreciation and understanding of the humanity of ...these 'Indigenous people', ... we might encourage support for all of Indigenous people in their struggles....." (Hunn 2008:13), the least that we can do is get actively involved in the fight for the full and real recognition of their rights. A crucial contribution of ethnobiologists is to "assist threatened Indigenous communities most effectively...by supporting their claims to land and control of resources while providing our audience carefully documented ethnographic analyses of TEK in action" (Hunn, 2007:8).

According to Hunn (2007) it was not until the 80s that the fourth phase⁸⁵ of ethnobiology appeared, it emphasizes the rights of Indigenous people to control their traditional knowledge. The works around this phase should be inclusive and build on the previous phases of the discipline in order to achieve the advancement and deep comprehension of traditional knowledge systems at the same time that the owners of these systems are supported in their struggles for the full recognition of their rights. I am convinced that, despite the potential dangers that doing research in ethnobiology implies our labor at the end is always more positive than the possible negative effects it may carry. If ethnobiologists were not in the field many questions would remain unanswered and ignored.

Conclusions

In Mexico it is urgent to study more the concept and implications of the biocultural axiom. Under this theoretical framework, Traditional Environmental knowledge (TEK) embodies an essential part of the biocultural diversity of the country. I proposed that TEK should be called Contemporary Indigenous Knowledge (CIK) to reflect the important dynamics that these systems have as well as their continuous changes, that the term traditional may not reflect; and also that TEK encompasses not only environmental data.

The design of more culturally appropriate projects of biological conservation as well as development requires having CIK as one of its main foundations. The *saberes* of Indigenous People represents an important alternative to the hegemonic presence of Western Science and as such should be approached in order to propitiate the recognition of other knowledge systems in the contemporary world. This may be achieved through a "*diálogo de saberes*" (knowledge dialogue). CIK is a key element for the maintenance and fortification of common property systems, as it is to a considerable extent the one that determines the management established. Finally, the documentation of the *saberes* should become a tool for the defense of Indigenous people's rights.

⁸⁵ Ethnobiology I, born decades before the discipline was called ethnobiology was characterized by an utilitarian focus, ethnobiology II was created from cognitive/linguistic anthropology having Berlin's general principles of folk biological classification and nomenclature (Berlin, 1992) as the main pillar, and the third phase is represented by the ecological ethnobiology that addresses the key role of knowledge and practice on making a living and the ecological consequences of this (Hunn 2007).

VI. The Pjiekakjoo Knowledges about the forest (El monte)

In order to respond to the aim of working towards achieving a deeper understanding of Indigenous knowledge in its entirety, as a system rather than particular aspects, the knowledge of the Pjiekakjoo about very diverse organisms was registered. This responds to the certainty that Indigenous knowledge systems do not perceive reality in a fragmented way. The cost for this was to sacrifice the depth with which each topic was approached, in order to gain a wider vision of all of the elements and their interactions.

Social scientists should not forget that Indigenous knowledge does not exist for its own sake, but is the result of the relation of humans to nature that is extended to the relation of humans to their historic and cultural space. The capacity of integrating processes from the social, political, economic, cultural and environmental spheres, avoiding simplification, is one of the most relevant characteristics of ethnoecology (Durand, 2010).

In the following sections I will describe Pjiekakjoo knowledge about wild mushrooms, vertebrate and invertebrate animals, and the most used plants. The division in sections is for practical reasons, and I assume, the limitations that my initial training as a biologist has given me, more than to the Pjiekakjoos perception of them. Despite having documented an extensive amount of information in relation to these groups of organisms, it is essential to emphasize that it is only an approximation that represents a first step toward understanding Pjiekakjoo knowledge.

Wild Edible Mushrooms and the Pjiekakjoo knowledge

The Fungi have great economic importance for the forest. On the one hand we have the microrhizal species that are essential for the maintenance of the forest. Besides their ecological importance as decomposers they have a utilitarian one, as many are edible and some have other uses.

In the State of Mexico 3,403 species of macrofungi have been recorded, of which 726 correspond to the Phyla Ascomycota and Basidiomycota, commonly called "hongos" ("mushrooms"). This state is 5th in the country in the number of species (after Veracruz, Oaxaca, Jalisco and Michoacan) (Frutis and Valenzuela 2009). In the Chichinautzin Biological Corridor 315 species of fungi have been recorded. The groups that are best represented in this area are: Tricholomataceae, Strophariaceae, Amanitaceae, Boletaceae, Polyporaceae, Clavariaceae, Lycoperaceae and Sclerodermataceae (Guzmán and Mora, 1983).

In the COBIOCH (*Corredor Biológico Chichinautzin*) there are more than 80 species of edible mushrooms that are sold in the main markets (Portugal and López, 1995). The most commercialized species in Mexico State are: *champiñones* (*Agaricus campestris*), *yemitas* (Caesar's Mushroom, *Amanita caesarea*), *panzas* (Penny bun, *Boletus edulis*), *duraznillo* (chanterelle, *Cantharellus cibarius*), *trompetas* (Woolly Chanterelle, *Ghompus floccosus*), *tejamanilero o señorita* (Common Funnel, *Clitocybe gibba*), *gachupines* (Black Elfin Saddle, *Helvella lacunosa*), *calvitos* (Fried Chicken Mushroom, *Lyophyllum decastes*), *huilacoche* (corn/maize smut, *Ustilago maydis*), *patitas de pájaro* (Changle, *Ramaria flava*) and *mazorquitas* (Morel, *Morchella esculenta*) (Villareal and Pérez-Moreno, 1989a, Mariaca *et. al.*, 2001; Burrola *et. al.*, 2008).

Antecedents

Garibay-Orijel *et. al.* (2006) have reported the consumption of some 300 species of mushrooms among Mexican ethnic groups. Mexico is considered a micophagous (*micófago*) country, as mushrooms are widely appreciated for their taste and nutritional properties. Therefore there is a lot of potential for their commercial use and cultivation (Ruan-Soto *et. al.*, 2004).

Escalante y López-González (1970) studied the uses of the sacred mushrooms among the Matlalzincas, who name them "*santitos*" (little saints) and say that they teach things. Guzmán *et. al.*, (2009) mentions the great importance mushrooms have in the markets of Amecameca and Tenango del Valle, where they report 81 species, some of which are also commercialized in Mexico city.

Bautista-Nava *et. al.*, (2010) registered 36 species of edible mushrooms in the municipality of Tenango de Doria.

From time immemorial people have used mushrooms as food. Of particular importance are the wild edible mushrooms that are a highly appreciated food for several Indigenous groups (Frutis and Valenzuela 2009), one of which is certainly the Pjiekakajoo.

Naranjo (1990) researched Tlahuica mycological knowledge. He listed 80 names (In Spanish and in Pjiekakajoo) for wild edible mushrooms that corresponded to 46 species. He recorded as well 15 considered toxic and three medicinal. Of the total of species, 30 had a name in Tlahuica. He documented the uses, traditional taxonomy, phenology and nomenclature of the mushrooms recognized by the people. This research is an important antecedent, to which we added a considerable amount of information. I did find some

concrete mistakes, reason for which I decided to conduct the ethno-entomological research as it would not be any precedent. He considered as different taxa several names that refer to the same mushroom. I found only one medicinal species of medicinal mushrooms instead the three that he reported, and I did not find either the methods to conserve the specimens out of season besides the traditional one of drying them. In addition several of the names in Spanish were not found (for example: Hongo de gato, Hongo de lagartija, Hongo de pescado, ojos de Borrego). Naranjo's Tlahuica ethnomycology is an important work as it is one of the first to consider the importance of the traditional taxonomy and other aspects beyond the utilitarian (for example, factors determining the emergence of the mushrooms and their ecological relations with other organisms of the forest). The scope of his research was wide. The most limiting factor may have been his methods. He mentioned interviews but in his results and discussion he seems to consider mainly the answers to 444 questionnaires, those he recovered of the 500 sent out through the students in the schools to the community. His research can be useful for a comparative exercise, as I have found knowledge is in constant change and the 21 years that passed since his research is enough time for some changes to happen. We did not explore in detail all the aspects of the ethnomycological knowledge that he recorded, therefore for future projects it will be important to document in detail the perceptions that the Pjiekakjoo people have about mushrooms and their forms of classification. For the Taxonomic determination I did not consider Naranjo's results, all the species were determined to the maximum possible approximation with the help of Professor Irene Frutis (See Chapter II). The Pjiekakjoo used the term **Nchoo** to designate mushrooms, very similar to the name used by their neighbors the Matlalzincas, who use the term "**cchó**" to name fungi (Mapes *et. al.*, 1981). In the present research we documented 77 folk taxa that include at least 74 Linnean species of wild edible mushrooms recognized by the Pjiekakjoo. These taxa are distributed in three classes, ten orders, 23 families, and 32 genera. (See table below). We documented 64 names in Pjiekakjoo and 112 names in Spanish for fungi. Additionally there are 17 folk taxa which were not identified taxonomically: *Abuelitos*, *Abuelitos de clavo*, *Hongo de capulín*, *Hongo de Chia*, *Clavito de Encino*, *Clavito de llovizna*, *Clavito de ocote*, *Clavito de Oyamel*, *Clavito de rosa*, *Hongo de Oyamel*, *Escorpión*, *Nchoo motoro*, *Ncho chu maíz*, *Hongo de Punta*, *terneras*, *Tolumbas* and *Comalito*. From these taxa it was not possible to obtain a photographic record or collect the species.

Table 4. Taxonomic distribution of the mushroom species registered.

Phylum	Order	Family	Genera	Species
Basidiomycota	7	18	25	55
Ascomycota	4	6	6	17
Myxomycota	1	1	1	1
Total	11	25	32	73

Pjiekakjoo recognized an impressive number of species. Other relevant cases are: the documentation of 74 species (53 genera and 32 fungi families) in the Zapotec town of San Juan Gbëë (Hunn, 2008). Mapes *et. al.* (1980) in a research about the Purepecha ethnomycological knowledge, registered 43 edible fungi, the study included 21 localities in the state of Michoacan. Martínez-Alfaro *et. al.*, (1983) found 40 edible categories in 13 localities in Puebla, amongst the Nahuatl and Totonacos. Díaz-Barriga, registered 115 species of edible fungi distributed in seven localities of the Biosphere reserve of the Monarch butterfly. Franco and Burrola (2010) found 73 species of edible fungi in the National Park Nevado de Toluca (Mexico State), they studied nine localities. They indicated that on average each family recognized five types of mushrooms, even though there are also some persons that can recognize as many as 25. This is far the case of the Tlahuicas where each family recognized easily at least most of the 73 species registered. Families may have their culinary preferences and consume certain species more than others, but they in general have an extensive knowledge of the edible species. In the Nahuatl community of San Isidro Buensuceso, on the La Malinche Volcano National Park, (Tlaxcala, Mexico) the mycological knowledge include 48 species (65 Náhuatl names and 40 in Spanish).

Table 5. Taxonomic relation of the species of mushrooms documented and their common names.

Species		Name in Local Spanish	Name in Pjekakjoo	Meaning
Phyllum Basidiomycota				
Order Agaricales				
Family Agaricaceae				
Genus <i>Agaricus</i>	<i>Agaricus campestris</i>	Hongo blanco/ Terneritas/Palomas	Nchoo pax	
	<i>Agaricus silvaticus</i>	Pipila	Nchoo sulí	
Family Amanitaceae				
Genus <i>Amanita</i>	<i>Amanita</i>	Cal, H de/ Blanco	Nchootindo	cal
	<i>Amanita</i>	Chepa	Nchoo ñile laá	
	<i>Amanita</i>	Chepa amarilla		
	<i>Amanita</i>	Dulce, H. de/ Peine de dulce	Nchoo tēoxlo	
	<i>Amanita</i>	Huevo	Ncho xildo	
	<i>Amanita fulva</i>	Peine	Nchoo tsuba	
	<i>Amanita caesarea</i>	Xical	Ncho ñelgua	
<i>Amanita muscaria</i>	Chepa loca / Xical rojo loco	Nchoo da mí	da mí, pepita	

Table 5., 1.1 Continued

Order Cortinariales					
Family Cortinariaceae					
Genus <i>Hebeloma</i>	<i>Hebeloma</i>	<i>aff birrum</i>	Clavito vidrioso	Nchondaa	daa, agua
Family Tricholomataceae					
Genus <i>Laccaria</i>	<i>Laccaria</i>	<i>laccata</i>	Zarza, H. de/ Zarzamoras/ Zarzitas	Nchoo indy	
	<i>Laccaria</i>	<i>bicolor</i>	Zarza, H. de		
Genus <i>Clitocybe</i>	<i>Clitocybe</i>		Zorruto	Nchoo üü	
	<i>Clitocybe</i>	<i>gibba</i>	Campanitas/Señoritas/ Tejamanilero	Nchoo jiyáá	
Genus <i>Collybia</i>	<i>Collybia</i>	<i>dryophila</i>	Tortilla, H. de	Nchoo tochme	tortilla
Genus <i>Tricholoma</i>	<i>Tricholoma</i>		Canarios		
	<i>Tricholoma</i>		Palomos		
Genus <i>Lyophyllum</i>	<i>Lyophyllum</i>		Clavito de chamusquina	NchoNda	
Genus	<i>Melanoleuca</i>	<i>grammopodia</i>	Queso	Nchoo quexu	
Order Russulales					
Family Russulaceae					
Genus <i>Russula</i>	<i>Russula</i>	<i>4 species</i>	Madroño, H. de/Santiaguero	Ncho pambal	
	<i>Russula</i>	<i>brevipes</i>	Trompas/ Trompas H. de/ Trompas de puerco	Nchoo wueto	
	<i>Russula</i>	<i>nigricans</i>	Carnero nchoo	Carnero nchoo	
Genus <i>Lactarius</i>	<i>Lactarius</i>	<i>salmonicolor</i>	Enchilado	Nchoo míí	H. de Chile
	<i>Lactarius</i>	<i>indigo</i>	Tinta, H. de	Nchoo kendi	tinta
	<i>Lactarius</i>		Miado, H. de/ Orin, H. de	Ncho minxdaá	

Table 5. 1.2 Continued

Order Boletales				
Family Boletaceae				
Genus <i>Boletus</i>	<i>Boletus</i>		Panza/Cemitas	Nchoo pandzy
	<i>Boletus</i>	<i>edulis</i>	Cemita de ocote	Nchoo cemitá
	<i>Boletus</i>	<i>luridus</i>	Galambos	
	<i>Boletus</i>		Pancita de encino	Nchoo pandzy
Genus <i>Suillus</i>	<i>Suillus</i>	<i>granulatus</i>	Chonchin/Babositos	Nchooyí
	<i>Suillus</i>	<i>tomentosus</i>	Chonchin	
Genus <i>Gyroporus</i>	<i>Gyroporus</i>		Tepozán	
Family Gomphidiaceae				
Genus <i>Gomphidius</i>	<i>Gomphidius</i>		Abuelito del chonchin	
Family Strobilomycetaceae				
Genus <i>Strobilomyces</i>	<i>Strobilomyces</i>	<i>flocoppus</i>	Panal, H. de	Nchoo dyetzi

Table 5. 1.3 Continued

Order Cantharellales					
Family Cantharellaceae					
Genus	<i>Cantharellus</i>	<i>cibarius</i>	Flor de calabaza/ Cempasúchitl/Suchil	Nchoo dyuu	flor
Family Clavariaceae					
Genus	<i>Clavaria</i>		Escobeta	Puek choo	
Genus	<i>Clavulina</i>		Hojas, H. de/Fideos/Sopa	Nchoo xitsechi	
Family Clavariadelphaceae					
Genus	<i>Clavariadelphus</i>	<i>truncatus</i>	Acocote	Ñtsuby	Acocote
Order Poriales					
Family Coriolaceae					
Genus	<i>Climacocystis</i>		Charal, H. de		
Family Lentinaceae					
Genus	<i>Pleurotus</i>	<i>aff. Oppuntiae</i>	Maguey, H. de	Ncho lööt	
Genus	<i>Lentinus</i>	<i>Lentinus sp.</i>	Coloyote	Nchoo palonko	
		<i>Lentinus sp.</i>	Ocote, H. de	Nchoo tsicmax	
Order Gomphales					
Family Gomphaceae					
Genus	<i>Gomphus</i>	<i>floccosus</i>	Trompeta	Ncho pípi	
		<i>kauffmanii</i>	Trompeta blanca		
Family Ramariaceae					
Genus	<i>Ramaria</i>		Escobeta		
			Escobeta amarilla		
			Pata de Pájaro, H. de	Nchoo molitaá	
			Venado, H. de	Nchoo tsambaly	tsambaly, venado
			Añil	Nchoo anis	

Table 5. 1.4 Continued

Order Lycoperdales						
Family Lycoperdaceae						
Genus <i>Lycoperdon</i>						
	<i>Lycoperdon</i>	<i>perlatum</i>	Bombones/Pedos/ Paloncos	Nchoo palonko		
Genus <i>Bovista</i>						
	<i>Bovista</i>		Llano, H. de/Llaneros/Sanjuanero	Nchoo yabi	yabi, abono	
Order Ustilaginales						
Family Ustilaginaceae						
Genus <i>Ustilago</i>						
	<i>Ustilago</i>	<i>maydis</i>	Milpa, H. de/ Zanacoxe/ Huitlacoche/ Maíz, H. de	Nchoo paá		
Phylum Ascomycota						
Order Hypocreales						
Family Hypocreaceae						
Genus <i>Hypomyces</i>						
	<i>Hypomyces</i>	<i>lactifluorum</i>	Orejas enchiladas			
Order Pezizales						
Family Helvellaceae						
Genus <i>Helvella</i>						
	<i>Helvella</i>	<i>elastica</i>	Cigarrito	Nchoo cigarru		
	<i>Helvella</i>	<i>infula</i>	Cueros/Cueritos/ Botas, botitas	Nchoo ximbaly	Piel de animal	
	<i>Helvella</i>	<i>crispa</i>	Gachupin blanco	Ncho tzongue xichi	Blanco	
	<i>Helvella</i>	<i>lacunosa</i>	Gachupín negro Negrito	Ncho tzongue ñitüi	negro	

Table 5. 1.5 Continued

Family Pezizeaceae					
Genus	<i>Sarcosphaera</i>	<i>Sarcosphaera</i>	<i>eximia</i>	Papa	Nchoo mbonyu
		è		Molcajete	Nchoo mandzaa molcajete
Family Morchellaceae					
		<i>Morchella</i>	(7 species)	Mazorcas/Olotitos/ Elotitos	Nchoo lèthuu
Order Eurotiales					
Family Trichocomaceae					
Genus	<i>Penicillium</i>	<i>Penicillium</i>		Espiga de maíz, H. de	Xi piox
Phyllum Myxomycota					
Order Physarales					
Family Physaraceae					
Genus	<i>Fuligo</i>	<i>Fuligo</i>		Huevito	Nchoo Nant'e huevo
				Abuelito de clavo	
				Abuelitos	Nchoo tü mendyee/ Ncho sityaa
			Capulín, H de	Nchoo ndatze	datze, capulín
			Chía, H de	Nchoo xifilindiyuu	
			Clavito de encino	Nchoo xindzaá	
			Clavito de llovizna	Nchoo mavi	mavi, lluvia
			Clavito de rosa	Nchoondaa	daa, agua
			Escorpiones	Ncho escorpio	
			Oreja de puerco	Ncho nllen pet zu	
			Oyamel Hongo de	Ncho tubi	
			Punta, H. de/ Nariz, H. de	Nchoo tuxmax	punta
			Tolumbas	Nchoo turumbux	
				Nchoo motoro	

One of the many advantages of the workshops, in which several people get to discuss the information, is that it prevents from registering descriptive phases and allows the correct identification of synonyms and "true names". It is only the names that people identified the ones that are registered.

They have some criteria they say an edible mushroom should fulfill. The first one is: "if the mushroom is eaten by bugs, it is edible", and the second one consists in scratching (talla) the mushroom and if it turns purple it is not edible.

The Pjiekakjoo consume rare edible species, the Huevito, *Myxomycota: Fuligo septica* (L.) Wiggers, first reported as edible by Mapes *et. al.*, (1981) among the Purepechas. As the later ethnic group, the Pjiekakjoo consume it with egg. This mushroom is characterized for the formation of a gelatinous plasmodium out of which the brown spores come, in a mass that looks like cocoa.



Figure 63. Huevito

There were some species that were not collected. The participants of the workshops commented that those appeared in distant places where they do not go frequently, but other people from other towns do harvest them.

Some names in Spanish have been introduced to the Pjiekakjoo communities as the result of their commercialization, as people get to hear how they are called in the towns where they go to sell them.

Cold and Hot, and details about the cooking.

As mentioned in Chapter III, the Pjiekakjoo have the notions of things as food and diseases to be of a hot or cold nature. Mushrooms are also classified by these concepts. In general fungi are considered to be cold, but among them some are considered colder than others. *Cornetas* are considered to be one of the coldest, for example. As cold food, they may cause stomach problems. In order to avoid this, mushrooms should be cooked with *epazote* (*Teloxys ambrosioides*), and garlic (which are considered to be hot), which are of a hot nature, and should not be eaten late at night. Martínez-Alfaro *et. al.*, (1983) in his research among the Totonacos, specified that to classify plants, animals

and fungi as cold or hot, is a galenic humoral (*humoral galénica*) classification and not a thermic one; and that the edible species are considered cold. All the mushrooms are cooked with garlic, that besides giving taste would identify if they are “hongos locos,” that is, “crazy mushrooms,” a reference to the toxic ones, if this is the case the garlic turns black.

Mushroom consumption implies a detailed knowledge of the species, as some of them have particular characteristics that demand that they be cooked only after a treatment. *Cornetas* and *chon chines* must be peeled (otherwise the dish would end up being slimy), and the former as well as the *Hongo de Cal* and the *escobetas* should be boiled first before being fried, to take away the bitterness. After they are boiled they are cooked; the others are cooked directly. *Mazorquitas* are filled raw and then just some *caldo* (broth) is poured on the top of them.

Panzas should never be mixed with *clavitos*. *Panzitas* are always eaten toasted in the *comal*. The *escobetas*, *mazorcas*, *hongo de Trozo*, *huevoito*, *acocote*, *añil* and *xical* are always cooked separately. They cannot be part of what is called “*revuelto*”, a mixture that can be cooked in different ways. The “*revuelto*” species comes from places that have not been burned. There are two species that grow particularly after a place burns: *Mazorquita* and *Clavitos de Chamusquina*. In 1999 there was a terrible forest fire where many hectares were burned. People remember that the year after the *clavitos* boomed, allowing them to collect as much as 300 kg. per day, despite the fact that there could be as many as 200 persons collecting mushrooms. A woman recalls she even got headaches from seeing so many mushrooms and how she dreamed about them at night in those days.



Figure 64. Hongo de Trozo

The most common species in the “*revuelto*” are: *Campanitas*, *Quesitos*, *Escorpión*, *Madroño*, *Enchilado*, *Hongo de punta*, *H. de zorro*, *H. de hojas*.



Figure 65. One of the species of H. de Madroño

A few species can be consumed raw: *Motoro*, *Súchil*, *Palomitas/terneras*, *gachupin blanco*, *corneta blanca* and *trompa blanca*.

Don Macedonio related that he has eaten the *chepa loca* (*Amanita muscaria*) and he has not gotten sick, he said that the secret is to be sure that it has been totally cooked, that "all the water is gone". Mapes *et. al.*, (1981) also reported the consumption of *Amanita muscaria* among the Purepecha, after being very well boiled.



Figure 66. Xical loco (*Amanita muscaria*)

All the dishes I have tried prepared with mushrooms are very tasty. They range from soups to much elaborated dishes; such as the one made with *mazorquitas* filled with cheese and ground meat. Another of my favorite dishes is made with *chonchines* wrapped in dried corn leaves, mixed with garlic and epazote, and cooked on the *comal*. During the workshops it was very evident that the recipes are master mainly by the woman.



Figure 67 Chonchines

Dried mushrooms

Some species are dried so they can be consumed out of season. In particular they are eaten during Holy Week when the consumption of meat is forbidden. The species that are dried are: *mazorcas*, *gachupines*, *negritos*, *cornetas* and *cempasúchitl*⁸⁶. The Pjiekakjoo families make beautiful chains of them that are frequently hung outside the houses to dry. (Figure 68 and 69). I did not find any concept among the Pjiekakajoo that would make reference to considering the mushrooms "flesh of the Gods", a concept present in other Mesoamerican cultures.



Figure 68. Mazorquitas and Negritos.

⁸⁶ This is also the name for the marigold flower; in this case it is given to the mushroom due to the similar color they have.



Figure 69. Mazorquitas

Medicinal Mushrooms

Mushrooms have a medicinal use handed down from prehispanic times. Frutis and Valenzuela (2009) and Guzmán (2009) mention several species. Naranjo (1990) reported three species with a medicinal use. The people with whom I worked do not recognize two of these, rather only one. The *Hongo de espiga de maíz* (xi piox, *Penicillium* sp.) was used to heal burnt skin (*para quemadas*). The elders recognize this use is very uncommon nowadays. They mentioned that it forms little balls on the top of the corn and that these are eaten by squirrels and birds. Mora (1989) also reported a medicinal mushroom called "quencho", but that its healing properties were known to few people.

The Collection

The extraction of wild edible mushrooms is part of the everyday life of the Pjiekakjoo communities in the rainy season; several families make a living out of this activity. The whole family, including children, could be involved in the collection. This is the peasant unit of production. A day of collecting starts at 6 am when they leave the community in groups not returning until 6 pm, 12 hours later. Collecting groups may be taken by truck closer to the places of collection at the base of the mountain (*al pie de monte*) for a daily fee (\$45 pesos, around 3.5 dollars) in 200), and from there the collectors have to walk for several hours. They take food to eat in the middle of the forest.



Figure 70. Campana

A good day of mushroom collecting represents at least 8 kg.; an excellent day would produce from 12 to 15 kg collected between two people. In basket terms, they said the maximum they have

collected are two full baskets. More detailed research is needed to establish the amounts of mushrooms that are extracted by family. For example Franco and Burrola (2010) recorded that in general terms, families extract 4 kg per harvest, and they calculated that in the summer season they could extract as much as 17 tons of mushrooms. The mushroom collection implies not only a cash income but also a cultural tradition. However, it needs to be determined what the ecological impact of the harvest in this non-timberforest product.

The *delegados* calculate that there are around 700 inhabitants, and that 40% of the families go to collect mushrooms ("van a hongear"). The *delegados* said that originally there were few "hongeros" (people dedicated to collect mushroom, and used as a form of disrespect), but that at present, with the lack of jobs, more and more people was going from San Juan and Teocalcingo, as well as from other towns around, such as Toto and Sta. Mónica, which has also affected the quantities of mushrooms that can be collected, forcing people to go to more distant places.

The different locales where mushrooms are collected are determined to a considerable extent by the fact that they have or have not burned.

The traditional collection of mushrooms implies cutting the tip of the mushroom (in strict sense it is the base of the fructification) to leave it inside the ground, according to the Pjiekakjoo this is the "seed", and guarantees the presence of mushrooms the next year. It is important to cover it, otherwise the fungi would get dehydrated and die. It is in relation to this type of practice that some people have expressed their concern that a growing number of mestizos from other communities are collecting mushrooms, as they are ignorant of some of the ecological/cultural rules followed by the Pjiekakjoo, contributing significantly to the overexploitation of the resource. This situation was also found by Franco and Burrola (2010) in the Nevado de Toluca National Park.

Phenology?

It is said that the chonchines both start and finish the mushrooms season.

By the middle of June, 2010, people started going for mushrooms. The *chonchines* are not collected to sell, but the first *clavitos*, the other specie that appears early, can be sold at good prices (as much as \$100 pesos/kg, around 8 dollars), when they first appear.

On the community meeting of the 1st of August, 2010, when I asked about the order in which the mushrooms appear, the people gave me the following order, not including all the species, but just the most significant ones:

Hongo de Trozo: Are the first ones that appear as soon as the rains start, in April and May. The Purepechas also recognizes a species (*Letinus lepideus*) from the same genus as the *Hongo de trozo*, and Mapes *et. al.*, (1981) recorded that they consider this species to bloom in the dry season and alone.

Huevito and Chonchines: The former species appears with the thunder. Both boom in April.

Chepa: They appear after the Huevitos and chonchines this two species are present for several months, as the people commented that they could be found even in December, when there were very low temperatures.

Clavito: They can be found during May, June and July

Gachupin, enchilada, semitas and trompas: July and August

Mazorcas: at the end of the season (August-October), and they can be found until December and January.

Chonchines: September-October.



Figure 71 and 72

It was hard for people to think in terms of the Western calendar by months. They conceptualize the mushroom's appearance in relation to environmental factors and communitarian activities, such as certain celebrations. According to them, all the species that are not mentioned above appeared in the middle of the rainy season, from the end of July to the beginning of October. The Purepecha, just as the Matlalzincas, according to Escalante (1976 cited in Mapes *et. al.*, 1981), recognize groups or companions of fungi that appear at the same time. Therefore it is a criterion that the appearance of one member of the group implies the appearance of the rest of the group.

Poisoning

Son muy pocos los casos que se llegan reportar, pero si llegan a existir. When I asked about the traditional remedies for this, they said that "agua de venida" (water that runs down when it rains) with alcohol, to which they add mixed (molida) *Capulin* (*Prunus*) seed (Cherry pits) and corn roots. Sometimes a very strong coffee is used. In general it is considered that the intoxications happen when the mushrooma are not well cooked.

Beliefs

There are beliefs associated with mushrooms. For example it is believed that it is only after lightning strikes (thunder hits) that mushrooms such as *Chepa*, *Trozo* and *Huevito* appear. Another belief is that says that you should not blow on the mushrooms, because if you do, they go to other places.

Mushrooms represent an important source of food as well as of economic resources, it is a key element of the multiple strategy of the management of natural resources that Indigenous communities have. "If the *milpa* grows beautiful, then it is not a *mushrooms year*; and if the *milpa* is not growing very well, then it is a *mushroom year*".

It is said that the *pancitas* always have their "companion," so once you have found one, another one should be very close by.



Figure 73 Pancitas

Commerce of Wild Edible Mushrooms

There are some species that are not sold; they collect them only for their own consumption. Some of the species that are not considered for commerce are: *Chonchin*, *Hongo de Cal*, *Maguey*, *Fideos*, *Cueros*, *Huevito*, *Chepa*, *Hongo de papa* and *Hongo de punta*. The people of the workshops (See chapter II for details) mentioned the last three are sold but only inside the community, identifying different levels of commerce, one out of town, and the other local.

Table 6. Species of mushrooms that are considered the most often sold and their prices (July 2008):

Common Name in Spanish	Prizes per kg in USD (February 2012)
Mazorquita	12
Clavito	12 - 14
Pancitas	7
Gachupin	5 - 5.5
Xical	3
Enchilado	3
Cornetas	3
Escobetas	4



Figure 74 Xical

The people have to look for a good place to sell mushrooms. They are commonly commercialized in different towns nearby, such as: Santiago Tianguistenco, Capulhuac, Tenango, Lerma, Chalma, Ocoyoacac, Malinalco and Toluca city, the state's capital.

The mazorcas, for which there is high demand, even in the cities, are sometimes sold to a man who comes to town exclusively for this purpose. A kilogram can be sold from \$150 to \$250 pesos. (2008). In 2007, a woman told me that she could get as much as \$700 from one basket. In general, besides of the organoleptic characteristics intrinsic to the species, prices depend, on the amounts of mushrooms available. The highest prices are present at the beginning and the end of the season, according to the supply and demand.

A woman told me that if you want to eat and buy mushrooms you should learn to recognize them, as it is a relatively common practice to mix more expensive species with a very similar one that is cheaper. For example they can mix the *clavitos* with *campanitas*.

Some of the people who collect mushrooms for commercial purposes do not collect the non-commercial species; they make a more targeted collection.

Management

Among the management practices that I found (besides not cutting the whole mushroom and leaving part) is the one about accelerating the blooming of the *Hongo de trozo*. People "water" the piece of wood (*trozo*) they know has the mushroom. This way they can harvest this species before the rains have started, as early as April, at least that happened on 2008.

Classification

Martínez-Alfaro *et. al.*, (1983) documented that Nahuas and Totonacos use the same criteria for the fungi classification: origin, habitat, shape and color. Martínez-Alfaro *et. al.*, (1983) and Mapes *et. al.*, (1981) have shown the close relation between the Indigenous and scientific systems of classification of the mushrooms. In the Pjiekakjoo case in general there is a correspondence of 1:1 between the folk taxa and the scientific species, though there are several cases of over- and under-differentiation. I suspect a case of over-differentiation are the *clavitos*, as there are several names for them but the

differences not very clear. People insist that these names correspond to different types of organisms, so one of the projects for the future would be to complete the collection of mushrooms.

With regard to under differentiation, there are two important cases, the *mazorquitas/elotitos*, which folk taxon is a complex of as many as seven scientific species and the *hongo de madroño*, a folk taxon that includes four such species.

Environmental changes and the mushrooms

During the workshops the *delegados*, the elders that participated, me and some women also involved were able discuss with the elders how changes in the forest have affected mushroom populations and occurrence. The elders are totally aware that due to forest fires the "seed" of several species is lost and only few species proliferate. Also they identified illegal logging as the main factor destroying the environmental conditions required for the mushrooms to bloom. The elders continuously mentioned how as recently as a couple of years ago there were mushrooms even around houses in the middle of town, and that it is not possible to find them there anymore. It is also recurrently noted that every year people have to go farther in order to collect good quantities of mushrooms.

Certainly they have felt the impact of Climate Change. The *delegado* Miguel told me that in the present year, 2011, there were no mushrooms, as the rains started very early and then stopped, to come back later than usual. The important changes in the climate cycles in the region are broadly recognized by the elders and even the adults that have noticed how the cycles have been changing and becoming verytime more unpredictable. The elders mention how it would rain way mre when they were children then as adults they started noticing changes that have become evern more evident now that they are elders. Even the adult generation from now relates how from the time they were children to now they there have been important changes, they notice specially the change in the amount and frequency of the rains.

Sustainable development and non timber products

There are two main factors that threaten mushroom species: the destruction of the habitat and the overexploitation of wild edible mushrooms (Franco y Burrola, 2010), besides urbanization processes and climate change. The growing demand in the market makes evident the need to develop programs for the sustainable management of mushrooms. Even though there are only three species of mushrooms (*Morchella esculenta*, *Boletus edulis*, *Amanita muscaria*) considered in danger of extinction in Mexico State this may only reflect our limited knowledge of the fungi (Frutis and Valenzuela 2009). Guzmán *et. al.* (2009) consider that many species may fall into the categories of threatened, rare or under protection due to the deplorable condition of the coniferous forests, to a large extent caused by illegal logging.

Wild edible mushrooms are undoubtedly one of the crucial non-timber products for the region, part of a complex traditional pattern of subsistence, based on the use of multiple resources (Mapes et. al, 1981). They represent an economic income, a dietary complement that embodies an important part of the culinary diversity of the country, a very important alternative food against bad maize harvest and also represent a form of social articulation, as neighbors organize to go to the forest, where they share their meals and spend several hours visiting and helping each other (Franco and Burrola, 2010).

Therefore, the policies developed around the Zempoala Lagoons National Park should include the management and protection of this natural resource. Actions that increase mushroom productivity should be promoted. This can include: the knowledge of their biology, the modification of the microenvironment for their better growth, both in size and quality, watering to increase the weight of the mushroom, dissemination of spores or inoculation of trees to establish new fungal colonies or forest manipulations to create more adequate conditions for fructification (Franco y Burrola, 2010). Along with this, adequate regulations are needed. The Mexican government established the Official Norm to protect species in danger of extinction (NOM-059_ECOL-1994). However, it does not work as it does not leave room for the possibility of the use of mushrooms by Indigenous people that have occurred since prehispanic times and because their commercial demand continues. It even propitiates the black market. A total contradiction was that some of the species on the "red list" were also published in the NOM-EM-009-SARH3-1994, with instructions for the use, transportation and storage of mushrooms (Franco y Burrola, 2010).

There are important possibilities of exporting mushrooms, but the ecological, economic and social consequences of this should be carefully studied. Commercialization can lead to overexploitation, as the changes in the patterns of the use of the mushrooms can affect the natural rates of recuperation of the mushroom populations, and there are weak regulations for their natural exploitation (Franco and Burrola, 2010). This emphasizes the need to establish the cultivation of the wild species, which would allow the protection of the natural populations and simultaneously have the advantage of harvesting the mushrooms outside their normal season. Commercial usage should be part of an integral program of management and multiple use of the forest.

More research is needed to develop the sustainable use of these organisms, research which considers properly the geographical, biological and cultural particularities of a place and that articulates the scientific and local communities with the governmental sector, things that have failed to be done so far. An effort is needed to promote from the techno-mycological studies the sustainable use and conservation of the wild mushrooms. New strategies and methodologies must be developed that allow in the near future for conserving the biological diversity that exists in the Indigenous communities, revalorizing their culture and generating economic benefits to them (Bautista-Nava et. al., 2010).

Animals and the Pjiekakjoo knowledge

The Pjiekakjoo in their everyday life establish important relations with different human and non human elements, with animals being one of the most important. In diverse cultures it has been observed that the relation between humans and animals is complex and deep. Human beings possess an innate connection with animals, that can go from attraction to aversion, from admiration to indifference (Santos-Fita and Costa Neto, 2007; Cano *et. al.*, 2009). Part of it is utilitarian and part symbolic as an important number of species of animals play a key role in the world views of different human groups. In Mexico, knowledge about animals that ethnic groups have has been mostly overlooked by ethnobiologists, who tend to emphasize the practicality of ethnobotanical knowledge.

Extensive ethnozoological research has established the importance of its conservation for present and future generations (Hunn *et. al.*, 2003; Nazarea 1999, Medin 1999; Aldasoro 2003, Alcantara 2003, Morales and Perfecto 2000, Lev 2003).

Invertebrates

Insects and Spiders

Antecedents

In the COBIOCH there are 1,348 species of insects distributed in 21 orders, 199 families and 748 genera. The order Coleoptera is the largest with 655 species (49.7% of the total), the next one is the Lepidoptera with 169 species (12.8%), Hemiptera with 78 species (11%). By comparison, there are 106 species (8%) of spiders (Burgos 1995).

Some studies report that some species of Lamellicorns (now Scarabaeoidea) have vanished due to the expansion of the agriculture frontier, deforestation, forest fires and irregular settlements (Deloya *et. al.*, 1993; Burgos, 1992).

Ethno-entomology

Unfortunately, considering the immense biocultural richness of Mexico, there have are very few holistic ethno-entomological studies in the country (Hunn 1977, 2008; Aboytes 1998, Aldasoro 2001, 2009). The bases for the development of the field in Mexico have been set with extensive research on entomophagy and entomotherapy, some of which was done in Mexico State (Ramos-Elorduy 1989, 1991; Ramos-Elorduy and Pino, 2004; Ramos-Elorduy *et. al.*, 1998, 2007, 2011).

Results

We recorded 70 taxa of invertebrates, taxonomically distributed in three phyla: Arthropoda (65), Mollusca (2) and Annelida (1). By the far the dominant Phylum is the Arthropoda with the following classes: Crustacea (2), Chilopoda (1), Arachnida (4) and Hexapoda (58). In total taxonomically the

taxa are distributed in six classes, 16 orders, 35 families, 22 genera and eight species. In total 56 names in Pjiekakjoo were obtained and 66 in Spanish.

Among these categories are 35 invertebrates that are used (28 with one use and seven with two uses) and nine that have a belief associated with them. The uses are distributed as follows: 16 that are edible (mainly Lepidoptera and Coleoptera larvae, Hymenoptera and one Hemiptera), eight that have a medicinal use, nine a recreational, two an ornamental, one an aphrodisiac and one a flavoring. In relation to the products, there are five types used: from the Hymenoptera, honey, honeycomb and bee bread (four species), and from the class Arachnida, spiderweb is used to heal wounds. The consumption of invertebrates is primarily at the larval stage (12), but also as adults (5). Only two species are also eaten in the pupal stage. We registered nine taxa that are associated with a belief, considered to be omens or with a story linked to them.

The consumption of invertebrates requires specialized knowledge about the ecology of the species, season of occurrence, host species, habitat, types of nutrition, life cycles and ethology.

For example, children have developed a technique to extract larvae (*Phassus* sp.) from the Tepozán tree (*Buddleia cordata*): "In the *Tepozán* tree, you look for the hole, then with a straw of oatmeal, some water is poured on it, then the animal comes out and with a maguey's thorn (*Agave* sp.) it is pulled out. You have to be on silent; otherwise the animal will not come out." With respect to the "gusano del madroño (*Arbutus* sp.)" (*Eucheira socialis socialis* Westwood, 1834), people know they "are produced" in a silken, bag-like nest ("botitas") with many of them, at the beginning of the rainy season. "El Peyote", as it is also called, is eaten toasted on the comal or with eggs. The Pjiekakajoo know they become butterflies, but they say that nowadays they can be found in far away places, around cliffs, because the trees were cut down to produce firewood. In this case the host is known, the life cycle and the effect that habitat destruction has had on this species. Among the Jñato (Mazahuas) of Temascalcingo (State of Mexico) it is also reported that this species is almost extinct, and there is just the memory of how many years ago the hills would look white due to the quantity of nests. They used to make dolls of the nests (Aldasoro, 2009).

The life cycle of the organisms is associated to the cyclical activities of the communities. For example the "gusano de elote" (*Heliothis zea* (Boddie, 1850)), is collected while they are harvesting green corn. "Years ago people would hang a little receptacle at their waist to put all the insects found".

The honey of the bee is consumed, and the honeycomb of two species of wasp, the "tlalpanal" (*Vespula* sp.) and the "avispa negra" (*Polybia* sp.). It is convenient to eat the *Polybia* sp. when there is a full moon, as that is when the honeycomb is full of honey. The "tlalpanal" is respected and is very well known for its painful sting. To obtain the buried honey and the honeycomb, people would inject smoke into the nest using a little "carrizo straw (popote)". The pupae and larvae are also eaten.

When the honeycomb is taken from the soil it is put next to a fire made with *ocoxal*⁸⁷ so the wasps will not sting. The *jicote* (*Xylocopa* sp.) produces a sweet that children like to collect. They call it “lencho” (it is the provision that the females leave for their larvae, a ball of pollen and regurgitated nectar, i.e., bee bread). Furthermore, it is said that these organisms are the ancestors that come on November 2. They say that it is around this day that many of them appear and that they greet the people. They are supposed to stay until the corn harvest is finished (Aldasoro 2010). “*Cuando viene llegando los días de los fieles difuntos el jicote se arrima mucho, en la puerta entra y anda pues diciendo...ese ya llegó el abuelito y se anda asomando*”..” *le hacen fiesta a uno*”, “*dicen ya llegué aquí estoy*”. Along with the Jicotes, the butterflies are also considered the souls of the ancestors (*almas de los difuntos*).The Jñato(Mazahuas) consider the monarch butterflies (*Danaus plexippus* (Linnaeus, 1758)) to be the souls of the dead that are passing by on their way to the other world (Aldasoro, 2009). An elder told me that before the parents used to tell the kids that if they touch a butterfly, the dust it leaves on your fingers would make their skin rot. Even though it is not so much mentioned anymore, it was a very effective way of discouraging children from playing around with these insects.

Knowledge about the *jumil* (*Acanthocephala* sp.) is also detailed: the first thing to do is to set fire to some ocote branches⁸⁸ (*Pinus montezumae*) so the smoke makes the insect come out. The “jumiles” are collected from October to April, after the rainy season starts they may be found but they are not “hot” anymore. Some people commented that there are three types of jumiles, a black one (*Acanthocephala* sp.), a white/grey one (*too xumbli*), and a smaller type that is not edible (*be ximanda*). The white *jumil* is found on the oak bark (*corteza de Encino*) and they are preferably eaten with pasilla chilis. Breastfeeding women cannot eat *jumiles*, as the chili would pass into the milk for the baby and the child may die.



Figure 75. G. de los palos

The *Acanthocephala* sp. is the black one; I did not make the taxonomic determination of the other species as it was not collected. At the moment to collect them “you should blow at it from the side (de ladito), in this way the *jumil* does not expel its liquid”, if the liquid expelled hits your face it will burn.

⁸⁷ Leaves of *Pinus* spp.

⁸⁸ Usually called *ocoxal*

Frequently the head of the *jumil* is removed so that they do not start fighting with each other in the jar and expel their liquid. Some people just remove the legs and wings to eat it raw, but it is considered dangerous, as you can choke. It is recommended to not breathe while you eat it to avoid the chili going up (*subirse el chile*) and start coughing. It is safer to eat it in a *salsa* of red guajillo chili or of chilaca. They know a similar species that is not eaten, and as in other regions of the country they call it “*cimarrón*” or “*jumil cuernudo*” (horned jumil). They recognized it is a relative of the jumil. The jumil “*debe muerte*” (owes death) as a man ate it, choked (*se ahogó*) and died. The *jumil* was put on a donkey and taken for a ride around the town as a way to exhibit it and demonstrate the harm it had done. This insect is also used to heal coughing and in a very peculiar way, as flavoring on cigarrets. The head is removed and the liquid put along the cigarette. They say it gives a very good taste. A family told me that in one afternoon they collected as many as about 100 insects, that they ate plenty and even gave away some to their extended family.

The consumption of arthropods is drastically decreasing due to the accelerated changes that modernity has brought to rural communities. This is very unfortunate as the insects are rich in proteins in contrast with the low quality processed food. It is necessary to have educational programs that give the new generations information so they can make informed decisions, not only about their diet, but also about their cultural heritage in general. It is essential to fight the stigma associated with the consumption of arthropods that it is only for poor and backward people.

Entomotherapy is present in different cultures all around the world, and the Pjiekakajoo are not an exception. This field of research needs to be promoted as it has not been carefully explored; but it has already been demonstrated that insects contain immunological, analgesic, antibacterial, diuretic, anesthetic, and antirheumatic substances (Costa-Neto, 2007). In Mexico, entomotherapy has been practiced since pre-hispanic times, as is related in the Florentine Codex and other documents (Sahagun, 1980 in Ramos-Elorduy and Pino, 1988) and it is still a factor in the everyday life of different Indigenous and mestizo cultures (Ramos-Elorduy and Pino, 1988).

Among the diseases treated with invertebrates are culture-bound syndromes or folk illness, such as evil eye (*mal de ojo*). To heal a child, a scorpion is made to walk on his back, after removing the tail. It can also be used to prevent the evil eye, but with the risk of the child becoming mean when he grows up. The female black widow is also used to treat this disease.

Warts (*mezquinos*) are removed with the liquid (with cantharidin) produced by the “*cantarito*” (*Meloe* sp., Meloidae, Coleoptera). “A leg is taken away with a needle; a whole is made in the wart; and the liquid is put there”. People commented that before warts were more common, but that they are not so common anymore. This use has also been registered among the Hñä hñus of the Mezquital Valley (Aldasoro 2001), Zapotecs (Hunn 2008) and Tzeltals (Hunn 1977).

The “pinacate” (*Eleodes* sp., Tenebrionidae, Coleoptera) is used boiled or spread directly for toothache. To treat “alferecía” (attack/epilepsy) it is put in alcohol for a couple of weeks. The use of *Meloe* sp. and of the *Eleodes* sp. was also registered among the Hñä hñus (Otomíes) of the Mezquital Valley in Hidalgo State and Temascalcingo in Mexico State, and the Jñatos (Mazahuas) of the latter state (Aldasoro 2000, 2009).



Figure 76. Edible wasp (*Polybia* sp., Vespidae, Hymenoptera).

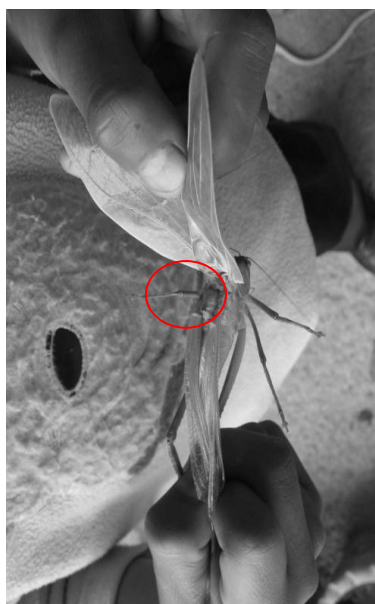


Figure 77. Animal of death (*Tettigoniidae*, Orthoptera), a skull figure can be found in its torax with the open wings.

Three species from the Acrididae family of grasshoppers are used, two of them are edible and a third is used to heal whooping cough ("tosferina") and "mal de espanto" (fright). The first two, called "poxes," are characteristic of the time where peas (chícharos de sereno) are cultivated (December/January).

The house fly (*Musca domestica* Linnaeus, 1758) is used to treat a diarrhea that appears on babies when the molar teeth are emerging; it is boiled in a tea with onion, garlic and tender leaves of zarza (*Rubus* spp.) and tejocote (*Crataegus* spp.).

Insects are used to heal not only humans but also animals. The left leg of the cricket is given to livestock that cannot urinate. It is also used to treat stuttering by children; it is put in the child's mouth. The former use is also found among Hñä hñus (Mezquital Valley and Mexico State) and the Jñato (Mexico State) (Aldasoro 2001; 2009). Among the Zapotecs of Oaxaca (Hunn, 2008) cricket legs are also used as a purgative for sheep and goats, and for horses and mules that do not want to drink. It was also reported as a diuretic for dropsy (Ramos-Elorduy and Pino, 1988).

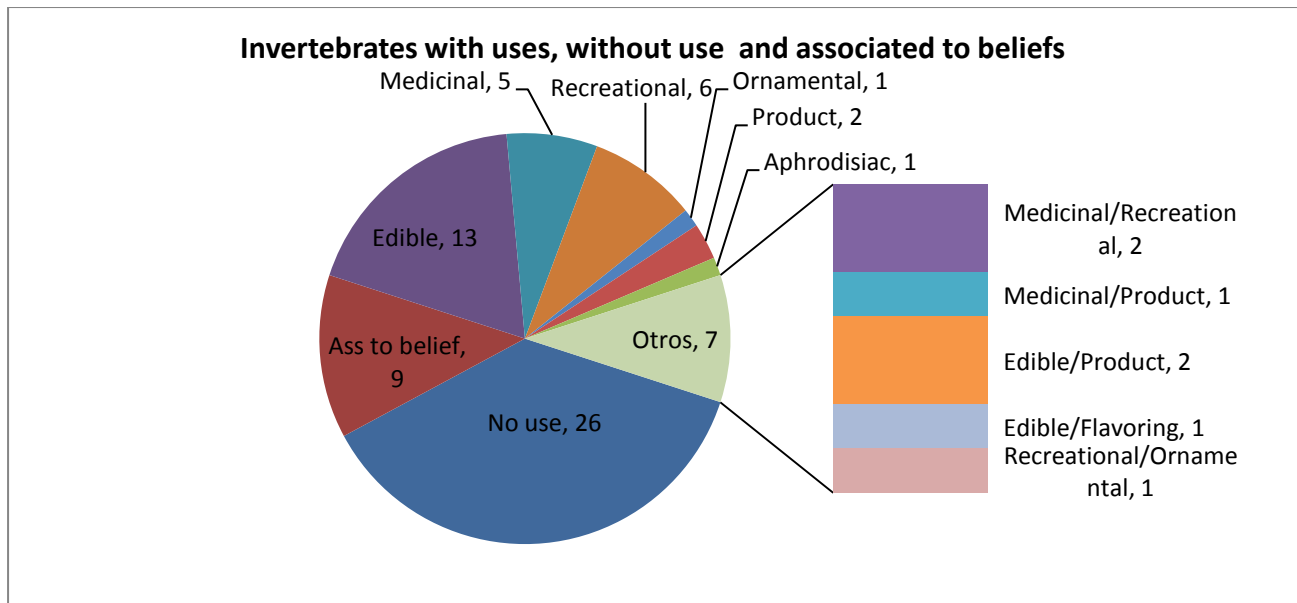
A recreational use for species of beetles and a species of katydid (Tettigoniidae) involves tying them to a piece of thread and making them to fly. The katydid is also an amusement for children who open their wings to see the skull figure on the thorax of this insect (Figure 77). This and the fact that these animals are very common around the Day of the Dead celebration at the beginning of November, has motivated the name "animal de los muertitos" (little dead one's animal). "Lucernitas" (fireflies; Lampyridae, Coleoptera) are put in a jar for children to use as a lamp. They also kill them and spread them on their skin so it glows.

The most amazing use of invertebrates for recreational purposes is that of organizing black widow versus scorpion fights. They are not so common today, but they used to be popular among the generation who are adults now. The surprising thing is that both of these arthropods are poisonous, the venom of the black widow (*Latrodectus mactans* Fabricius, 1775) being highly dangerous because it is neurotoxic. The *delegados* told stories of their infancy, how they used to say that the scorpion regularly wins as it pinches (*deinflar*) the spider, which is at a disadvantage, as they say the spider needs to clear the area where it is going to bite.

Ornamental uses include the "xagri" and the "moyotes", which seem to be different species of beetles (Coleoptera), particularly of the Scarabaeidae that are collected and appreciated because of their aesthetic value, mainly because of their colors. They can be used as pins. Both of these beetles appear in the rainy season. The "moyotes" are particularly abundant "cuando va a jilotear" (when corn starts producing green cobs).

One species of the Elateridae (click beetles) or the Tenebrionidae (darkling beetles) was recorded as an aphrodisiac for men. Despite the shyness and the laughter in the workshop someone dared to explain to me that this use is due to its hardness, which is passed to the men who eat it, a transfer of properties takes place that is seldom found in the human-animal relation. It has been documented that due to sympathetic magic, associations between body parts of insects and humans have emerged. This is the case for the use of larvae recommended for treating impotence (Costa-Neto, 2005). Ramos-Elorduy and Pino (1988) reported the use of larvae of Meloidea, Buprestidae and Elateridae in male love potions.

Figure 78. Number of taxa per use, without use and associated with a belief.



Arthropods may be observed not only to be used, but also some are known just for their peculiarities or the danger they represent for humans and animals. Besides scorpions, the black widow or the Hymenoptera that sting, the "ranilla" (praying mantis: Mantodea and also Phasmida) is considered highly lethal for livestock. If an animal eats it, the animal's stomach is swollen and its guts explode, causing death. Once again, this belief is also present among the Hñä hñus (otomíes) and Jñato (Mazahuas) (Aldasoro 2000, 2009). A similar belief is common among the ranchers of Chiapas (Gómez, 2012 pers. Com.)

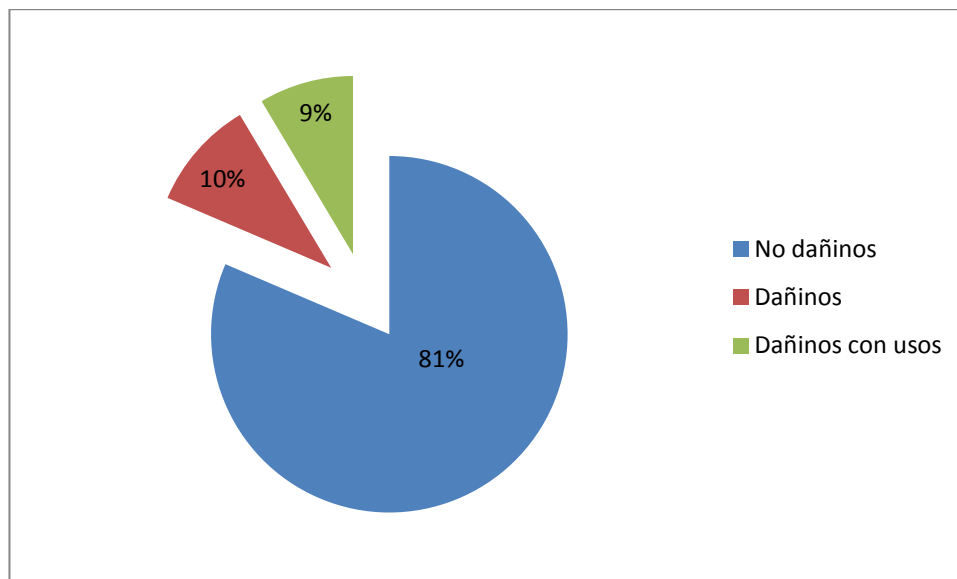
Fleas are also among the harmful insects, but only during the rainy season, as the people say that they disappear in the dry season.

Another insect that is considered harmful is the "gallinita ciega" the larvae of *Phyllophaga* spp. (Melolonthinae, Scarabaeidae, Coleoptera), as it eats the roots of the corn plants and of peas, the milpa turns yellow when these larvae attack it.

The graph above is important to show that the relation of the Pjiekakajoo with insects it is not a strictly utilitarian one. There are almost as many invertebrates named that lack uses (24, or 35 if we consider the ones associated with beliefs to “lack a use”), as that have uses (35). I do not consider insects associated with a belief (9) as having a use. For me this relation is not a utilitarian one. According to the data, it is half and half; out of 70, 35 have uses and 35 have no use. I have shown in other ethno-entomological research with other Indigenous groups (Hña hñus of the states of Mexico and Hidalgo, and Jñtaro of the State of Mexico) that the relation between humans and insects is not predominantly utilitarian (Aldasoro, 2001, 2009, 2010). The utilitarian aspects of insects in particular, have been one of the more studied areas of Ethno-entomology, but I will argue that it is only one aspect of the human-insect relationship, other aspects including such fascinating ones as the presence of these organisms in stories and the appreciation of their beauty and complex behaviors.

I do not find what Hunn (2008) documented in his work with Zapotecs, that the negative impacts are the most prominent, such as the fact that as insects bite, sting, are ill omens, pests of crops and of livestock. As shown in table 7, where insects that are considered dangerous have been pointed out, the total taxa that can be considered harmful are thirteen. We should not forget that at the same time as recognizing they can be harmful; these taxa are also very well known for other characteristics. The Hymenoptera may sting if you bother them, but they are also recognized for such delicious products as honey, honeycomb and beebread. Even the very dangerous ones, such as the scorpions and the black widow, are used to toys by children! Of the 70 taxa, 81% are considered harmless, 10% just harmful, and another 9% harmful but with uses.

Figure 79. Percentage of harmless, harmful and harmful and useful arthropods.



Unidentified invertebrates

Some categories were not determined taxonomically, as they could not be collected. However, there are clues about them that allowed me to determine at least the order to which they belong (e.g., Coleoptera: *Jung'u* and *Bejal*; Diptera: *Pinolillo*). The *Pinolillo* is recognized as a very small type of mosquito that bites, it is from warmer regions such as Chalma, though sometimes they are present also in the Pjiekakjoo communities despite the colder weather. People mentioned that the *Jung'u* and *Bejal* were similar to the "pinacate" (*Eleodes* sp.), which is a coleopteran. There were four categories left over for which not even the order could be determined. These are the *gusano de cajete de maguey con agua*, *Granadilla*, *Gusano de retama* and *Gusano de Jara*. I and my Pjiekakjoo partners will continue working on the collection of data and specimens so I will be able to eventually determine these species taxonomically.

Myths, Stories and more beliefs

There are several species that are omens. For example, camel crickets (Gryllacrididae (*juzgón* or *nana de las hormigas*)) makes the people feel shame ("*si uno lo encuentran le da pena a uno*"), it is said that if you kill one a child will die. They are supposed to live in ants' nests. An old woman told me that it is not poisonous, but that in Mexico City where people do not know anything about little animals, they think it is dangerous. The "*chicharrita*" (cicada; Cicadidae, Homoptera) sings when the rain is coming, it calls the rain. The antlion (Myrmeleontidae, Neuroptera) announces a lot of rain. If an earwig (Dermaptera) visits a party it is to make fun of the people who organized it, implying that they are not going to give away anything (*Si entra y tiene pachanga dice que se andan burlando de nosotros que no vamos a dar nada*).

A pregnant woman should not look at a "*chancuecla*"; if she does the baby will have prominent eyes such as those of the larvae of the swallowtail butterfly, *Papilio multicaudatus* (Kirby, 1884).

Mora (1989) recorded a story about how different types of bees killed a woman who used to live in Tepetongo and who ate newborn babies (See Appendix VI). Some of the elders in our community gatherings recalled a story like this, but they did not know it anymore.

Challenges

In taxonomic terms, studies of arthropods, along with those of mushrooms, represent a huge challenge. If the country suffers from a dearth of arthropod taxonomists, for example, this is exacerbated in the field of ethnobiology. Considering Mexico's richness few studies have been completed on the complex relationship between invertebrates and human society. The so-called field of ethno-entomology was established in the research agenda by the pioneer work of Julieta

Ramos-Elorduy and José Manuel Pino from the National University. They have compiled an enormous store of data about edible and medicinal insects, but still there is a world to discover.

It is necessary to emphasize the importance of holistic ethno-entomological research through which the co-dependence that exists between biological and cultural diversity can be recognized. This allows us to have a better and deeper comprehension and knowledge of each side of the equation. The invertebrate-human relation is a very complex one, with the utilitarian approach only part of it. Still, this part has an immense potential that must be developed in Mexico. Insects have been proposed as the best source of protein for human diet in the future (De Foliart, 1995; Ramos-Elorduy, 1982; Vantomme, 2010) and are an unexplored pharmacological resource. The sustainable use and management of insects and invertebrates in general should be promoted as a real alternative for rural communities, with commercial and self-consumption value.



Figure 80. G. de Tepozán

Table 7. Taxonomic determination of the invertebrates' species, their names and uses. Uses (E: Edible, M: Medicinal, R: Recreational, B: Belief associated to it, P: Product and O: Ornamental, A: Aphrodisiac and F: Flavoring). The (L) indicates that the insect is eaten in the larval stage, (P) in the Pupa and the (A) in the adult stage. H: Harmful. ♦ Common names in Spanish that re NOT used among the Pjiekakjoo, Ω The Mantodea belong to the Order Dictyoptera and are a totally different group form the Order Phasmatida; they are mentioned in the table in the same category as for the Pjiekakjoo they are the same.

No. Sp.	Local Name in Spanish	Name in Pjiekakajoo	Name in English	Species	Uses
Phylum Arthropoda					
Class Crustacean					
Subclass Malacostraca					
Order Decapoda					
Family Cambaridae					
1	Acocil		Type of crayfish	<i>Cambarellus zempoalensis</i>	E (A)
Order Isopoda					
Family Armadillidiidae					
2	Marranitos (Cochinilla)♦	Ñendo petzu	Pillbug		
Class Chilopoda					
3	Cienpies	Xilë	Centipedes		
Class Arachnida					
Order Scorpionida					
4	Alacran	Ngi	Scorpion		M ,R, H
Order Opiliones					
5	Sacabuches	Mbaxitu	Harvestment/ Daddy long legs		
Order Araneida					
6	Araña	Xic-max	Spider		M , Pr
Family Theridiidae					
7	Capulina	Zee	Black widow	<i>Latrodectus mactans</i>	M , R, H

Table 7. 1.1 Continues

Class Insecta					
Order Odonata					
8	Helicóptero (Libélulas)♦(niños)▲	Ñu mazú	Dragonflies		
Order Phasmida/Mantodea Ω					
9	Ranilla (Insecto palo)♦	Pixcal	Walkingsticks A praying mantis		B, H
Order Orthoptera					
Family Acrididae					
10	Chapulín Mantequilla	Mi chit'seé	Grasshoppers		E (A)
11	Chapulín	Nit'seé			E (A)
12	Chapulín de los perros	Ñe pox			M
Family Tettigoniidae					
13	Gusano de los Muertitos		Katydid		R
Family Gryllotalpidae					
14	Nana de las hormigas/juzgón (Cara de niño)♦	Txety	Leaf-rolling crickets		B
Family Gryllidae					
15	Grillo	Grillu	Cricket	<i>Gryllus</i> sp.	M
Order Blattodea					
Family Blattellidae					
16	Cucaracha		Cockroach		
Family Termitidae					
17	Polilla	Ñe tzandza	Termites		
Order Dermaptera					
18	(Tijerilla)♦	Cheet'	Earwigs		B
Order Psocodea					
Suborder Anoplura					
Family Pediculidae					
19	Piojo	Ñi too	Louse	<i>Pediculus humanus</i>	H
20	Liendre	Ñie mbuetoo			
Suborder Ischnocera					

Table 7.1.2 Continued

21	Piojo de pollo	Ñi too puyo			
	Order Hemiptera		Bugs		
	Family Cicadidae		Cicadas		
22	Chicharrita	Ndo kulluly			B
	Family Gerridae		Water striders		
23	Aires	Ñemupi			
	Family Coreidae				
24	Jumil	Xumbli	Leaf-footed bugs	<i>Acanthocephala</i> sp.	E (A),B, F
25	Jumil blanco/gris	Too xumbli			E (A)
26	Jumil cuernudo	Be ximanda			
	Order Coleoptera				
27	Pipiol	Jung'u			
28		Bejal			
29	Gusano amarillo (que sale cuando siembran)	Nzacmu	Elateridae/Tenebrionidae?		A (L)
	Family Lampyridae		Fireflies		
30	Lucernitas	Ñendo lucesita			R
	Family Coccinellidae		Ladybird beetle		
31	Catarinas	Ñendo xupy			R
	Family Meloidae		Blister beetle/ Oil beetle		
32	Cantarito	Danzaje		<i>Meloe</i> sp.	M
	Family Tenebrionidae		Darkling beetle		
33	Pinacate	Xupi		<i>Eleodes</i> sp.	M

Table 7. 1.3 Continued

Family Scarabaeidae		Scarab beetles			
34		Xagri			O
35	Roda caca	Ñendo toro			
36	Gallina ciega	Ixticuil	May/June Beetles	<i>Phyllophaga</i> sp.	H
37	Moyotes	Ñe jangue			R, O
38	Tontos			<i>Macroductylus</i> sp.	R
39	Toritos		Ox Beetle	<i>Strategus</i> sp.	R
Family Cerambycidae		Long-horned beetles			
40	Gusano de Encino	Zan zaa			E (L)
41	Gusano de ocote	Chiza			E (L)
Family Chrysomelidae		Leaf beetles			
42	Gallinita	Ndo chutu			R
Family Curculionidae		Weevil			
43	Gusano de cajete de maguey [seco]	Nyosh ñuapi			

Table 7. 1.4 Continued

Order Lepidoptera		Butterflies		
44	Luxes	Mbati	(Any hairy larvae)	
45	Mariposa/Palomita	Xilin diuu		B
Family Cossidae		Cossid millers or carpenter millers		
46	Gusano de Maguey	Nyosh xiloti	<i>Comadia redtenbacheri</i>	E (L)
Family Hepialidae		Ghost moths		
47	Gusano de Tepozán		<i>Phassus</i> sp.	E (L)
Family Hesperidae		Common Skippers		
48	Gusano de penca de maguey	Nyosh xiloti	<i>Aegiale hesperiaris</i>	E (L)
Family Noctuidae		Owlet moths		
49	Gusano de elote	Tsa túu	Corn earworm <i>Heliothis zea</i>	E (L)
Family Pieridae		Madrone caterpillar		
50	Gusano de madroño/Peyote		<i>Eucheria socialis</i>	E (L)
Family Papilionidae		Two-tailed Swallowtail		
51	Chancuecla	Tsutsi	<i>Papilio multicaudatus</i>	B
Order Diptera		Flies		
52	Pinolillo			H
Family Tipulidae		Crane flies		
53	Zancudo	Nlangua		
Family Culicidae		Mosquitoes		
54	Mosquito	Ndo-nin-gui		H
Family Muscidae		Fly		
55	Mosca	Nin-gui		M
Family Calliphoridae		Blow flies		
56	Mosca cercera	Bepojti		H

Table 7. 1.5 Continued

Order Hymenoptera					
Family Formicidae					
57	Hormiga	Nyoxschiu	Ant		B
Family Vespidae					
58	Tlalpanal	Chojky	Yellojacket	<i>Vespula</i> spp.	E (L,P),Pr, H
59	Avispa negra	Ndetsy	Paper wasp	<i>Polybia</i> sp.	E (L,P) Pr
60	Avispa güera	Nyu mupox	Paper wasp	<i>Polistes</i> sp.	H
Family Apidae					
61	Jicote	Lendye	Carpenter Bee	<i>Xylocopa</i> sp.	Pr, B, H
62	Colmena (abeja)♦		Honey Bee	<i>Apis mellifera</i>	Pr, H
Order Siphonaptera					
Family Pulicidae					
63	Pulga	Ñiha	Flea		H
64	Gusano de cajete de maguey con agua	Nyosh daa		?	
65	Granadilla			?	
66	Gusano de retama			?	E (L)
67	Gusano de jara	Neyosh xitzalita		?	E (L)
Phylum Mollusca					
Class Gastropoda					
68	Tlaconete	Chynchy	Slugs		
69	Caracol		Snail		
Phylum Annelida					
Class Oligochaeta					
70	Lombriz	Xibajá	Earthworm		

Fish

In the lakes of the COBIOCH there are five species of fishes that live mainly in the Zempoala Lagoons National Park: *Ctenopharingodon idellus* (Carpato herbivora), *Cyprinus carpio* (Common carp, *carpa común*), *Oncorhynchus mykiss* (Trucha arcoiris, rainbow trout), and *Girardinichthys multiradiatus* (Dark-edged Splitfin, mexcalpique). It is important to mention that the only one that is originally from these lakes is the *mexcalpique*, the others are introduced species (Contreras-MacBeath 1995). The mexcalpique is considered Vulnerable by the IUCN. It is not included in the NOM-059-SEMARNAT-2010 (SEMARNAT, 2010), but is included in the "report of the General strategy for the environmental rescue and sustainability of the Lerma-Chapala Basin as "threatened" (SEMARNAT and IMTA, 2009). In general it is considered that this species has been highly affected by the introduced commercial species and the destruction of its habitat, independently of its official status. The mexcalpique is eaten in *tamales* by the Tlahuicas, and this is a much appreciated dish.

The Pijekakajoo have a category *Liju* 'fish' that apparently designates an unaffiliated generic unders Berlin's proposal (1992), as the carps and the mexcalpique are considered to be part of it. On the workshops only the *mexcalpique* and the *carp* were mentioned as species present in the region.

Amphibians and Reptiles

Antecedents

There are ten species of amphibians in the Corredor Biológico Chichinautzin (COBIOCH). They belong to five families in two orders. The Mountain Stream Siredon (*ajolote*; *Ambystoma altamiranoi*) is endemic to the rivers and ponds of the Zempoala Lagoons National Park. The other species of salamander present are: *Pseudoeurycea altamontana*, *P. belli*, *P. cephalica*, *P. leprosa* and *Chiropterotriton chiropterus*. The species of frogs are: *Hyla plicata*, *Spea hammondi* and *Rana spectabilis*. There are 43 species of reptiles recorded for the COBIOCH distributed in seven families. They represent 3.64% of all Mexican species (Castro and Burgos, 1995).

Results

Uses

Aguilar y Casas (2009) mentioned that some amphibians and reptiles are consumed in the State of Mexico: frog legs and tadpoles, and the *axolotl*, a giant neotonous salamander, which are prepared variously as in *tamales*, soups and sauces.

Of the Amphibia and Reptilia classes, we recorded at least 22 scientific species that correspond to 20 Pijekakajoo taxa. The categories "frog," *ajolote ciego* and "rattlesnake" include two folk species each. Unfortunately it was not possible to determine the scientific names of several of the organisms of the suborder Serpentes (snakes). Four species are edible and to are associated with beliefs, and one of which also has medicinal and ornamental uses, i.e., the rattlesnake.



Figure 81. Rattle

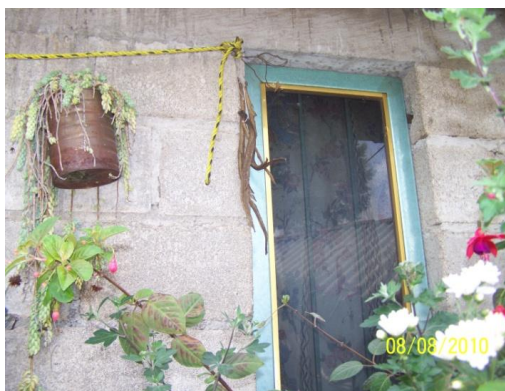


Figure 82. Dried Rattlesnakes.

Taxonomically the local amphibians are distributed in two orders, four families, four genera and six species while the reptiles includes two orders, five families, five genera and six species. There are 12 names in Pjiekakjoo for amphibians and reptiles.

The Ajolote (*Ambystoma altamirani*) is edible; people commented that they are eaten as if they were fish. This species is sold in the regional markets, especially at Santiago Tianguistenco, where they are exhibited inserted in long threads, giving the impression of being chains (*cadenitas*).

Frog legs (*ancas*) are edible. There is also the belief that a pregnant woman should not bathe in a stream because frog's urine could cause malformations in the baby. A woman told me her personal story. She had a baby that was born at seven months that was anencephalic. He lived only a few hours. She thinks that this happened because while pregnant she went to the Zempoala Lagoons and bathed in the streams there. Another edible amphibian is the *tepocate* (called in Pjiekakjoo **lakapo**), but people now recognize, it is rare that someone goes to the Zempoala Lagoons to bring some home to cook in *tamales*.

Toads are considered poisonous, though people frequently do not properly distinguish toads from frogs. The *ajolote ciego* and *salamanquesa* are salamanders, I propose that these two species are the most common, but I am not certain how the species in the chart correspond to the Pjiekakajoo categories, as sometimes they were recognized from pictures and at other times they were not. People could not specify the main features that would distinguish an *ajolote ciego* from a *salamanquesa*. Some argued there was no difference, as these were just two names for the same type of animal.

Most probably the *salamanquesa* is a salamander, as most of the people described it as having a slimy skin like that of frogs and that is very slow and lives in old logs. Unfortunately I was unable to get a photographic record that would allow me to determine the difference between the *salamanquesa* and the *ajolote ciego* which I suggest are the two most common species of

salamander for the region, but I do not know which of them correspond to the common names recorded.

Among the reptiles, the "escorpión" (*Barisia imbricate*) is considered poisonous, the Pjiekakjoo believe that the part where the animal bites you will rot. There are no traditional remedies for such an attack; they go to the doctor. It is believe this animal should only be touched with a dry stick, otherwise, if the wood is still fresh, the lizard can transmit the poison through it.



Figure 83. Escorpión

This lizard's peculiarity is that it likes to bathe in the *aguamiel* of the maguey plant (*Agave* sp.). It is considered to be a type of snake⁸⁹. A belief associated to them is that kids should spit when they see a lizard; on the contrary it would become the stepmother of that kid.

Another species that can no longer be found is the *camaleon* (horned lizard perhaps, *Phrynosoma* spp.). Some people considered it to be medicinal, as it is used to heal bronchitis. The animal is put inside the sick person clothes, next to the chest. It is believed the animal sucks out the disease as it gets swollen. This belief is also present among the Hñã hñus of the Mexico State. Among the Zapotecs it is also considered medicinal (Hunn, 2008:108): "Some say it can cure a headache: place one on your head to draw out the heat". Its use against spell is reported also, it consists in using the dried body as an amulet (*Enciclopedia Digital de la Medicina Tradicional Mexicana* (BDMTM), 2009). From prehispanic times to the present different healing and magical properties have been attributed to the *camaleón* (García-Vázquez and Mendizábal-Beverido).

The *víbora chirrionera* is said to be able to fly through the trees and to stand up like a stick. The *víbora rayada* is considered inoffensive, but people say that it is so colorful that it scares them, it is an aquatic species of snake. The *víbora de toro* used to be eaten during weddings and that people would have to hunt one in order to eat it. They say it is big, thick and dangerous; that it chases

⁸⁹ The center of the *Agave* sp. is removed and scraped ("raspado") to produce the *aguamiel*, which is the fresh juice of the plant. This is left to ferment in order to obtain pulque, the alcoholic beverage.

people, and that it tastes like fish. It is found only at a distance from the town, in cliffs. Even though the *mazacuate* (boa constrictor) is not local to the region, they mention it because of its special salience. They know that it is from warmer places close by.

Last but not least, the most important category of reptile is the *víbora de cascabel* (rattlesnake). This category is the most salient among all the amphibians and reptiles. Firstly, it is used for ornamental purposes to make bells (the rattles) and boots (the skin). Secondly, it is used as medicine to prevent diverse diseases such as cancer and diabetes. It can also be used to treat cancer once it has attacked someone. The meat should be consumed in soup or alone; toasted and pulverized rattlesnake meat is also used to heal wounds. A medicinal remedy for cancer, diabetes and heart disease can be prepared by putting a piece of rattlesnake meat in *mezcal* for a year and then drinking the alcohol. It may also be prepared with flour to prevent chickens from getting sick or to heal them if they are already sick.

The species of rattlesnake (*Crotalus* spp.) have an impressive reputation in the traditional therapeutic repertoire of Mexico as they are used to treat a great variety of diseases, their meat and fat the most often used. It is believed that the properties of the animals the rattlesnake eats are incorporated into her body, which is why it is such a powerful medicine. Some of the medical conditions that are treated by ingesting fresh, boiled or pulverized meat are acne, allergies, anemia, asthma, arthritis, gallstones, kidney stones, cancer, cirrhosis and diabetes, among others. Rattlesnake fat is particularly recommended for the treatment of musculoskeletal disorders (BDMTM, 2009).

As is believed in other cultures⁹⁰, the Pjiekakjoo claim the rattlesnake's age can be determined by the number of rattles, each rattle (*bordito*) indicating one year. This is not true, as the snake adds a rattle every time it molts, which could be two or three times per year. Moreover the rattle sometimes breaks, making it impossible to calculate the snake's age, still it is probably generally true that the more rattles the older the snake. So the belief is not entirely without empirical foundation.

There are several other beliefs associated with this species. To carry a rattle is suppose to bring good luck, but it brings as well thunder. The same happens if you wear a bell or boots made with its skin. Musicians can put a rattle inside their guitars, so they sound more powerful, and it can also make an enemy's guitar break down.

To encounter a *víbora fina* is considered bad luck. For example, if you see one on your way to collect wild edible mushrooms it means you won't find them. The oil from this snake is recommended for ones

⁹⁰ See for example www.fish.state.pa.us/fagamp.htm#8, www.tpwd.state.tx.us/huntwild/wild/species/timberrattlesnake/

hair, but again with the inconvenience that when it rains the braid (*trenza*) needs to be attached to a big piece of wood, as it otherwise moves.

There are two more species that I could not determine scientifically. The *coralillo* and *the lagarto cadeno*. There are several species from different families that might be given these names, and when I asked people to describe the colors (Elapidae)...but rather listed colors like green and brown. So definitely more fieldwork and *in situ* observations are needed in order to define the *coralillo* taxonomic category. It is considered poisonous. The *lagarto cadeno* is one of the species that people report as having disappeared. They say this animal whistles, making a noise like a cricket. It used to be medicinal, prepared in soup, for whooping cough and children that bite their finger nails.

Table 8. Species of Amphibians and reptiles. Uses: E (edible), M (Medicinal) and O (Ornamental). Red List IUCN: LC (Least Concern), E (Endangered), V (Vulnerable) (<http://www.iucnredlist.org/>). A (threatened) and Pr (Subject of special protection) and *Endemic according to the Nom-059 (SEMARNAT 2010) (See Appendix VII). ♦ Common name in Spanish that is not used locally.

Class		Amphibia					
Order		Anura					
1	1	Sapo	Nyo cua	Toad		?	
Family		Hylidae					
2	2	Rana	Kua	Mountain Treefrog	<i>Hyla plicata</i> Brocchi, 1877	E/B	LC/A *
3				Canyon Tree Frog	<i>Hyla arenicolor</i> Cope, 1866		LC
Family		Ranidae					
4	3	Tepocate (Rencuajo)♦	Lakapo	Tadpole/Montezuma Leopard Frog	<i>Lithobates montezumae</i> Barid, 1854	E	LC/Pr *
Order		Urodela					
Family		Ambystomatidae					
5	4	Ajolote	Nchoxmi	Mountain Stream Salamander	<i>Ambystoma altamirani</i> Dugès 1895	E	E/A *
Family		Plethodontidae					
6	5	Ajolote ciego (Salamandra)♦	Da choo	Morelos False Brook Salamander	<i>Pseudoeurycea cephalica</i> 1938 <i>Pseudoeurycea leprosa</i> Cope, 1869		E/Pr * V /A *

Tabla 8.1.1 Continued

Class		Reptilia						
Order		Squamata						
Family		Anguidae						
8	7	Escorpión		Imbricate Alligator Lizard	<i>Barisia imbricata</i> Wiegmann 1888			LC/Pr *
		Iguanidae						
9	8	Lagartija	Kuu	Lizard	<i>Sceloporus torquatus</i> Wiegmann, 1828	B		LC
10	9	Lagartija grande						
		Phrynosomatidae						
11	10	Camaleón		Horned lizards	<i>Phrynosoma orbiculare?</i> (Linnaeus, 1789)	B		
Order		Serpentes						
12	11	Víbora	Chíí					
13	12	Víbora chirrionera	Shu-luju					
14	13	Víbora rayada			<i>Thamnophis</i> sp.			
15	14	Víbora toro					E	
16	15	Víbora café	Nyetchíí					
17	16	Víbora de agua	Nxulyuju					

Tabla 8.1.2 Continue

Family		Boidae					
18	17	Mzacuate		Boa constrictor	<i>Boa constrictor</i> Daudin, 1803		NO entries/ A
Family		Viperidae					
19	18	Víbora de cascabel	Nlejiush	Mexican Dusky Rattlesnake	<i>Crotalus triseratus</i> Wagler		M,O,B No entries/- LC/Pr *
20		Víbora fina		Cross-banded mountain rattlesnake	<i>Crotalus transversus</i> Taylor 1944 <i>Crotalus ravus</i> Cope, 1865		
21	19	Lagarto cadeno	Nda kuu		Sceloporus torquatus Wiegmann, 1828 Sceloporus sugillatus Smith, 1942		M
22	20	Coralillo			?		

Birds

Antecedents

De Sucre *et. al.*, (2009) documented a total of 490 species, 273 genera, 65 families and 20 orders for the State of Mexico. For the COBIOCH (Urbina 1995) registered 237 species of birds in 41 families. The importance of this group of vertebrates goes beyond the ecological realm to include also the cultural, as birds have an aesthetic value for humans due to their songs and colors, their commercial value, and their use as food and as pets.

As for ethnozoology in general, ethno-ornithology represent a whole universe to explore. In México some of the most relevant studies include Hunn with the Tenejapa Tzeltal (1977) and San Juan Gbëë Zapotecs (2008); Argueta (2008) with Purépechas, Cuevas (1985) with Amuzgos, Alcántara (2003) with Zapotecs, Anderson (2005) with yucatec Mayans and Morales (2006) with Seris. A review of this research proves the complexity of the birds-human relationship and invites us to continue documenting it.

Results

We registered 59 taxa that correspond to 58 species, 29 Families and 13 orders. The Pjiekakjoo use 66 names in Spanish and 53 in their language for this group of living beings. Of the 59 taxa recorded ten taxa could not be determined scientifically (See Table 9).

Uses

The vast majority of birds are considered edible (30 taxa). There are many anecdotes by people in their 30's of how they used to go to hunt birds (*pajarear*) in order to eat them.

There are some species that are not eaten because of beliefs associated with them. The swallows (*golondrinas*) are not eaten for several reasons. Some people say their meat is too sweet; others that they are the Virgin's/God's/Saints' birds (*Son cosa de Dios, adorno de los santitos*). Thrushes (*tordos*) are also not eaten, as they feed on the lice of livestock. The raven (*cuervo*) can be eaten, but only if it is cooked with sticks (*ramitas*) instead of firewood. Otherwise the flesh gets hard. Nor are hummingbirds eaten. People offered different reasons; one is that they are for good luck; another is that they are too small and it is not worth the effort to kill them.

Besides food, birds are also medicinal. I and my Pjiekakjoo colleagues, recorded four taxa that are so used (See Table 9). The excrement of the roadrunner (*correcaminos*) is used against bad witchery. It should be boiled and drunk. The excrement is also used among the Otomíes to straighten the legs of children who cannot walk (2004). The *zeseto* and the toucan (*pito real*) are also used for medicine,

but it was not specified for which diseases. Finally the vulture's (*zopilote*) blood is used to treat coughs and seizures.

Birds also have ornamental value, for which they are highly valued. Among the nine taxa used "de lujo" (for luxury) are screech-owls (*tecolote*), eagles (*águila*) and hawks (*aguillita*) (See Table 9).

Though it is illegal, some men still capture birds to sell them in the regional markets. In total, eight taxa were recorded as of commercial value (See Table 9). The solitaire (*Jilguero*) was the most often sold bird. There is a considerable amount of knowledge associated with this practice, as to how and when set the cages and what to feed the birds, but because it is an illegal activity people were very reluctant to share this knowledge in a systematic way so as to record it. Instead, the prohibition of the commercial use of the birds, it is urgent to establish management programs that would represent a very much needed economic benefit for the families at the same time it could guarantee keeping maintaining stable populations of these species.

Birds, or parts of them, are used as amulets. Hummingbirds are used to bring good luck or to attract lovers. A hummingbird body can be hung in a business or carried around in a pocket. On the contrary, some people commented that this type of bird should not be killed because they wear the Virgin's colors. Toucan (*pito real*) feathers are also considered a good luck charm.

Of the 59 total taxa, 18 have no use (See Figure).

Birds related to beliefs, stories and as omens.

We documented 12 taxa under this heading. Several birds are associated with weather conditions. For example, it is said that when there are a lot of *aguillitas* (hawks) dancing they call the rain. The *pedrito* also calls the rain and *golondrinas* and *cuervos* bring hail ("granizo"). The *zezeto* sings to announce the end of summer. If it "cries" (*chilla*) early (at the beginning of October) it means that bad weather will come soon; if it cries later, it means the contrary. Finally, *golondrinas* announce the arrival of the spring.

As reported among other Indigenous peoples, animals tend to be visualized as messengers of divine decisions about a human's fortune or fate (Cano et., al 2009). It is common to have birds as omens. If someone on his way to hunt runs into a roadrunner (*correcaminos*), the hunter will not find animals to hunt. To bump into these birds means to have bad luck. There is a story about the roadrunner. It tells how the *correcaminos* put the "olla con nixcomil"⁹¹ but it had too much corn, so the pot broke and burned the *correcaminos*. This is why the roadrunner complains in the forest, this refers to the moaning calls of this bird. It is important to point out that in this story the animal is perceived to be making

⁹¹ Corn with water and lime that is put on the fire to later be mixed to prepare tortillas.

human activities. I have argued that this is one thing that makes the human-animal relation fascinating and more complex than that between plants and humans. Animals are animated, thus it is more likely that people will project human behaviors and characteristics onto them,.

The *cuervo* is also a bad omen, the *delegados* said that the “grandparents” used to say that when *cuervos* fly by, you needed to throw some salt making a cross to the fire, to avoid that something bad would happen. On the contrary, the *cuervo*, as well as the *gavilán* and *tecolote*’s feathers are put on a hens’ nest to get beautiful chickens.



Figure 84. Gavilán

During the workshops a fascinating discussion took place. Someone mentioned the birds considered omens are “*brujos*” (witches or warlocks) as they can see the future, so in general people are afraid of them. Some of the elders defended these omens saying they are not bad, but on the contrary, people should be grateful for them, as they let you know in advance that something bad may happen so you can prepare for it. It is not that they cause harm themselves.

The bad omens *par excellence* are the nocturnal birds: the *lechuza* (Barn Owl), the *posporrin* (Whip-poor-will) and the *tecolote* (screech-owl). Their singing proclaims that a bad event will occur, such as that someone will die. The *tecolote* may be the most notorious, as there exists in Mexico the phrase, “*Cuando el Tecolote canta el indio muere*” (When the *tecolote* sings, the Indian dies). The people say that its singing says “*Dame tu hija sino mueres tu*” (Give me your daughter or the one dying would be you). People claim that if a *tecolote* is killed its tongue should be cut out so that it does not talk. Similar beliefs have been registered elsewhere (Alcántara2003; Hunn, 2008).

There is a story about the *Pedrito*, it is a boy that got lost in the forest and the bird calls to him to show him where there is water to drink.

I did not include in the tables the *águila* (*Aquila chrysaeto*), as Dra. Alcántara, a Mexican ethno-ornitologist who reviewed the information, suggested that the distribution of this species did not extend so far south as the Pjiekakjoo region. The Pjiekakajoo mentioned it, but did not say anything relevant about it, but identified it easily in a book. This species certainly is very relevant in the oral

tradition of the Mesoamerican cultures, and also of the nation, as it is a patriotic symbol. It needs to be more carefully documented if a variety of large hawks can also be named as *águilas*.

I identified only two obvious onomatopoeic names, the *Posporrín* and the *Pedrito*⁹². In this realm I have to mention that my lack of training in ornithology was a considerable limitation and further studies with the participation of a specialist is needed. It is expected that there are more onomatopoeic names, as "vocalization are of outstanding prominence in the identification of birds, as they are more often heard than seen" (Hunn 2008: 113).

⁹² The Zapotecs also use this name for the same genus (Hunn, 2008).

Table 9. Taxonomic of the species of birds documented, their names in Spanish, English and Pjiekajoo, and their uses (E: Edible, M: Medicinal, O: Ornamental, Co: Commercial, A: Amulet and not a use but included on the chart: B: species associated with a belief).. At the end of the table were included the 10 taxa that were not determined taxonomically. ∞ See Appendix VII for the definition of each of the categories (E: Probably extinct in the wild; P: In danger of extinction; A: Threatened; Pr: Under special protection).

No. Taxa	No. Sp.	Species	Name in Local Spanish	Name in English	Name in Pjiekakjoo	Uses	Perm	Status NOM-59 [∞]
Order Accipitriformes								
Family Cathartidae								
5	5	<i>Coragyps atratus</i>	Zopilote	Black Vulture	Tsoki (when it is on the ground), Xibati (flying) Churrio	M	R	
	6	<i>Cathartes aura</i>	Zopilote	Turkey Vulture			R	
Family Accipitridae								
6	7	<i>Accipiter striatus</i>	Gavilán	Sharp-shinned Hawk	Ñinmuty	O/ B	W	
	8	<i>Accipiter cooperii</i>		Cooper's Hawk			W	
7	9	<i>Buteo brachyurus</i>	Aguililla	Short-tailed Hawk	Nzaa mut'i	E, O, B	R	
	10	<i>Buteo jamaicensis</i>		Hawk			R	
Family Falconidae								
8	11	<i>Falco peregrinus</i>	Zezeto	Peregrine Falcon	Salilietsi	M/ O/ B	R-W	
Order Gruiformes								
Family Gruidae								
9	12	<i>Grus spp.</i>	Garza	Ñe pox				

9.1.1 Continued

Order Charadriiformes							
Family Charadriidae							
10	13	<i>Calidris sp.</i>	Granicero	Dunlin	Xalipse	B	
Order Columbiformes							
Family Columbidae							
11	14	<i>Zenaida macroura</i>	Guilotas	Mourning Dove	Ñe guilotà		R
12	15	<i>Columbina inca</i>	Tortolita	Inca Dove	Ñe ndo konko	E/ B	R
13	16	<i>Columbina passerina</i>	Paloma barranqueña	Common Ground-dove	Xaat inbindaa		R
Order Cuculiformes							
Family Cuculidae							
14	17	<i>Geococcyx velox</i>	Correcaminos	Lesser Roadrunner	Ñundzo	O/ M/ B	R-end
Order Strigiformes							
Family Strigidae							
15	18	<i>Otus flammeolus</i>	Tecolote	Flammulated Owl	Tecuru	E / O/ B	R
	19	<i>Megascops trichopsis</i>	Tecolote	Whiskered Screech Owl			R
	20	<i>Bubo virginianus</i>	Tecolote	Great Horned Owl			R
Family Tytonidae							
16	21	<i>Tyto alba</i>	Lechuza	Barn Owl	Do pa	O/ B	

9.1.2 Continued

Order Caprimulgiformes								
Family Caprimulgidae								
17	22	<i>Caprimulgus ridgwayi</i>	Posporrin	Whip-poor-will	Cocogüi	B	R	
	23	<i>Caprimulgus arizonae</i>					R	
Order Apodiformes								
Family Trochilidae								
18	24	<i>Lampornis amethystinus</i>	Colibrí	Hummingbirds	Nlindyiu	A	R-end	
	25	<i>Lampornis clemenciae</i>					R	
	26	<i>Selasphorus rufus</i>					R	
Order Trogoniformes								
Family Trogonidae								
19	27	<i>Trogon mexicanus</i>	Pito real	Mountain Trogon	Pandyii	E/ A	R	
Order Piciformes								
Family Picidae								
20	28	<i>Picoides villosus</i>	Curiche	Hairy Woodpecker	Currech	E	R	
21	29	<i>Picoides stricklandi</i>	Carpintero	Strickland's Woodpecker	Kusndza	E	R-end	A
Order Passeriformes								
Family Grallariidae								
22	30	<i>Grallaria guatimalensis</i>	Chiribisquitos	Scaled Antpitta	Chischí		R	A

9.1.3 Continued

Family Tyrannidae							
23	31	<i>Contopus spp.</i>	Pedrito	Olive-sided Flycatcher	Ndo pipí	E/ B	R
24	32	<i>Myiarchus tuberculifer</i>	Copetón	Dusky-capped Flycatcher	Ñe copeton	E/ Co	R
25	33	<i>Tyrannus forficatus</i>	Cuachichilota	Scissor-tailed Flycatcher			TM
26	34	<i>Pyrocephalus rubinus</i>	Guajolotito	Vermillin Flycatcher	Ñendo ta'mhoe		
Family Corvidae							
27	35	<i>Calocitta formosa</i>	Urraca	White-throated Magpie-Jay			
28	36	<i>Corvus corax</i>	Cuervo	Common Raven	Kaá	E/ B	R
Family Alaudidae							
29	37	<i>Eremophila alpestris</i>	Zacatonero	Horned Lark			R
Family Hirundinidae							
30	38	<i>Progne subis</i>	Golondrina	Barn Swallow	Ñe bendzondo	B	TM
	39	<i>Hirundo rustica</i>		Purple Martin			R
Family Troglodytidae							
31	40	<i>Campylorhynchus megalopterus</i>	Matraca	Grey-barred Wren	Nda xitüma	E	R-end
32	41	<i>Thryomanes bewickii</i>	Chira	Bewick's Wren	Zuzu nurkü	E	R
33	42	<i>Troglodytes aedon</i>	Viborero	Winter Wren	Tza tii	E	W
Family Turdidae							
34	43	<i>Sialia sialis</i>	Azulejo	Eastern Bluebird	Ne quix	E	R
	44	<i>Sialia mexicana</i>		Western Bluebird			R
35	45	<i>Myadestes occidentalis</i>	Jilguero	Brown-backed Solitaire	Ñe xakiminda	E/ Co	R Pr
36	46	<i>Turdus rufopalliatu</i>	Primavera/Mirla	American Robin	Ndaxixiyabi	E/ O	R

9.1.4 Continued

Family Mimidae							
37	47	<i>Mimus polyglottos</i>	Centzontle/ Pico Largo/ Picudo	Northern Mockingbird	Ndasisnurku	Co/ O	R
38	48	<i>Toxostoma ocellatum</i>	Cuitlacoche	Ocellated Thrasher	Chopaá		R
	49	<i>Toxostoma curvirostre</i>	Cuitlacoche	Curve-billed Thrasher			R
39	50	<i>Melanotis caerulescens</i>	Mulato	Blue Mockingbird	Mulatu	E/ Co	R
Family Ptilonotidae							
40	51	<i>Phainopepla nitens</i>	Canario de Monte	Phainopepla Flycatcher			R
Family Parulidae							
41	52	<i>Dendroica nigrescens</i>	Morrallero/Panalero	Black-throated Grey Warbler	Nim tuu	E	
Family Emberizidae							
42	53	<i>Pipilo maculatus</i>	Capirota	Spotted Towhee	Chuwi	E	R
43	54	<i>Aimophila ruficauda</i>	Pechuga	Stripe-headed Sparrow	Ñimbiellá	E/ Co	
Family Cardinalidae							
44	55	<i>Cardinalis cardinalis</i>	Canario	Northern Cardinal			R
45	56	<i>Pheucticus melanocephalus</i>	Tigrillo	Black-headed Grosbeak	Nbuetna	E/ Co/ M	R

9.1.5 Continued

Family Icteridae							
46	57	<i>Agelaius phoeniceus</i>	Tordo	Red-winged Blackbird	Ñie pangatz	E	R
47*	58	<i>Icterus pustulatus</i>	Calandria	Streak-backed Oriole	Betsi tuna	E/ Co	R
48			Águila Ω	Eagle	Ni-mut'i	O	
49			Arrieros Ω		Ñe viajero		
50			Cerillitos Ω				
51			Chilloncito Ω		Ñendzimbo	E	
52			Chogüi Ω		Chowi	E	
53			Gorrion Ω		Ndo gorrión	E/ Co	
54			Guajolote cimarron Ω				
55			Lagartijero Ω		Be zacuu (el que come lagartija)		
56			Maizero/ Rastrojero Ω		Ñe betsendiyitu	E	
57			Palomas Ω		Palomax	E	
58			Patalarga Ω		Xivalmo		
R=Resident, W=Winter visitor, TM=Transient migrant, SR=Summer resident							
AOU, 2011							

Mammals

Antecedents

Chávez *et. al.* (2009), reports 125 species of mammals for the State of Mexico, distributed in 8 orders, 21 families and 77 genera, which represents 26% of all the mammals species of Mexico. It is worth mentioning that according to Chávez *et. al.*, Ocuilan is one of the best studied municipalities and it is among the top three in terms of diversity.

In the COBIOCH, 18 families of mammals represented by 60 species have been recorded. Bats and rodents are the best represented groups due to their large number of species. Some of the species present are the *tlacuache* (opossum, *Didelphis virginiana*), the *musaraña* (shrew, *Sorex*), rabbits (cottontails rabbits, *Sylvilagus floridanus* and *S. cunicularius*, with a wider distribution than the *teporingo* o *zacatuche* or volcano rabbit, *Romerolagus diazi*), considered in danger of extinction. The carnivores include the weasel (*comadreja*) and three species of skunks (*Mustelidae* family). The *Procyonidae* family is represented by three species, of which the *cacomixtle* (ringtail, *Bassariscus astutus*) is more common than the *mapache* (raccoon, *Procyon lotor*) and the *tejón* (coatimundi, *Nasua nasua*). There are also foxes and coyotes. *Neotomodon alstoni alstoni*, ratón de los volcanes is an endemic species; it has been recorded near the Zempoala Lagoons Park and at El Capulín, Fierro del Toro and Tres Marías (Lozano and Santillán, 1995).

The felids include the cougar (*Puma concolor*) and bobcat (*Lynx rufus*). They are facing loss of habitat due to deforestation, the growing urban populations and the expansion of the agriculture frontier. However, they are not in the official norm 059 of the SEMARNAT listing organisms with a special conservation status. Under the same ecological pressure are white-tailed deer (*Odocoileus virginianus mexicanus*), the artiodactyl with the greatest importance for hunting (Lozano and Santillán, 1995).

Results

I and the Pjiekakjoo people that participated in the project recorded 23 taxa corresponding to the class of mammals; these are distributed among seven orders, 12 families and 28 genera and species. Of these categories, 15 received a name in Pjiekakjoo.

Table 10. Taxonomic list of the Mammal species, their common names in Spanish, English and Pjiekakjoo, and their uses. Uses: E: Edible, M: Medicinal, B: Belief, O: Ornamental. *:endemic. IUCN: EN:Endangered, LC: Least concern.

Sp.	Taxa	Local Name in Spanish	Name in Spanish	Name in Pjiekakajoo	Name in English	Species	Uses	Status IUCN/Nom 59
Order Didelphimorphia								
Family Didelphidae								
1	1	Tlacuache	Tlacuache		Virginia Opossum	<i>Didelphys virginiana californica</i> Bennett, 1833	M	
Order Cingulata								
Family Dasypodidae								
2	2	Armadillo	Armadillo	Too	Nine-banded Armadillo	<i>Dasypus novemcinctus mexicanus</i> Peters, 1864	E, M, O	LC (species)
Order Lagomorpha								
Family Leporidae								
3	3	Liebre	Liebre		Hare	<i>Lepus sp.</i>	E	
4	4	Conejo	Conejo	Tuch	Cottontail	<i>Sylvilagus floridanus</i>	E, O, B	LC
5			Teporingo		Volcano Rabbit	<i>orizabae</i> (Merriam, 1893) <i>Romerolagus diazi</i> (Ferrari-Perez, 1893)		(especie) EN/ P*
Order Chiroptera								
6	5	Murciélago	Murciélago		Bat			
Order Carnivora								
Family Canidae								
7	6	Coyote	Coyote	Xuyo	Coyote	<i>Canis latrans cagottis</i> (Hamilton-Smith, 1839)	M, O, B	LC (species)
8	7	Zorra	Zorra gris		Fox	<i>Urocyon cinereoargenteus nigrirostris</i> (Lichtenstein, 1850)		LC (species)

Table 10.1.1

Family Felidae								
9	8	Gato montés	Gato montés		Bobcat	<i>Lynx rufus escuinapae</i> J.A. Allen, 1903	O	LC (species)
10	9	León	León/Puma	Tunsi	Cougar	<i>Puma concolor azteca</i> (Merriam, 1901)	O, M	
Family Mustelidae								
11	10	Huron	Comadreja	Nimyu	Long-tailed Weasel	<i>Mustela frenata</i> (Lichtenstein 1831)	M, B	LC (species)
12	11	Tlalcoyote	Tlalcoyote	Ndojapy	American Badger	<i>Taxidea taxus berlandieri</i> Baird, 1858		LC (sp)/A (especie)
Family Mephitidae								
13	12	Zorrio aguamielero/Castellanito	Zorrillo listado	Ñinmuly	Hooded Skunk	<i>Mephitis macroura macrorura</i> (Lichtenstein, 1832)	M	
14	13	Zorro		Ñinmuly	North American Hog-nosed Skunk	<i>Conepatus leucotonus leucotonus</i> (Lichtenstein, 1832)	M	
Family Procyonidae								
15	14	Cacomixtle	Cacomixtle	Maxtla	Ringtail	<i>Bassariscus astutus astutus</i> Lichtenstein, 1830	E, M, O	LC (species)
16	15	Tejón	Tejón/Coatí	Muetoo	White-nosed Coati	<i>Nasua narica molaris</i> (Merriam, 1902)	E	LC (species)
17	16	Mapache	Mapache		Northern Raccoon	<i>Procyon lotor hernandezii</i> Wagler, 1831		LC (species)

Table 10.1.2

Order Artiodactyla								
Family Cervidae								
18	17	Venado	Venado cola blanca	Tsambajly	White-tailed Deer	<i>Odocoileus virginianus mexicanus</i> (Gmelin, 1788)	E, M, O, B	LC (species)
Family Tayassuidae								
19	18	Jabalin/Marrano cimarrón	Jabalin/Pecarí de collar	Nza petzu	Peccary	<i>Tayassu tajacu humeralis</i> Merriam, 1901		
Order Rodentia								
Family Sciuridae								
20	19	Ardilla	Ardilla gris	Nyemi	Southern Flying Squirrel	<i>Sciurus aureogaster nigrescens</i> Bennett, 1833	E, O	LC (species)
21			Ardillón de roca		Rock Squirrel	<i>Spermophilus variegatus variegatus</i> (Erleben, 1777)	E, O	LC (species)
22			Ardilla voladora		Mexican flying squirrels	<i>Glaucomys volans goldmani</i> (Nelson, 1904)	E	LC/A (la especie)

Table 10.1.3

Family Muridae								
23	20	Rata	Rata		Rat	<i>Rattus</i> sp.		
24	21	Raton	Ratón	Xumbo	Mouse	<i>Peromyscus</i> sp.		
25						<i>Neotoma</i> sp.		
26	22	Saca toros/Chincolo	Metorito	Nie-ash	Mexican Vole	<i>Microtus mexicanus</i> <i>mexicanus</i> (Saussure,1861)	E	LC (species)
Family Geomyidae								
27	23	Tuza	Tuza	Loo	Pocket Gopher	<i>Thomomys</i> sp.	E, M	
28						<i>Pappogeomys</i> sp.		

Uses

The hunting of animals is prohibited due to the inclusion of part of the Pjiekakjoo territory in the Zempoala Lagoons National Park. Few people dare to say that people still go hunting. Rather, they denounce hunters who come from outside the community. When asked directly, most people say they do not go hunting anymore, that it was many years ago when one could eat deer meat regularly. According to the parents of several families, most of the present generation of children has never tried deer meat. This has its downfall; in 2009 in one of the workshops people were telling me the story of a teenager who got lost in the forest, precisely in a hunting expedition. From this story I can assume that hunting is still taking place, but it is difficult to determine its frequency.

People recognized that three things have happened to stop them eating wild animals. Firstly there is the prohibition by the environmental authorities. Secondly, they report that animals are scarcer, harder to find. For example, even rabbits, squirrels and armadillos are no longer easy to find. Lastly, now there is less necessity for hunting, as one can buy cow, pig and chicken meat to eat.

We recorded eight categories of edible mammals, ten that are used as medicine, eight that are used for ornamental purposes (dissected or parts of animals in key chains/hats) and four associated with beliefs. In the following paragraphs I will briefly describe the most relevant information recorded for each category.

The tlacuache (from the náhuatl *Tlacuatzin*) is used as medicine to heal *empacho*⁹³, especially of children. The meat is toasted and eaten. It is also used as a purgative. A use that is widespread among other Indigenous groups (as the Hñä hñu in the Mezquital Valley and Mexico State and the Jñato of the same state, as well as in Michoacán) is to use the fat of the tlacuache to remove thorns from the skin. The oil is applied two or three times per day for eight days until the thorn starts coming out of the skin. The Pjiekakjoo have heard about but have not used the tail to accelerate the delivery of a child, a very common practice in other parts of the country, such as in Morelos, Hidalgo, Chiapas and Veracruz, a treatment that dates from pre-hispanic times. Its medicinal properties are reported in the Matritesne and Florentino Codex (BDMTM, 2009). Alves and Alves (2011) reported that the tail of the tlacuache has uterotonic action due to the prostaglandins it has.

⁹³ "Empacho is a gastrointestinal illness which can affect anyone but is commonly seen in children. It has often been defined as a perceived stomach or intestinal blockage. In most cases, it is not an actual obstruction but rather indigestion or gastroenteritis". Hoogesteger, Carl. 2008. Hispanic Folk Illnesses. <http://altmed.creighton.edu/MexicanFolk/Empacho.htm>. Recorded 3rd December 2011.



Figure 85. Tlacuache

People say there are two types of armadillos distinguished by the number of tongues; the one with two tongues should not be eaten. The two-tongued armadillo is considered to be a hybrid between an armadillo and a scorpion. The one tongue armadillo is regularly eaten in *tamales*. The flesh is considered to be of a very cold nature⁹⁴, thus lactating women should not eat it. Some people commented that the meat has a humid taste and that is why they do not like it. Some medicinal properties are attributed to armadillo's meat, shell and blood, such as, to heal whooping cough (*tos ferina*). The fat is used also as a purgative. This animal is recognized by the BDMTM (2009) as one of the animals most often used to treat diseases of the respiratory system, such as *tos ferina* and bronchitis. Other Indigenous groups that use it this way are the Hñã hñus (Otomíes) of the Mezquital Valley and the Totonacos of Papantla. The Purépechas of Pátzcuaro cite other medicinal uses for this species, e.g, the fat is drunk dissolved in a chamomile tea to treat colic; the fat is also applied topically to treat skin problems.



Figure 86. Armadillo

⁹⁴ The flesh is also considered to be cold among the Tzeltals, who used it as medicine for dysentery (Hunn 1977:126).

The three categories of the Leporidae family are all edible, the hare, the volcano rabbit and the cottontail. The last two also have ornamental uses, as the paws and tail are used as amulets. To see a rabbit is considered good luck. Some people commented that the hare has disappeared in the region. The volcano rabbit is in danger of extinction. This species is a good example of the intra-community variation in knowledge and even nomenclature. The participants in the workshops in Teocalcingo said they did not use the word "Teporingo" and that they made no distinctions between different types of rabbits, but the people participating in the Ecotouristic project and that had received training to become guides (most of the people working with the Comisariado de Bienes Comunales), have learned this name and the importance of the species because of its conservation status.

The Coyote is an important character in the Pjiekakjoo world view. It is considered a very intelligent animal. Therefore its hair and fangs are used as amulets for protection or to bring good luck with women or to win a football game. The magic associated with certain parts of the animal lies in the belief that the coyote's qualities can be transmitted to the holder of the amulet. The disadvantage is that it is said that people carrying some coyote part, or who has eaten coyote meat, will be attacked by dogs all the time. Coyote hair is also used to protect babies from the evil eye. It is believed that when a coyote howls he is announcing when something bad is going to happen. It is believed that when someone tries to shoot a coyote, and the person looks at the coyote face to face, the weapon will not work, that is, unless you make a cross with saliva on the edge of your gun. They say that a person who sees a coyote cannot talk for a while,. People attribute to coyote the power to leave you mute for the time necessary for him to run away or even steal a sheep.

Coyote is also implicated in issues relating to childbirth. When a woman has problems during the delivery, she could be asked to lie down on a coyote skin or to drink water from boiling a coyote's guts. A use that seems to have been widely adopted is the use of coyote fat to relieve colds and sparins. It is also used dissected with ornamental purposes.

In general, coyote is very important in traditional medicine. Coyote fat is used for rheumatic pains and the meat to treat nervous disorders (BDMTM, 2009).

Years ago, there were more coyotes and they used to come around people's houses to eat chickens. When one was hunted, the hunter would put a flower collar around the coyote's neck and hang the body on a wooden stick and carry it around the town.

Hunters would visit different houses where people would hit the coyote and give the hunters money, alcohol and/or food for having saved them from the coyote.

The main thing that people mention about the ox (*zorra*) is that it likes to drink *aguamiel*

The *gato montés* can be hunted only when the sun is shining. It cheats people, pretending it is dead. Once the person is close by, he attacks. The meat tastes good and the whole animal, particularly the skin and the paws, are used for ornamental purposes and to make key chains.

There is a very famous story in the communities studied about the *león*. It is said that some years ago people hunted and ate a *león* and that they then went crazy. It was a married couple and the woman especially lost control. People were so scared that they wanted to kill her. Fortunately, they just tied her down and after a couple of days she calmed down. Therefore people strongly believe that if you eat the flesh of the *león*, you will become a rebel. This species also has medicinal properties: the fat is used for *reumas* and for muscular pains and to give massages to people who feel weak in the waist (*suelos de la cintura*). The hair is used as an amulet. People recognize two types of [what??], the smaller ones (*chaparro* o *cuadrillero*) which form groups of three or four animals; and the bigger ones that have a smoky color (*humeado*). As in the case of the *gato montes*, the paws are used to make key chains. The fangs are also used as an amulet.

If you run into a *hurón*, it is a sign of bad luck, so it is considered a "brujo" (witch). In order to avoid bad luck, the person should make ten crosses on the road. Some people mentioned that people who eat the heart of the *hurón* would be protected against witches and it is also used to heal heart problems in children. In the BDMTM (2009) it is mentioned that the consumption of weasel (*comadreja*) brain is recommended to treat seizures (*ataques*).

There are two types of *zorros* (skunks), small ones called "castellanito" or "aguamilero" and a bigger one that is called simply "zorro." Both types are used as medicine after the meat has been dried in the sun with garlic. The meat is used to heal spells, whooping cough (*tos ferina*), wounds and some kind of skin condition (*granitos*) and in general to prevent diseases. In the BDMTM (2009) several medicinal uses are recorded for skunk's meat: for rheumatism, syphilis, blood intoxication and weakness (Michoacán), to remove thorns buried in the skin (Mexico State), and to heal anemia and skin disorders (Mexico City). The Totonacos from Papantla also used it for skin problems and rheumatic pain, and lastly the Nahuas of Mexico City used it to fight witchcraft.

The *cacomixtle* is not eaten anymore. People say that they are not common anymore and also that they now they can buy food, unlike ancient times. The meat is used to treat rheumatism. As several of the other species of mammals, it has an ornamental value when dissected.



Figure 87 Cacomixtle

The *Tejón* populations are also considered to have diminished considerably. *Tejóns* characteristically eat honey. People also mention there that there are two types: a solitary kind weighing around 35-40kg, and a bigger one (*cuadrillero*) of 12-15kg. There is a little saying: "When someone runs into someone else going to "raspar" the maguey (*Agave sp.*) for the production of *pulque*. One asks: "Is that all the honey you got?", and the other answers: "yes, the *tejón* finished it all".

People recognize that the *mapache* is not native to the region, but that they migrated in after a fire in a warmer region close by, near Chalma. This may be the reason why people have little to say about it.

The deer is a very important animal and thus has several uses. Though it is prohibited to hunt deer, some men still kill them from time to time. People say that they are still common, but only farther away than before, in places that are difficult to access. When a deer is hunted, the legs, skin and head are used for ornamental purposes. The head is hung on the wall, and the skin might also be laid on top of a bed. The legs were used as key chains, especially the left legs, which were considered good luck charms. The leg bones are also used as a tool for the corn harvest. It is believed that a picker (*pizcador*) who has one harvests much faster.



Figure 88. Deer feet

The man who kills the deer keeps the leg, the head and the skin, the rest is distributed among the other men who accompanied him. It is said that some deer have a black stone in the stomach which is also used as an amulet by the man who killed the deer. This amulet should not be borrowed, otherwise it loses its power. Not all deer have this stone. The deer chooses to whom to give it, as for the person who has one it is easier to hunt deer. This belief also exists among the Nahua and Popolucas of Veracruz, where these calcareous concretions of the digestive tract of the deer are called "deer stones" or "bezoars." They are considered to have healing qualities besides guaranteeing success for the hunter who holds one (BDMTM, 2009).

Men say that you need to know where the deer walks, as they have special trails, as the nine pointed antler can get stuck. Once you have learned the trails, the strategy is for one person to wait for the deer to come while the others chase the deer in his direction.

The blood of the deer is considered medicinal to prevent and heal several diseases. The warm blood, just after the animal has been killed, is used to improve strength, to treat lungs, heart and blood pressure issues, as well as convulsions. The blood is dried and, it is said, forms a "stone." In this way it may be kept for as long as four or five years. Such blood stones are highly valued. They can be very expensive, as a tiny glass of crumbs could be sold in \$100 (7.9 USD) to \$200 (15.8 USD) pesos in 2009. The information about how this blood is used during pregnancy is contradictory. Some people mentioned that it can cause an abortion if ingested with carrizo root. Other people used it to prevent an abortion.



Figure 89. Deer's blood

Maybe it depends on the plants added, but the women interviewed did not want to talk extensively about this taboo topic and I did not pressure them. The women did talk about the fact that when a pregnant woman eats deer meat, she remains pregnant for ten to twelve months. I talked with a couple of women who assured me this happened to them. Some women said that the normal gestation time is nine months and nine days but after the consumption of deer meat is ten months and ten days. The blood is also mixed with chocolate to prevent hemorrhage, and a small piece of dried blood can be used for a toothache. The elders talk with nostalgia about their regular consumption of deer meat, varying from once a month to once a week. Now they claim it has been years, eleven or as many as 25, since they have eaten deer, and that many children of the present generations have never tried it. The whole body of knowledge and tradition around deer hunting is in danger of disappearing as it is considered an illegal activity.

It is said that the devil can take the form of a deer, and this is why when hunting deer men should be very careful, as the devil has sometimes cheated them and made the men shoot one another, instead of the deer. The devil in the shape of a deer makes men follow him until they get lost. This was the case of a young man who got lost while hunting. The men who were with him and others called out from the town spent all night looking for him, but he did not appear until the next day in the early morning.

This deer, as with the *coyote* and the *tlacuache*, is an important presence, not only in traditional medicine but also in the mythology of several Indigenous groups. According to the BDMTM (2009) the Triquis used it to treat anger (*muina* or *coraje*). A deer tail is an essential amulet in every house. Zapotec use deer to facilitate delivery, a use that is also reported for Morelos. The Purépechas used pulverized antler to treat post-delivery hemorrhages. In Pátzcuaro (Michoacán) and Mexico City the blood is recommended fresh

or dried to heal heart disorders. For the Huicholes the deer is part of a sacred trilogy along with peyote (*Lophophora williamsii*) and corn (*Zea mays*). It is the main offering in ceremonies, a symbol of fertility and of life. The legend tells how the deer's footprints become peyote. Before planting, deer blood is spread on the corn to propitiate abundance.



Figure 90. Deer used for ornamental purposes.

The squirrel's paws and tail are used for ornamental purposes in key chains and hats. There used to be a dance, called the *Huitos*, which had the main dancer carry a squirrel. All squirrel species are edible, but the forest species is preferred over those from cultivated fields.



Figure 91 Squirrel's tail

Rats are another species that has recently arrived in the Pjiekakjoo communities. People remember seeing them first in Santiago Tianguistenco. Mice are considered harmful as they eat corn. One mouse, the *chincolo* or *saca toros*, used to be eaten. The elders like to tell the story of how they used to eat this mouse after working in the fields. They say they are small but tasty. They are recognized by their small size and big snout. People agreed that with tractors and pesticides their numbers have diminished.

The pocket gopher is edible, despite the humid taste of the flesh. To remove it, the flesh should be dried very well in the sun. The heart and blood is used as medicine: for children who cannot talk; for people suffering attacks, and the warm blood is spread on the crown of the head (*mollera*) when a child faints frequently. The use of the meat for attacks/epilepsy is also reported among the Zapotecs (Hunn, 2008).

Cosmovisión

Pijekakjoo believe that the devil can also take the shape of a deer. It is in this way that the devil makes a person follow him and get lost in the forest,. Also deer have been blamed for people shooting each other.

Another belief is that if you see a dangerous animal and you don't kill it, it would become the godfather of your children, which is very bad luck. You do not want a rattlesnake to be your *comadre*. Cano *et. al.*, (2009) mentions that animals can also be representations of deities or of concepts opposed to human nature. Human-animal interactions are regulated by myths, through which we can appreciate the continuum that exists in the nature-culture relation⁹⁵.

The importance of animals as cultural symbols is reflected through gods, ceremonies, myths and numerous other elements of the culture. A key feature has been the relation of animals with the sacred since time immemorial, a crucial role in myths and legends. In sum, the animals are omnipresent in the world view or *cosmovisión*, and they are an inexhaustible source of symbolic possibilities, the source of metaphoric expressions of the human experience and imagination (Cano *et. al.*, 2009).

I suggest that the zoological knowledge of Indigenous people may have fewer practical uses but more symbolic power than the botanical, as human cultures have always attributed anthropomorphic characteristics to animals. Such knowledge plays a key role in the development of a culture's worldview. Humans and animals are in the same kingdom. In strict biological terms, humans are animals. This simple but fundamental fact may have been forgotten by modern man, but not by many citizens of traditional societies who easily relate to our animate companions in the world. This complex and beautiful relation must be studied and appreciated. In the ethnobiological area, the number of ethnobotanical research projects compared to the ethnozoological is extreme⁹⁶.

⁹⁵ In contrast with Western culture which is characterized by the culture-nature dichotomy (Descola, 1998).

⁹⁶ A review of the state of the art in Mexico has been done by Argueta *et al.* 2011.

There remains the task of a deeper understanding of the role of animals in the Pjiekakjoo *cosmovisión*. The present research is intended to just open a door to the fascinating world of Pjiekakjoo *saberes*, with the hope that other researchers, and of course myself, continue to learn more about them.

Some numbers

Mammals are the group with the highest number of species used for medicinal purposes⁹⁷, followed by the invertebrates. Birds are by far the group of animals with the largest number of edible taxa. Birds and mammals are the most valued for ornamental purposes, and the mammals and invertebrates are most associated with beliefs. The most common use is as food, largely due to the fact that most birds are edible.

Table 11. Summary of the number of taxa with the most common uses, and per group of animal. * This is important because several of the taxa have more than one use, in this column I considered the numbered of uses compared to those without uses.

Groups of Animals	Medicinal taxa	Edible Taxa	Ornamental Taxa	Total Taxa with at least one use per group*	Taxa associated to a belief	Taxa with no use	Total Taxa registered
Fishes	-	2	-	2	-	-	2
Amphibians	-	3	-	3	1	3	6
Reptiles	2	1	1	3	3	11	15
Aves	4	30	9	38	12	18	59
Mammals	10	8	8	15	7	7	23
Invertebrates	8	16	2	35	9	35	70
Total	24	60	20	96	29	61	173

⁹⁷ To see an interesting analysis and a bibliographical review of the animals used in the traditional medicine of the Otopame group see Navarrijo (2004).

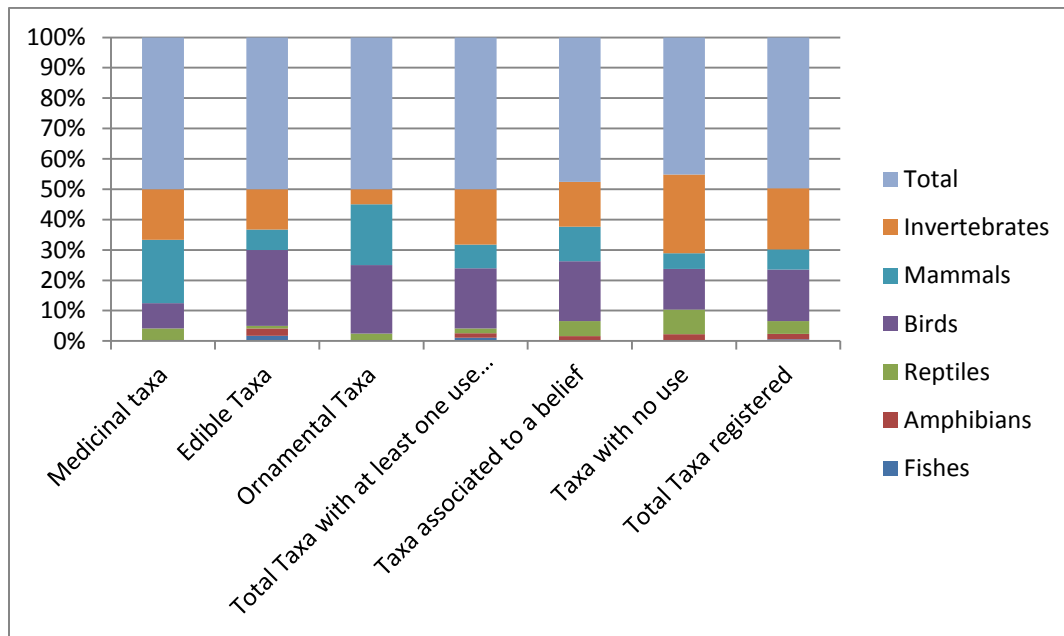


Figure 92. Number of taxa of each group of animals by use.

As appreciated on Figure ____, the utilitarian factor can not be considered the determinant one for the development of TEK with regard to the animal kingdom. There has been a long debate in ethnobiology about the motivations of Indigenous people for the recognition and classification of living beings (Hunn, 2008). The utilitarian perspective, proposed by Malinowski, and the intellectualist one, emphasized by Levi Strauss, have been at the center of this debate. In my short 12 year experience in the field, several as an ethnoentomologist, I have not found an exclusive utilitarian relation of the Indigenous people with whom I have worked with the living beings. They do not recognize, classified or name only what is food, medicine or even toys; they know details about living organisms, their shapes, colors, behavior, and these life forms are definitely part of their everyday life and *cosmovisión*. In the present research the only group for which we follow the utilitarian perspectives was the mushrooms. This relation of Indigenous people to living beings is always under construction and redefinition as the modern world and its dynamics affect it. I will discuss this further in Chapter VII.

Pjiekakjoo Taxonomy

The richness of knowledge gives sense to the names given to the elements of nature and it is embodied in the traditional taxonomies. Bonfil (1986) stated:

“The study of the classifications and nomenclatures allows a better understanding of how the Mesoamerican cultures perceive the relation human-nature. It is important to emphasize that it is not about death nomenclatures, remains that have lost sense and coherence. On the

contrary, as they belong to alive languages, they maintain their full meaning in the semantic field that originated them, therefore they keep their capacity as linguistic systems that express and condensed the knowledges of the Mesoamerican civilization" (Bonfil 1986).

It was not one of our objectives to study taxonomy per se, which requires in itself a lot of attention and could be a whole topic of research on its own. Rather I decided to write about some of the data that emerged from the workshops.

There is no term for all invertebrates, mammals, amphibians and reptiles, no cover category, which is the most common pattern at the kingdom rank (Berlin, 1992). They all seem to me to be "unaffiliated" folk generics. Hunn (2008) mentioned that at least for mammals, this is usually the case in folk zoological classifications. They do have life forms for fungi: **nchoo** and for birds: **liljaá**. The latter name is not entirely clear for me, as when I asked elders if chickens and turkeys were **liljaá**, they said they were not, as they do not fly high. Hunn (2008) found something similar among the Zapotec: **mguin** may be translated as bird, but only for small ones, because vultures and chickens are not recognized as **mguin**. This is an example of how cautious scientist should be in assuming referential equivalence between life-form names on various languages solely on the basis of partial or prototypical overlap (Randall and Hunn, 1984).

We did a small pile sorting exercise with men only, and it showed that a very important criterion is locomotion. For example they classify worms and snakes together because they creep. To lump what for the Linnean classification are very different types of animals in a single category it is not uncommon in other knowledge systems. Brown (1979) proposed the use of the taxon *wug* that includes bugs and other small creatures such as worms, snails, frogs, tortoises, crabs, and lizards.

As I just mentioned above birds are also separated according to whether they fly high or low. Even insects are classified according to whether they jump or fly. To sort terms into piles they also considered ecological relations. They did not feel comfortable putting animals together that for example would eat each other.

The men participating were very concerned to do it right. When I had explained that every culture could have its own way of organizing living beings, they fully understood it. They then enthusiastically started giving me different ways in which they could have organized the animals I had shown them. They organized them as with and without feathers, edible and not edible, from the forest or domestic, etc. I did not explore more deeply the meaning of this, how many parallel systems of Pjiekakajoo taxonomy are in place is a

question that will remain unanswered, at least for the moment. Elders wondered if there were more names. I found very few specifics; most of the names are generics. When I asked people if there were names for each of the squirrel types that they clearly recognized, they said that maybe there used to be, but they do not remember them any more. It is discouraging how they always have this feeling that their language is fading away.

I would insist that these systems are under continuous construction and modification and may differ between generations. In the pile sort exercise the younger men would try to explain to the others how animals could be divided between mammals, reptiles, etc... Western categories that the older men were not familiar with, as few of them have formal education. At the end, the older men's opinions were more considered.

In relation to nomenclature, I found the same as Hunn (2008) documented among the Zapotecs, the Pjiekakajoo incorporate Spanish and Náhuatl elements, and how these borrowed names are typically modified to correspond phonetically to the Pjiekakajoo.

Table 12. Terms with Spanish elements and of Nahuatl origin.

	Spanish elements	Náhuatl elements
Fish		Mexcalpique
Fungi	Nchoo anis	Tejamanil
	Nchoo cemitá	Cempasúchil
	Nchoo cemitá	Huitlacoche
	Nchoo cigarru	Tepoztlan
	Ncho quexu	Molcajete
Invertebrates	Grillu	
	Ñi too puyo (pollo)	
	Ñendo lucesita	
	Ñendo toro	
Birds	Ñe viajero	
	Chachalacá	
	Ñe copetón	
	Ndo gorrión	
	Palomax	
	Mulatu	

The *delegados* and *comandantes* did not know or have not heard heard about a term equivalent to “wild.” In a strict linguistic sense.

Plants and Pjiekakjoo knowledge

In the COBIOCH, Bonilla (1995) reported 785 species of plants distributed in 135 families; the best represented families being orchids (Orchidaceae), Asteraceae, grasses (Poaceae) and mints (Lamiaceae).

I record only the main vegetal resources used by the Pjiekakjoo, wild and domestic. For medicinal uses, they collect a few species from the forest, in particular *el timbre* and *la hierba de la fuerza*.

There are different types of wood, though people say that for cooking almost any kind of wood is good. However, the *oyamel* (balsam fir, *Abies spp.*) makes lot of noise (*truena*) because it has a lot of oil; *ocote* (*Pinus spp.*) catches fire very quickly because it is *carnudo*. Some people collect and sell small pieces. The *cumelillo* (*li-menxaa*) is used particularly to make plows (*arados*) and ax handles (*cabos de hacha*).

Some species have disappeared, indicators of environmental change, ej. *Hierba del Sapo*. The elders say that before you could find it everywhere but now the chances of finding it are very low.

The Milpa

Agricultural knowledge is not the focus of this research, but being aware that a considerable part of the community life turns around the *ciclo agrícola* and furthermore, that corn is one of the pillars of Mesoamerican cultures, one workshop was devoted to discussing basic agricultural information.

People should not work on the *milpa* during the days that the moon is absent, because if people do, the soil is spoiled. Another belief is that a pregnant woman may get sick (*que le de aire*) if she goes to the milpa. To avoid this, an onion is put behind their ears. Maize (*maíz*) is called *Nda tijuu*; several varieties are recognized, each of them with a particular use (see chart I). The *elote* is used to prepare *tamales*, *atole*, *tlazcales* and *esquites*.

Table 13. Agricultural cycle.

Time	Activity
February-March	Barbecho. The land is prepared. It should be done in days with moon, otherwise the land is spoiled (se <i>agusana</i>).
From mid April to may	Siembre. The latest that the planting should be done is May 15. People should <i>persignarse</i> before planting. The activity requires one sembrador, two aboneros, one frijolera y one yunta. The frijolera should wear her hair <i>suelto</i> (las trenzas sueltas) so the beans really grow.
A month and a half after the planting	1era tierra: Se escarda. With the help of the yunta se le hecha tierra, se pica la yerba con el asadón.
15 or 20 days after the 1era tierra.	2nda tierra
December and January	The harvest

Table 14. Maize varieties with their Pjiekakjoo names and some of their uses.

Name in Spanish	Name in Pjiekakjoo	Use
Negro (Black) Criollo	ñumbotju	tortillas, gordas, no se usa para tamales rinde más, la mazorca pesa a pesar de ser chica. Para tortillas, gorditas y tamales.
Amarillo (yellow)	Kjamuly (literally yellow)	
Rojo	Ndajde	
Maíz Palomero	Timitsi	

Elote: **muxa**

Hojas de maíz: **xitiju**

Hoja de elote: **xichexi**

Caña del maíz: **nlo**

Cabellito del maíz: **xindex**

Espiga de maíz: **xipiox**

Raíz: **ñibly**

Mazorca: **tju**

Sincolote: **tü**

Aguasol (caña seca): **xilo**

Sincolote: se asoma al echar 1er costal de mazorca, se deja el sahumerio abajo

There is a godfather of the harvest, and it is the person that finds two mazorcas together. The godfather has to buy candies (colación) and give them away on a chosen date.

The *sincolote se adorna*, with colorful papers and flowers. The first thing that should be put inside the *sincolote*⁹⁸, is bread from San Nicolasito (September 10), one in each corner and, if there is enough, one in the center.

The person who finds red corn has to offer beer to the other men working on the harvest.

People are aware that the production of corn is not profitable, but that they do it to a large extent for cultural reasons. It is possible in many cases only thanks to remittances. Hunn (1999) reported that subsistence is sacrosanct among Alaskan Native Indian, Aleuts and Eskimo communities. Hunters and fishermen work for wages to support their "subsistence habit". Paradoxically, when I asked some Pjiekakjoo people if I was not better just to buy corn with their remittances, they say they cannot rely on them, as sometimes they take longer to come or do not come at all.

People comment that the corn that they buy does not taste good nor does it last (it runs out faster). Even migrants cultivate corn; they send the necessary money for this. Their relatives say that it is important to cultivate at least a little piece of land (*aunque sea un cachito*). In general, local production is enough to cover family necessities, and in good years the harvest is enough to sell part of it. They have a saying: "*El que no siembra no come*". He who does not plant, does not eat.

The corn plant also has a medicinal use; the "hair" of the elote (*cabellito de elote*) is used to treat urinary infections (*mal orína*, literally bad urine). The best variety is the one with purple kernels.

Plants and the Pjiekakajoo

We held two workshops about plants. Because of funding and time constraints I did not make taxonomic determinations of all the organisms collected. However, I think it worthwhile to mention the basic results we documented. It was important to have some reference to plants in order to conduct the interviews comparing resident and migrant knowledge of the plant, animal and mushroom kingdoms.

In our workshops the objective was to record the most important plants used under the categories: edible, medicinal and ornamental (see Appendix VIII, IX and X for the tables with the names).

⁹⁸ Wooden structure where the corn is kept.

Table 15. Number of taxa documented and the number of names in Spanish and Pjiekakjoo.

Use	Total Taxa	Number of names in Spanish	Number of names in Pjiekakjoo
Edible	22	23	14
Medicinal	63	60	34
Ornamental	18	18	15
Total	103	101	63

Ethnobotanical research among the Pjiekakjoo is an unexplored field full of potential, and people from the new delegation are eager to also document in detail their knowledge in this area.

Conclusions

The Pjiekakjoo people possess a holistic, complex and detailed knowledge about the living beings; and have developed with them a deep relation that is not limited to utilitarian interests. A better comprehension of this relation was achieved through the study of the uses, myths and beliefs associated to the different elements of the ecosystems.

Despite the status of the language as in danger of extinction, I and the people that participated in the project documented 264 names in Pjiekakjoo for different types of organisms (See Appendix XI), to which we may more words related to the products and parts of them.

This research is just a first approximation to the *saberes* Pjiekakjoo, as due to the scope of the project some topics were approached superficially as are the nomenclature and traditional systems of classification. Lot of work needs to be done still in relation to the taxonomic determination of several of the specimens, and research about the knowledge and wisdom about the domestic animals and plants needs to be addressed.

VII. Variability in TEK, Education and Migration

Traditional Environmental Knowledge has more variability than it is usually recognized due to variables such as age, gender, occupation, schooling and migratory experience. In this chapter we will analyze some of the dynamics of the Pjiekakjoo knowledges in relation to these variables. In the topic of education, I will discuss the relevance of Intercultural education. The documentation of the migratory experience of the Pjiekakjoo people and its relation to TEK results relevant due to the debates about the future of TEK.

Formal and non formal

Only through education in the extended sense of the word will *Indigenous* knowledge be vindicated, through a commitment that includes an advancement of formal and non-formal education systems for the transmission of Local Knowledge (Bicker *et. al.*, 2004). It is urgent to include IK in the curricula of the schools at all levels, in the whole country, not only in the *Indigenous* communities and to explain to the new *mestizo* generations the importance of the heritage that *Indigenous* cultures and their knowledge, represent. It is urgent to cultivate a pedagogy of the recognition of the "Other" (Pérez y Argueta, 2010). The average Mexican is ignorant of and discriminates against the *Indigenous* people of their own country, despite the fact that they represent more than the 10% of the population. This discrimination, often unconscious, has been provoked by the economy, politics and education that have prevailed in Mexico (Anguiano, 2003).

At the national level, in Mexico, the school was the main tool of "desindianización," a process through which the populations that originally had a particular and distinctive identity, based on their own culture, are forced to reject that identity, with all the consequent changes in their social organization and their culture. The "desindianización" does not result from the biological *mestizaje*, but of the action of ethnocidal forces toward the end of stopping the historical continuity of a *pueblo* as a culturally differentiated social unit. "Desindianización" has happened at different rates and levels. This process can be reversed through the documentation and dissemination of TEK as well as its vindication, precisely in the schools.

As I witnessed in the school year 2007-2008, IK/ LK is totally absent from the formal school environment. IK is left outside of formal learning as it is considered unimportant at the schools. If formal education means acquiring important knowledge for life, then I believe it requires the incorporation of other knowledges from different cosmogonies (Pacheco

2010) and acceptance of *Indigenous* knowledge (Lauriola and Moreira, 2006). Nabhan (1998) talks of how educators should know whether the way in which science is taught in schools is changing children's values and perceptions of local animals. He gives as an example a science teacher who may lecture students about how horned lizards are harmless animals, while the children's grandparents simultaneously teach them that these creatures are dangerous and may cause human illness if mistreated.

When I visited the primary school located in the center of San Juan Atzingo in April 2008, I asked in one of the groups which names of animals they knew, a student asked, "What is that?" he was trying to make fun of me, but his attitude was not so far from the reality. A talk was given to the teachers in order to present my research project and the activities I wanted to organize in the school, some were indifferent and only a couple interested. One teacher humbly told me she did not know anything about the *Indigenous* group, though she had been teaching at San Juan Atzingo for some years. She was surprised to hear they were not Nahuas, as she imagined. Zent (2001) observed that among the Piaroans, "the more one participated in formal (Spanish-language) education, the less likely it was that the person would have the same level of naming competence that an unschooled person of the same age retained".

At the non formal level, the Pjiekakjoo have some hope at the family level, not for the language but for the world view. The *delegados de la Loma* showed a great commitment through this project and the education part it involved. Many people are aware that their knowledge is lost every time an elder dies, and that there is a need to systematize, register and resocialize it. A young woman regrets how she did not learn from her grandmother how on more than one occasion she had saved her babies lives. She said that when her second baby was born she started taking notes of all the remedies the grandmother would use, but eventually she stopped. Now her grandmother has died, taking to the grave all her knowledge and wisdom.

Historically, low levels of schooling may have helped traditional knowledge survive. The elders have kept their knowledge, but their children, who are now adults with families and who attended school for a few years, show different perceptions about the environment and traditional knowledge, as a result of their years of schooling. There are other variables that may be affecting the production and reproduction of Pjiekakjoo knowledges such as occupation, migration and even the personal history.

In cultural terms, the cognitive systems of *Indigenous* people have enormous relevance. During and after the conquest, religious systems, languages, and clothing of the prehispanic cultures endured a process leading to syncretic practices in some cases, and the extermination of certain cultural components in the worst cases. I consider TEK one of the realms in which colonization had less impact. Due to its importance for everyday life and the utilization of natural resources, it was not attacked as directly as others. The knowledge associated with some religious practices may have been banned, but the corpus and praxis were not, and in many cases it was even learned and used by the conquerors.

To remove religious idols, clothing, and other physical elements from the *Indigenous* cultures was feasible, but not so the removal of the forests, deserts, lakes, flora and fauna with which the *Indigenous* people were able to maintain a deep relation.

Intercultural Education

The recognition that Mexico is a pluricultural country is far from a reality. In relation to education, for example, in theory the languages and *Indigenous* cultures are promoted, but this does not happen in the schools (Anguiano, 2003). The case of the Hña hñu professors at the Tlahuica bilingual school exemplifies this. The director told me, they cannot teach the language but they emphasize what the children know. It may be vital that the children acquire a positive attitude towards their own culture, which the teachers inculcate at the bilingual school. But the systematic study and learning of their heritage is also needed. When I visited the bilingual school and asked the children about wild edible mushrooms, I was pleased to realize they knew a lot about them, except for the Pjiekakjoo names.

As a result the director asked them for homework to bring lists of the names of mushrooms in their language. It is more than evident the different attitude towards the Pjiekakjoo heritage among the boys of the federal primary school compared to those of the federal bilingual school. In the former I explained to the children that I had come to San Juan to learn, as there it was something there that I could not find anywhere else in the world, something very special. The children tried to guess what this might be, but without success. They had no idea of the value and relevance of their cultural heritage. The signs of stigma have had negative consequences on the way people feel about their ethnic roots, Though this has changed, particularly among certain families, it is still very common to find parents who in order to avoid pain and discrimination to their children, do not expose them to their cultural heritage. I experienced this personally, when I had to deal with the fact that one of

my closest families would not allow their children to go to the workshops we were organizing, as they did not want them to get "confused" between Spanish and Pjiekakjoo. None of my arguments made them change their mind. The fear of putting their children at a disadvantage or in potential danger is greater than the importance they gave to the survival of their cultural heritage.

The Pjiekakjoo people live exposed to a dynamic of social, cultural and educational discrimination that affects their quality of life. I believe it should be through education at different levels and sectors that this will be stopped.

In Mexico Interculturality has been demanded by *Indigenous* people, and is a process that is under negotiation and construction. The assertion of autonomy has been the main way through which *Indigenous* people has fought to get their rights respected. And it has been under this frame that new forms of conceiving the prominence of *Indigenous* knowledge appeared.

For some the official intercultural projects have been a form of mediatize the *Indigenous* demands and disguise the integration. For others, the educative interculturality, even the official one, is an opportunity that should not be wasted, as they considered it is a way to reinforce the knowledge of the *Indigenous* cultures in order to be able to face issues such as *Indigenous* and national development, through the *diálogo de saberes (knowledge dialogue)* (Pérez y Argueta, 2011).

Intercultural education though, should be applied throughout the country not only in the *Indigenous* communities, in fact the population most in need of it are the *mestizos* that are ignorant of the richness in biocultural diversity in Mexico. To have bilingual (or *Indigenous*) education is to compartmentalize the space, which is only useful for efficient supervision and for emphasizing distinctions between individuals (Smith, 1999). *Indigenous* schools enclose *Indigenous* children and define spaces inside the communities. Smith (1999) mentions how Foucault has called this type of process "formulas of domination" which are applied through a concept of discipline that includes the organization of systems of knowledge but also a way of organizing people; the colonizing of the *Other* through discipline. The more obvious forms of discipline were though exclusion, marginalization and denial, all of them applied to the *Indigenous* knowledge systems.

The proposal of interculturality has gone beyond the educational realm, the Latin American intercultural philosophy (*rompió en la escena*) appeared three decades ago. It defends

plurality, proposes new epistemological forms to approach to the thought of *Indigenous* peoples and considers interculturality (como forma común de vida) as one of the bases for the refoundation of the state. This philosophy recognizes all the traditions of thought of humanity and assumes a commitment to support *Indigenous* struggles for cultural, economic, political and religious rights as well as their right to self-determination (Pérez y Argueta, 2010:42).

Teaching projects at the community level

Just as the projects about conservation and development should take into consideration the political, social, cultural and historical factors, education projects should do likewise. To fail in this requisite may prove counterproductive of the original intended objectives. This has been the case around the teaching projects of the Pjiekakjoo language in San Juan Atzingo. Many families are very dissatisfied with the fact that several of the courses have been given by a woman who is not a native speaker but who learned the language from the elder women. However, this may not be the main objection, but rather the fact that when she was younger she used to make fun of people, calling them *pipilas* (small turkeys) when they spoke Pjiekakjoo. People accused her of having a mere economic interest in the language and of claiming she knows it all when she only has a limited understanding of it.

In 2010, students who had graduated from the UIEM from the department of Language and Culture taught courses about the language in San Juan Atzingo, due to the interest of the center authorities to claim the *Indigenous* presence, to claim that they were the barrio with the larger number of speakers and to become a different *delegación*, la *delegación indígena Tlahuica de Teocalcingo*. Ironically, the students live in the new *delegación*, but belong to the few families that are against the partition⁹⁹.

Perspectives about the culture's revitalization through education are varied and go from hopeful to cynical. Ildelfonso Zamora, the president of the *Comisariado de Bienes Comunales* and some of the people that work with him, once told me that they believe that only by force would people learn the language and some Pjiekakjoo Knowledge, only if the governmental programs demand it or if were part of the official grades that students get in school. Other people, especially from Teocalcingo, have a more dynamic perception of their culture, and are aware that some elements may disappear and other

⁹⁹ I have already documented these issues in chapter II.

retained through generations, and they attribute to the family the power to influence these processes.

Critiques of TEK

I have identified two main issues around which some researchers have expressed concern about the study of TEK. One emphasized the failure to situate TEK in larger contexts of history and power (Hodgson in Escobar, 1999), and the other highlighted the danger of idealizing *Indigenous*/peasants communities due to a lack of problematization, reason for which Ethnoecology is associated with the emergence of the postmodern ideas and the rescue of the romanticisms inside the anthropology (Durand, 2002).

In relation to the latter even some *Indigenous* researchers are skeptical or cautious about the mystical, misty-eyed discourse that is sometimes employed to describe *Indigenous* people's relationships with the land and the universe (Smith, 1999:12), which evokes the Rousseauian image of the "noble savage" (Rabey 2005). Some detractors of ethnoecology criticize the assumption that *Indigenous* communities live in equilibrium with their environment. Many of these traditional cultures have maintained this ecological equilibrium (though it is neither immutable nor static), but there are also some that do not have it, or that had it and lost it.

In relation to the first issue, the anthropology of local knowledge, besides eliciting "local" meanings and uses of nature, should provide information on historical changes in such meanings and uses or the contemporary supralocal political-economic contexts that influence their production, which make their findings look more like an organic regime (Hodgson in Escobar 1999).

Most ethnoecological studies have focused on the cognitive systems, leaving aside their practical purposes, suggesting in this way culture as an entity autonomous of the productive sphere (Toledo, 1990). For example, it is said that the taxonomic classifications have become important in themselves, ignoring the context in which they are developed. Some analysts have ignored the variation, flexibility and the social and cultural conditions of classification systems and the contrasts among them, leaving aside the fact that it is one thing to know how people call the objects of the environment in which they live, and another and very different one, how they interact with those objects (Ellen 1989, Bellón, 1993, Durand 2002)

Indigenous communities are not isolated from modernity; they are situated in a continuum in relation to it (García Canclini, 1996). Not all traditional communities are in a situation of sustainable development; this cannot be considered an intrinsic characteristic of non-Western societies. It is important to recognize that some lack functional knowledge and others may apply knowledge that is opposed to their own interests. For example, when they misuse pesticides. Knowledge is adapted to specific circumstances and when these change, local knowledge may become inadequate and it may take some time to readapt (Durand, 2000, Thrupp, 1993).

It is one thing to demand that ethnoecological studies problematize the context of the knowledge being researched, and quite another is to state that ethnoecology supposes *a priori* a functional relation between traditional knowledge and the management of natural resources (Bellón 1993, en Durand, 2008). This type of statement voices one of Hunn's (2007) concerns in his proposal of the four phases of Ethnobiology¹⁰⁰. He explains that it is important that the phases be inclusive, and he showed some concern and skepticism about ethnobiology IV being as inclusive as the three previous phases were. I would include in ethnobiology IV, which is centrally concerned with *Indigenous* peoples rights, research from a purely theoretical perspective about TEK. If Durand and other authors would have made some effort to investigate ethnobiology phases I and II, they would have realized you cannot suppose things *a priori* about knowledge and practice (I would also add the cosmos around them). Ethnobiologists do have a theoretical framework, but we do detailed and strict fieldwork in order to test these ideas. Personally, I have found this one of the most appealing characteristics of ethnobiology. Trained originally as a biologist, I appreciate having concrete data to support my statements, and I am not talking just about quantitative data, but rather, for example, lists of species recognized, names and use, which when added to the social and spiritual concepts built around them gives a very concrete base from which we can theorize and think about human-environment relations without getting lost in abstract ideas. I cannot simply assume Pjiekakjoo recognize around 80 species of mushrooms and how its collection and management are one of their main subsistence activities; rather, I must document this empirically.

TEK's study tools

Scientists have warned about negative implications of some of the analytical tools and theoretical frameworks used by ethnobiology/ethnoecology. A concrete example would be in the Mexican scenario, the cosmos, praxis and corpus model of Toledo (2001) has

¹⁰⁰ See the section TEK and Indigenous People Rights in this chapter

been recognized as a bridge between Western and traditional knowledge, but also its potential benefits and dangers have been noted. The organization of IK in these three spheres allows us to take note of and separate the religious and mythological framework of IK, at the same time that it isolates IK about nature. This makes *Indigenous* knowledge susceptible of being translated and incorporated to the modern way of conceiving the world. It is only after this translation that the scientific character of this knowledge may be recognized and its validation, generalization and universalization may occur (Maya *et. al.*, 2009). Making it easier to get an economic profit out of it, and leaving its owners as spectators of the processes

Besides the need to situate *Indigenous* knowledge in its complex reality, it is also necessary to respect it in an integral way. Toledo's tool should provide a way to help us to get a better comprehension of traditional knowledge, and not a way to rip it out of its context in order to be coopted by other paradigms. This could be the case in particular areas such as the one of biotechnology, where the approach to *Indigenous* Knowledge is very utilitarian and reductionist, it is frequent to find that the scientist working on it do not consider the cultural importance of the information.

A critique of Durand's (2002) that is worthy to be considered is that linking ecological anthropology with the pretension of making anthropology a quantitative science.

I have experienced in the field how to make interviews when rapport has not been established, and realize that establishing rapport in most Mexican *Indigenous* communities will take time, as a result of the history of abuse and misappropriation of *Indigenous* natural and cultural heritage. The lack of trust between researcher and research "subjects" has also strong implications for research findings, as they may not be reliable. I did an interesting exercise to respond to these inquietudes. I compared free listings of insects among Zapotec young people, done first at the beginning of a project to create an ethnoentomological collection and again at the end of it (Aldasoro and Hunn, 2002). The results were considerably different, which should not be the case if we consider a strict cognitive anthropological approach that assumes that people have fixed categories organized in their minds. In the second free listing the young and enthusiastic men and women mentioned more names in their language, which resulted in more categories being mentioned, as there were some categories without a Spanish name, more categories in general and in particular listing more subcategories of each taxon. So while in

the first free-listing they for example would have mentioned only "ant" (Mixtepec Zapotec **mre**), in the second they mentioned also **miob** (army ant/*hormiga arriera*), **miadz** (winged leaf-cutter ant/*chicatana*), **ndun** (*hormiga mora*), **mre cieq** (*hormiga ciega*),.. The fact that I have trained them to collect and preserve insects, a process through which we get to spend some time together getting to know each other, was a crucial factor that altered these results, and made me wonder how trustworthy are the very quantitative results that some colleagues are obsessed with obtaining in the shortest time possible with no interest in spending time getting to know the people whom they interview.

A trend in modern Western science is to demand quantitative data for validation, for example, in order for results to be published. I would here ask for tolerance from the scientists that do quantitative research and who are resistant to the social scientists like me, who do not share this paradigm. Can ethnography be quantifiable?, can we quantify the human experience?. Of course qualitative research demands a high price in time. Are the dominant scientific system of production and the academic institutions in Mexico willing to make changes in order to allow scientists to do research with a more human and academic quality?....

The Culture-Nature Dichotomy in Ethnobiology?

Durand (2002) has suggested that the link of ethnoecology to postmodern ideas has imposed on this discipline a cultural determinism that is characterized by the belief that a people's world views are built through social experience. This transforms reality into an incommensurable element, since if meanings are socially constructed they are accessible only through cultural interpretation, without which reality is nonsense and inexistent. She affirms that according to ethnoecology, culture is perceived as a determining factor that defines the environment, as it gives meaning to it. Later on, she accepts that many of the culturalist and materialist proposals now co-exist and that "the most recent proposals from environmental anthropology do not try to determine if nature or culture is the dominant causal force, nor whether the congruence between nature and culture is a measure of success or adaptation". In fact the new perspective considers Descola and Pálsson's (1996) perspective, that there is no necessary dichotomy between nature and culture, and the fact that it is present in Western culture does not mean it is in traditional cultures, as some studies have shown. These authors affirm that humanity and nature are inseparable in their definition and relation. I would like to consider a definition for political ecology that

can be applied to a critical environmental anthropology: "A critical political ecology must balance the cultural/social construction of nature with a meaningful consideration (and analysis) of the natural construction of the cultural and the social (Stonich 1999). We can adopt the terms used by Hill (1999): "socialization of nature" (or construction of a cultural landscape) and "naturalization of society".

TEK Dynamics

I intend to try to answer some of the critiques and failures of research in the field of ethnobiology, I intend to go beyond the traditional approaches to ethnobiological research and document not only knowledge, but also to address the dynamics it experiences in a changing world.

There is a contemporary debate about the current situation and future of traditional knowledge systems, systems which are the result of groups of people inhabiting the same territory for thousands of years. On the one hand, there is growing concern for the fate of TEK in the globalizing era (Antweiler 1998; Benz, *et. al.*, 2000; Bicker *et. al.*, 2004; Brodt 2001; Hunn, 1999; Kirsch 2001; Nazarea 1999). Researchers have expressed the fear that this valuable heritage may be lost because the practical value has decreased so that it is no longer indispensable for people's livelihood strategies. Today entire *Indigenous* towns depend on wage labor and remittances, and ecologically sensible practices and the knowledge they entail, have been displaced by the increase invasion of the contemporary world; its values, the free market economy and its push for commodity production. Under capitalism farmers become workers separated from ownership of the means of production and the product of the labor process, and therefore become alienated workers detached from their land and customs; this originates the creation of new ones.

The label peasant-worker has emerged to refer to the simultaneous existence of and participation by people in these two modes of production. Capitalism submits peasant households to a process of proletarianization, what implies not only economic but also cultural changes, as a clash of values and forms of organization takes place between capitalism and traditional ways of subsistence. Globalizing capitalism represents just a part of a larger globalizing process that involves time-space compression due to the availability of new technologies and has effects on the structure and scale of human relationships. Under this framework, understanding the production and reproduction of TEK, and its conservation is crucial to avoid a world where only a global capitalist consumer society

exists and where the destruction of natural resources prevails. The most pessimistic predictions claim that capitalist globalization today implies the virtual extinction of *Indigenous* people, due to forced migrations, the drastic reduction of subsistence activities, changes in their traditional practices through exploitation projects such as ecotourism, mining and bioprospecting (Cruz, 2009).

On the other hand, TEK is seen as a very adaptive and dynamic system that will survive through strategies of resistance to globalization and modernization and the high rates of change that societies have experienced for some decades already. This current of inquiry is related to theories of identity formation and resistance. According to this approach, globalization "from below" parallels globalization from above (directed by the dominant groups). In the former, we note the reemergence of identities that is taking place and alternative cultural and economic projects that are developing as a challenge to global capitalism.

The main idea is that when communities are displaced from their land, or the regime under which land is used is changed, the value of TEK and its adaptive function may be different than the original more purely practical one. Despite the fact that TEK may be eroded and no longer essential for people to make a living, it may acquire a more relevant symbolic value, becoming a key element of identity formation and resistance processes, which become the fundamental source of social meaning in a world of global flows of wealth, power and images (Hunn, 2002; Hunn *et. al.* 2003). This standpoint questions the fact that globalization means the end of local cultures, as place-based communities develop alternative ways to inhabit places and create new communities.

The traditional concept of *Indigenous* communities as self-sufficient (*autocontentidas*) entities has been superseded (Durand, 2000). It has been a challenge for some who used this concept to grasp the fact that these *Indigenous* and peasant communities do not live in isolation (and in most cases they never did). They maintain complex links to industrial society; on one hand they are producers with a specific interchange with nature, and on the other they are engaged with capitalist markets (Cruz, 2009). Marshall McLuhan, has clearly expressed this in his phrase, the "global village" (Rabey, 2005). In the Pjiekakjoo global villages it is possible to watch children using a Walkman to listen to American music while harvesting corn or taking care of the sheep.

This has had consequences, as Western development through national and international policies, cultural and economic globalization, the destruction of the environment and

related violence have had serious consequences in the *Indigenous* communities (Alderete 2005).

The concept of *Indigenous*/traditional communities has to be redefined in order to respond to the realities their members have faced, in some cases for decades. The strong division that used to exist between urban and rural in the 1970's has disappeared. Nowadays rural populations are interconnected by macrosocial processes and there exist multiple links and overlap between "the traditional" and "the modern" (García Canclini, 1996). It is necessary to include these factors in any study of the human-culture/environment relation. This has been one failure of ethnoecology, according to Durand (2008). She argues that ethnoecology has not considered that the expansion of Westerns civilization has not only caused the destruction of traditional practices, but also provoked a process of interaction. To the extent that ethnobiology/ethnoecology has not assumed this, it has fallen into the trap of idealism.

It is a fact that in the contemporary world no body of traditional knowledge remains beyond the influence of global scientific perspectives.

Many things have been said about the destruction of the *natural* and the *primitive* by the process of globalization and how it homogenizes the cultural patterns of the globe. For one, it is claimed that particular, local cultural modes, specific or discrete, but at the end inferior, tend to disappear in favor of a transnational culture. It has been claimed that cultural frontiers are vanishing in favor of a transnational culture and landscape, reproduced according to the monotonous but still attractive logic of capitalism. However, some cultures persist in preserving their own culture: the way they organize the world, the relations between people, their beliefs, the way of organizing their everyday life and of the particular way they build the landscape (Figeroa 1996). In Bonfil's (1986) words: they are the art of an alive culture, the persistence of certain technologies and practices are linked to a heritage of knowledge that results from accumulated experience systematized for centuries, and that is consistent with particular ways of perceiving the world and understand nature, with schemes of values deeply rooted, with particular forms of social organization and with the correspondent universe of everyday life. Hunn (2008) for example mentions that the people in San Juan Gbëë (a Zapotec community in Oaxaca) are aware of modern medical treatments but still trust their traditional medicines. He claims that their knowledge of modern scientific medicine as an option has neither transformed nor displaced *Indigenous* theory nor practice in the diagnosis and treatment of illness. He

in particular gives the example of how to cure "fright" or "*chaneque*" people would use herbal medicines.

We should keep present that *Indigenous* people have managed to preserve the main characteristics of their identity, adapt to successive historical epochs and made their knowledge about the territory, social organization and human body to endure (Pacheco y Romo 2010) while adapting to the always changing circumstances

Today these communities present different levels of "disarticulation", for most of them everyday life occurs between two worlds (Alderete 2005), the so called modern, urban and impersonal one and the traditional, rural and where the social relations are still crucial for the everyday life. Bonfil (1986) explained that the everyday life *Indigenous* people live reflects the schizophrenia of Mexican society: if the curandero does not heal, they go to the doctor; if that does not work, they go back to their traditional methods...the same in the production of corn, etc.... (Bonfil 1986)

The integration to the market has not implied that *Indigenous* people must leave traditional cultural patterns behind (Bonfil, 1986, Figueroa, 1996, Mares and Peña, 2010). Therefore it is relevant to start by considering the different ways and processes in which traditional communities are articulated with or part of modern societies. Sadly, these ways in most of cases, are disequilibrating or violent, and complicate the dynamics of these communities, aspects that ethnobiology cannot forget (Durand, 2000).

In the present research cultural reproduction will be approached as a dynamic process through which directions of change are delineated. It is a different framework from that of "acculturation," which implies passive attitudes and unidirectional processes. Cultural reproduction denotes the symbolic appropriation and re-elaboration of elements of one's own culture and of other cultures (Castilleja 2009). According to Bonfil (1986) there are three main actions that have allowed the persistence of *Indigenous* cultures: resistance, innovation and appropriation (Bonfil 1986). The UNESCO (2010) in its definition of immaterial cultural heritage has affirmed that the uses, representations, expressions, knowledge and techniques are constantly recreated in relation to the groups' environment, context and history, which gives the heritage a sense of continuity and identity that contributes to promoting respect for cultural diversity and human creativity.

"*México profundo*¹⁰¹... is not a passive, static world, but, rather, one that lives in permanent tension. The peoples of the *México profundo* continually create and re-create their culture, adjust it to changing pressures, and reinforce their own, private sphere of control. They take foreign cultural elements and put them at their service; they cyclically perform the collective acts that are a way of expressing and renewing their own identity. They remain silent or rebel, according to strategies refined by centuries of resistance". Permanent change is far from representing rupture, It is on the contrary a dynamic continuity, Pueblos continue to exist with their own collective identities sustained by the existence of a cultural heritage formed historically and that acquire particular and defined meanings because they is articulated with the cultural matrix of Mesoamerican civilization" (Bonfil 1986: xvii).

Definitely the crisis experienced by *Indigenous* people in relation to their knowledge and practices associated with management of natural resources should not be assumed as a symptom of the annihilation of their cultures and their identities. The adoption of practices and values, even with negative impacts, are part of an active response to the imposition of hegemonic life models; it is about change and the reinterpretation of processes through which the participation in such models is negotiated, at the same time they evaluate the appropriation of new referents. Identities are constantly negotiated and redefined, as well as symbolic referents (Cano et. al 2009). We should not assume that cultures are monolithic; they are constituted by diverse and frequently contradictory versions of the same culture (Boaventura, 2009:146).

I documented a concrete case of how old and new knowledge is integrated into new processes. As described in Chapter IV, the *Comisariado de Bienes Comunales* has established a nursery. The women working there were explaining to me the process that the seeds need so that they germinate. They used to have a forestry engineer advisor from an NGO they were working with, but now they were left without guidance. They said it did not matter anymore, as he has taught them the basics and now they could do it on their own, and that it was better that way, because he was very narrow minded and wanted always to do things in certain way, while they were willing to experiment. For example, he said the seeds should be covered with *ocoxal* for germination, but after he left they tried different methods and discovered that the seeds germinated much faster and the

¹⁰¹ A term widely use among Mexican social scientist to make reference to the deep Indigenous roots of the Mexican nation-state, that are denied and tried to be erased.

percentage of germinated seeds was higher if they were covered with plastic bags instead.

Indigenous people have been able to survive in diverse territories thanks to the refunctionalization of the knowledge they inherited from their ancestors and which has been selected through time. The strength of *Indigenous* people is based on their capacity to link traditional knowledge with the knowledge learned in school, by migrants, and from the mass media. Despite all this, the loss of control over their territories and resources, the displacement of *Indigenous* systems of governance, the effects of globalization and the threats to their natural resources have caused *Indigenous* people to have progressively fewer possibilities to put their knowledge in practice (Pacheco 2010). Regardless, scientists have found that *Indigenous* knowledge can be reproduced, articulated, and employed to resist globalization (Alderete 2005). I deeply agree with Hunn (2008) that it is worth the effort to understand how a modest peasant community could have preserved such rich knowledge despite 480 years of political, economic, religious and cultural colonization by European derived traditions and values. *Indigenous* communities are “in the front lines of the global confrontation in which those who value and would preserve biocultural diversity are on the defensive before the seemingly overwhelming force of the ever-expanding human consumption of resources, land and energy” (Hunn 2008:5).

TEK's variability

The internal variability that exists in the TEK of communities has been largely ignored by researchers, who tend to characterize it as a monolithic entity, while it is in fact rarely homogeneous (Bicker *et. al.*, 2004). Rabey (2005) explains how typically the ethnographers tend to look for the rules that characterize and differentiate the studied group from others. Therefore it has been easy to overlook differences with the result that static patterns are documented. In general anthropology has not been very receptive to the local emergence of new behaviors and ideas; ignoring intra-cultural diversity as a source of and as evidence about endogenous change.

Traditional knowledge as part of the immaterial cultural heritage of populations is collective property; many members of a particular society have contributed to the collective heritage through time. Thus that the knowledge is continually modified and expanded with use and through time (Machuca 2009). Furthermore, not all the members of a community equally share local knowledge, as factors such as age, sex, socioeconomic position and level of transculturation among other factors, have an impact

on the distribution of knowledge within a society (Martínez-Alfaro *et. al.*, 1983). This dynamism makes it difficult to represent it simply (Bicker *et. al.*, 2004).

Traditional Environmental Knowledge is far from static; it is transformed by each generation that selects among the heredity of diverse knowledge. The knowledge is increased based on the new group experiences and their transmission occurred in an oral and practical way. Iks are part of the way of being of the people that possess them. They represent a deep knowledge of nature, its cycles and its manifestations (Pacheco 2010).

It is essential that anthropology start looking at knowledge that does not conform to cultural norms and stop reducing variation to a deviant part of the studied society, embracing in this way one of the main dimensions of cognition: dissension? We need to study how and in which contexts common people build their knowledge ¹⁰² (Rabey, 2005). Intra-cultural and inter-cultural diversity can be the fundamental base for change and for sociocultural evolution (Pelto and Pelto, 1975; Rabey, 2005). Moreover, in the contemporary world it may be impossible to set limits between intra- and inter-cultural processes, due to the intensity of the flux of information and the rate at which people move, both not experienced before. What of the Pjiekakjoo who left the community for years, raised their children in Mexico City, and then came back to the town, bringing with them a whole new set of knowledge and perceptions. Would this be intra- or inter-cultural change/variation?...considering they have as a base the local culture on top of which has been added new perspectives and experiences. The children of this types of family are also a peculiar case, as depending on the age at which they come back they would possess a mixture of knowledge and notions resulting from their time spent in the city or in the U.S. with the knowledge transmitted by their parents, and the new knowledge and perspectives acquired from the peers of their own generation who have grown up in the town. These generations whose life has passed through very different spaces are the living evidence that cultures change, recreate themselves and can still claim to be *Indigenous*; that *Indigenous* communities are complicated, internally diverse and frequently contradictory (Smith 1999). This should force us to leave behind the perspective obsessed with the "authenticity" of *Indigenous* people that conceptualizes these cultures as frozen in time, and that sadly is a very prevalent viewpoint in Mexico. These perspectives besides being outdated are dangerous, as they are linked to notions of institutions having the

¹⁰² Rabey (2005) mentions that "...a preliminary partial exception can be found in the post modernist proposals about the inventive condition of culture (Clifford 1986) as well as the interest in *processual* analysis Rosaldo (1989)".

authority to declare who and/or what is *Indigenous* or not, and therefore who has *Indigenous* rights and who does not.

Through the workshops and interviews I noticed a considerable variability of TEK: firstly, contrasts between the people from San Juan and the people in Teocalcingo; secondly, family level contrasts, and finally generational differences. It is evident that the people of San Juan are not as knowledgeable about Pjiekakjoo culture as the people of Teocalcingo. The few workshops we held with the *delegados* of San Juan and the *comandantes* there demonstrated they no longer know the names in Tlahuica of the plants, animals and mushrooms, but they knew a couple of stories that were not recorded in Teocalcingo. The *delegados* and in general the people of Teocalcingo know more names of organisms in their language and their uses and stories about them.

Teocalcingo people explain these differences, mentioning two factors: 1) The fact that the people from Teocalcingo have not denied their *Indigenous* origin and have worked in the last years to preserve it (for example building the bilingual schools) and 2) the fact that the people of Nativitas dedicate most of their time to commerce in diverse products beyond the community, which leaves little time to spend with their children or in subsistence activities. The people of Teocalcingo also engage in commerce for some products but only for a few days per week. It would be possible also, that as the people from Nativitas goes out of the community for commerce that has modified more their identity. At the family level there is also some variability. For example, some families prefer some names over others, especially in the case of mushrooms. As a consequence each species has two or three local names. Lastly, but no less important, is the innovation in names that the new generations present; they just simply rename some mushrooms or animals if they find a new word that proves more adequate for them. For example, in one of the workshops a girl mentioned a mushrooms called "*manguito*" that no one else knew. After she described it, the elders said that it may be the *Xical* (*Amanita* sp.) because of its color. She was surprised and just said that she and her siblings always called them "*manguitos*" when they went to collect them with her mom, a simple example of how knowledge and names are reinvented, demonstrating human agency Knowledge is a hybrid that mixes community and personal knowledge. For the management of natural resources, collective social knowledge is necessary but it is complemented by individual knowledge based in personal experience (Cruz, 2009). If scientists want to gain a deeper understanding of these complex connections we should not forget that "the inter-cultural does not happen among cultures, but among real people doing real things according to particular cultural

traditions in complex historical connections" (Roth 2007:23 in Castillejas 2009). "These connections allow understanding culture as a complex process through which a person internalizes socially organized practices that are also structured by unequal processes of a differential access to power and wealth" (Castillejas, 2009:21)

The life of these communities does not happen exclusively within the limits of their own culture, and the extent of this varies from one case to another (Bonfil 1986). In the case of the Tlahuicas who have been migrating for decades to Mexico City and the U.S., the quantity of ideas and knowledge to which they have been exposed has certainly contributed to local knowledge. *Indigenous* people develop intercultural relations, but maintain at the same time their cultural and social identity, making possible cultural negotiations with the dominant societies (Alderete 2005).

Intercultural relations are not established exclusively with the dominant society. In the Pjiekakjoo communities there are some cases for example of intercultural marriages that have enriched the local culture. I have registered at least three, two women married with men from the Nativitas barrios, one from Puebla and the other from Hidalgo. By now they have spent more time in their husband's community than where they were born, as they married at an early age. There was also a young Zapotec woman who met a young man in the U.S., but they have separated. In the short time she spent with him and his family, I had the opportunity to witness how the welcoming family was very curious about the ways Zapotec people do things, organize themselves, the food they eat and so on. The other intercultural marriage I learned about is that of a Pjiekakjoo woman who married a Mazateco, and contrary to local customs, they came to live in town, instead of going to live with his family¹⁰³. Cano *et. al.*, (2009) recorded that despite the fact that the Lacandones do not base their traditional therapeutic practice on the use of plants and animals, they recorded the presence of some that the Lacandones have learned how to use from other *Indigenous* groups that live in the region.

It proved very thought-provoking that when I interviewed the woman from Puebla who had been living in San Juan Atzingo for 18 years, she told me of an invertebrate use that no one else had mentioned. When I asked other families about this, they corroborated this use and said they did not think I would find it relevant or interesting??!!!!.....The use was relative to the medicinal properties of the scorpion. She told me that the tail can be removed, and the scorpion made to walk on a sick child's back in order to give him strength. I think it may

¹⁰³ Both Zapotec and Mazatec are ethnic groups from Oaxaca State.

have been easier for her to mention this despite having appropriated much of the life style of the Pjiekakjoo and their beliefs, since she could be safe from people making fun of her as she was not originally from that culture.

These three levels of cognitive process should be considered in ethnobiological research: acquisition, transmission and socialization. Each of these levels takes place at the family, community and extra community levels, which generates a flux of information that is also influenced by other factors, such as the mass media (Gutiérrez-Santillán *et. al.*, 2010).

TEK´ s Transmission

As mentioned in the previous paragraph there are external factors that impact *Indigenous* communities. Modernization processes and changes in life styles demand time and space away from the traditional mechanisms of transmission of knowledge across generations (Lauriola and Moreira 2006). These mechanisms have also been affected by the changes in land tenure and access to natural resources that have separated the people from their environment and altered the internal social organization of the communities (Castilleja 2009). The transmission of knowledge in *Indigenous* communities occurs in different ways, one of the main ones being practice. It is through practice that children are incorporated into communitarian activities and interiorize the way of being characteristic of their social group (Pacheco 2010). In the present research we corroborate this; from all the knowledge recorded it is the ethnomycological that has been least eroded. We attribute this to the fact that children learn and put in practice this knowledge while collecting wild edible mushrooms in the company of their parents and extended family. In contrast we found that it has been the ethnozoological knowledge that is most eroded, this due to the very restrictive regime enforced by the guards of the PROFEPA. In general the use of animals is associated with not respecting the law and therefore of the potential danger of legal problems. The declaration of part of their territory as a National Park plus the ignorance of the people about environmental legislation added to abuses by the police have had negative consequences on the retention of traditional subsistence skills (Ohmagari and Berkes, 1997).

Another example of how state policies have affected the production and reproduction of traditional knowledge is the case of the disappearance of specialized healers. Elders commented that decades ago they used to have different types of healer. For example, there was one specialized in "cleansing" ("*hacer limpias*"); there were also midwives and those specialized in healing broken bones (*sobadas*). Some healers died and had not trained anyone else to continue their practice, and unfortunately those left are afraid of

exercising their traditional practices, as some were not registered in a governmental campaign to “regulate” these practices. To be granted an official ID they had to take some courses and the elders complain that the government did not support them to fulfill the requirements. As a result some of their families told me they know how to heal but that it is very risky for them, as if they make a mistake they could get into legal difficulties.

I consider it urgent to review the legal framework as well as the development projects proposed by the CONANP (Comisión Nacional de Areas Naturals Protegidas) in the region so that they be also oriented not only to make profits but also to help in the preservation of TEK, which can be integrated into plans of management of the local fauna, for example, instead of just prohibiting any use of it.

TEK and Migration

The Pjiekakajoo’s migration and TEK

“...que se cree un sector no solo migrante sino indígena, porque si somos migrantes pero tenemos una cuestión más fuerte que es ser indígena”
(in Velasco, 2003)

The integration of Mexican Indigenous people in the global market has drastically increased in the past two decades with the intensification of their migration to the U.S., a phenomenon that has changed the overall composition of Mexican immigration (Marcelli and Cornelius 2001). Non-Indigenous Mexican migrants are more interested in urban jobs, leaving space at the agricultural labor force market for Indigenous people; Mixtecs, Triques, Zapotecs and Chinantecos were the main groups taking advantage of this situation, and were followed by Nahuas and Pure’pechas (Varese, 2005).

A key factor for a successful migration in the case of Indigenous people has been the personal networks, some of which began at the end of the bracero program¹⁰⁴. The ethnic

¹⁰⁴“Bilateral agreement signed between the U.S. and Mexican governments in 1942 that allowed the entry of “native-born residents of North America, South America, and Central America, and the islands adjacent thereto, desiring to perform agricultural labor in the United States.”Between 1942 and 1964, some 4.6 million Mexicans were admitted to do farm work; many Mexicans returned year after year, but 1 to 2 million gained legal U.S. work experience. The Bracero program was small during the war years. Admissions peaked at 62,000 in 1944, meaning that less than 2 percent of the 4 million U.S. hired workers were Braceros. The wartime Bracero program ended in 1947”.
<http://hnn.us/articles/27336.html>.George Mason University's History News Network. Recorded 29 January 2012.

and regional communitarian networks develop “daughter communities” in the U.S. that are related to the sending communities; these helped reduce the costs of migration and have helped migrants find a job and a place to stay. Indigenous migrants of the first migrations were from the medium and medium high class of their communities as they were people who could count on resources and family support, factors that allowed them to migrate (Varese, 2005).

The percentage of Indigenous people in relation to the total of undocumented Mexicans in the U.S. is unknown. For 1998 it was estimated that there were approximately 130,000 to 250,000 Indigenous people in the US. The geographic areas of major concentration identified then were: California, Oregon, Washington, Texas, Florida, Georgia, the Carolinas, New York, Chicago, Illinois, Iowa, Colorado and even Alaska. The following ethnic groups were found in the U.S. in those years: Pure'pecha, Chinanteco, Mixteco, Zapoteco, Trique, Nahua, Otomi, Yucatec Mayan, Tzeltal, Tzotzil and Mam (Varese, 2005). For several years the highest rates of Indigenous migration were among the Zapotecs and Mixtecs from the state of Oaxaca (Lewin and Gúzman 2003). Their strong presence changed the cultural landscape, giving rise to terms such as *Oaxacalifornia* (Rivera-Salgado 1998), or *mixtecization*, a word referring to the increased presence of Oaxacan people in California's agricultural labor force (Zabin, 1993)¹⁰⁵.

Few studies about Mexican migration to the U.S. have considered the Indigenous factor, (Fox and Rivera-Salgado 2004, Besserer 2003, Barabas 2001, Rivera-Salgado 1999, Kearney 1996, Zabin *et. al.*, (1993); Corbett *et. al.*, (1992); Velasco, 2009). The general trend views Mexican immigrants as a homogeneous group. As a result, the subject of the migration and the permanent settlement of Indigenous people in the U.S. needs more thorough attention¹⁰⁶.

¹⁰⁵ Zabin *et al.*, (1993) reported that Indigenous workers like Mixtecs make up between the 5 and 7% of the agricultural labor force in California. There are as many as 20,000 Zapotecs in the Los Angeles region.

¹⁰⁶ Varese (2005) listed the main cultural differences between Indigenous migrants in comparison with non-Indigenous Mexican migrants: a) They have a specific Indigenous citizenship: with concrete rights and obligations, imprescriptibles [what?] and compulsory, b) The “culture of community” plays an important role of social control that is in competition with the values spread by the “culture of the economic market”, c) In the Indigenous peasant communities of Mexico the resistance and opposition to consolidated forms of socio-economic differentiation is a defined intentional cultural proposal defended in different levels by the community members, d) the income of the families is

It has been documented how in particular Mexican Indigenous immigrants maintain ties with their homeland and community and therefore play a key role in the economic and political processes of their towns of origin. This has been increasingly possible due to new telecommunication technologies that have changed perceptions of space and time, as well as due to the intensity of the flows of money, information, people and goods that takes place through the immigrants' strong communication networks. These networks confront the opposition between attachment and displacement that is part of the view of modernization that envisions the unavoidable destruction of autochthonous community links by global forces (Clifford, 1997). This has not been the case, however, as the distances between people have been reduced, creating a new social field: the transnational community (Portes *et. al.*, 2003). This represents one at their final destinations.

Among the Indigenous transnational communities ethnic identities have reemerged as a response to culturally homogenizing forces and socioeconomic conditions (Valenzuela 2000; Appadurai 1996; Castells 1997, Nagengast 1992, Velasco 2008). This trend challenges the "melting pot" perspective that predicted the assimilation of immigrant cultures into the American mainstream culture (Gutierrez 1996, Portes and Rumbaut 2001). We are witnessing the emergence of new maps, areas of *cultura fronteriza*, populated by strong ethnic and diasporic groups, unevenly assimilated to the dominant nation-states (Clifford 1997). Reactive ethnicities have not only persisted, but these new identities have gone beyond the typical level of the local village and have allowed people from different ethnic groups to join transnational organizations (Nagengast 1990, Hernandez-Díaz 2001, Velasco 2003).

This urban and transnational Indigenous migration is one more of the multiple survival strategies, and it does not necessarily imply the structural abandonment of neither the territory nor a permanent deterritorialization (*desterritorialización*). Appadurai (1996) has

directed to the communitarian institutions of social welfare, e) The whole communitarian system tends to reinforce the ethnic-cultural loyalty, f) as a result of the "culture of community" with its language of locality and of politics of the communitarian space, there is a trend of transnational Indigenous migrants to rebuild their communitarian and ethnic space in the receptor country and g) "They re-discover themselves belonging to a ethnic-linguistic community bigger and encompassing. This conscious and voluntary election of an ethnic-communitarian citizenship gets expressed in a greater organizational capacity and a labor political militancy way more participative than the one of the non Indigenous migrants. This is reflected in transnational organizations such as the FIOB¹⁰⁶ and the Radio Bilingual radio of Fresno, California (Velasco, 2003, 2008).

explained how as groups migrate they regroup in new localities, rebuild their stories and reconfigure their ethnic projects. He claims that groups are no longer tightly territorialized, spatially tied. The symbolic and concrete processes of deterritorialización and reterritorialization seem to have become the axes of the dynamic of cultural reproduction in ethnic and national diasporas. The territory has been globalized by the effect of the intense flows of communication, migration and the multifocality of the life of those who cyclically migrate and who live in several cultural spaces. These processes gave rise to terms such as "re-localization" and "glocalization". The process of migration, displacement, and deterritorialization that immigrants experience challenges the fixed association between identity, culture and place (Gupta and Ferguson, 1997).

According to Varese (2005) there is no evidence that transnational migration is causing the structural-territorial dissolution of the community. The massive migration of Mexican Indigenous people to the U.S. needs to be understood in a national framework. In Mexico globalization has brought reforms that have reduced the "state of well being" (*estado de bienestar social*), there has been a growing pressure for the privatization of the productive infrastructure and of the communal lands (Indigenous communities and *ejidos*), there has been a cancelation of credits for agricultural activities and the detachment of the state from the programs of social development. These resulted in the modification of article 27 of the Mexican constitution which facilitated the commodification (*mercantilización*) of land and communal resources. Despite this, the commodification and rent of Indigenous and peasant lands has not happened as expected. On the contrary, as Varese points out, Indigenous communities have responded to the economic, structural and political changes and pressures that they face by embracing even more their communal property and reaffirming their communal Indigenous citizenship, based in the collective possession of territory and the right of communal jurisdiction over it. This has been the case for the Pijekakajoo. Guided by Ildelfonso Zamora and the *Comisariado de Bienes Comunales* in his struggle to keep control of the community's forest and his appeal to migrants' sense of responsibility and asked for their support. In community general assemblies one family member of each migrant citizen can represent him with power of attorney. Migrants' support is a key factor, as it can make the difference in an assembly vote.

Migration has not led to the abandonment of communitarian responsibilities, as I have mentioned in Chapter II, three of the four new *delegados* were migrants and at least two

of them stayed in the community just to fulfill this duty¹⁰⁷. As migrants cannot fulfill their community work responsibilities, the new delegados established a system, in order to avoid problems with the management of money and as they have to build their *delagación*, they asked them to give construction materials.

It is necessary for anthropological research to approach the mostly overlooked Indigenous component of Mexican migration to the U.S. and to balance the excessive attention that has been given to quantitative economic data about Mexican migration. The scant existing scholarship on Indigenous immigration involves ethnographies of social networks that facilitate migration; community studies of cultural capital and adaptation; ethnographies of ethnicity and identity in political mobilization; and descriptive analyses of demographic and socioeconomic characteristics (Varese, 2005). Despite the growing number of scholarly studies focused on what is called the “Mesoamerican Diaspora” (Kearney 1996, Fox and Rivera-Salgado 2004, Fox 2006, Stephen 2007, Velasco, 2008),¹⁰⁸ the interconnectedness of transnational migration and the environment have barely been explored by the scholars in Migration Studies.

Radel and Schmook (2009) observed how migration affects both rates of deforestation and forest recovery, as it can contribute to the acquisition of more agricultural inputs and a decrease in the rate of chili cultivation. Lee (2008) analyzed the relation between a new migrant source area in Puebla, Mexico and the significant changes this had on human-environment relationships, in particular when a protected area and ecotourism project was established.

Poe (2007) in her work with *pueblos mancomunados* in Oaxaca, Mexico, noted how migration over the past century has produced interesting dynamics for forest resource activities including projects for sustainable development activities developed as the “brainchild” of residents who lived in the United States and since returned. Taylor *et. al.*, (2006) revise how migrants and their remittances affect gender relations, ethnicity, land use, and land distribution in Ixcán, Guatemala. The authors found, in relation to environmental changes, that that social and economic remittances facilitated the conversion of rainforest to cattle pasture and also resulted in the accumulation of land in

¹⁰⁷ González (2001) documented how migrants are called to serve cargos in a Zapotec community, and how those who cannot do it or do not want to serve have to pay someone else to do it for them.

¹⁰⁸ The increasing presence of Indigenous peoples in American society is undeniable and it will be recognized by the U.S. Census Bureau. It will tabulate handwritten entries specifying that the respondent belongs to a Mexican-origin *Indigenous group* (Barbassa and Valdes 2010).

the hands of migrants. These findings indicate that transnationalism can have effects that range from increased pressures for deforestation to sustainable and community-centered development projects.

Few studies have focused on the Traditional Environmental Knowledge (TEK) of Indigenous Mexicans and the way it is transformed and adapted to the multi-sited place-making experience (Peña 2003, Mares and Peña 2010). Mares and Peña (2011) also found that the multiethnic Indigenous farmers of the South Central Farm in Los Angeles adapted agroecological practices from their origin communities to the practices followed in their US-based urban community gardens. This included polyculture and companion planting systems, permaculture practices like the preference for edible fencing (using cactus, sugarcane, banana trees, etc.), seed saving and exchange practices, biodynamic soil management, and the use of ethnobotanical remedies; all of these are indicative of the persistence of TEK in transnational migratory context. Also, they reported that the SCF was managed on the basis of communitary norms and the general assembly form of self-governance. In other words, the farmers of the Mesoamerican Diaspora, as Devon Peña told me, “are bringing their biotic, cultural, and politico-organizational baggage” to the USA (in a personal communication, August 2009). This suggests that research on TEK and migration can yield rich and significant results and that future study of bi-national development and Indigenous migration must not ignore TEK as a form of social or cultural capital. This has implications for my own study of Pjiekakjoo TEK.

It is possible to propose this research framework, since despite the post-modern analysis of the middle of the 1980’s that predicted that the expansion of globalization, a “logical consequence” of late capitalism, would lead to an erosion of popular culture and politics of territoriality, the opposite has occurred in several occasions. Ethnic identities have been redefined and more interest has been paid to the conservation of Indigenous cultural heritage, part of which is embodied in the impressive amount of Traditional Environmental Knowledge (TEK). Nevertheless, there is growing concern over the fate of Indigenous knowledge in the post-migration era. TEK was once essential for the survival of subsistence-based communities, but today entire Indigenous towns live on remittances. Thus, the practical value of TEK has decreased as it is no longer indispensable for people’s livelihood strategies. Some researchers have expressed concern that this valuable knowledge may be lost (Antweiler, 1998; Benz *et. al.*, 2000; Brodt 2001; Kirsch 2001; Nazarea 1999). Yet, on the other hand, some studies have emphasized the relevant symbolic value of TEK and the essential resource that it embodies (Hunn 2002; Hunn *et. al.*, 2003).

This investigation follows the lead of McGuire (2001) and Bade (2004), who employed multi-sited ethnographic research to document the crucial role that ethnobotanical knowledge plays in the health practices of immigrant Mixtecs in California.

Greenberg (2003) found TEK persisted among internal migrant Maya women through their polyculture kitchen gardens in Yucatan. Mares and Peña (2010) studied the urban polyculture *milpas* – ethnically distinctive community gardens – in Los Angeles and Seattle, and called these, drawing on Gonzalez (1995), autotopographies, living memory landscapes of places left behind in Mexico. The authors found that Indigenous diaspora farmers reproduce the home kitchen garden by transplanting the seeds and agroecological practices of their homelands. In contrast, Volpato *et. al.* (2009) conducted an ethnobotanical study among Haitian immigrants in the province of Camagüey, Cuba and found changes and adaptations of the knowledge as a result of their emigration and integration into the new society. They concluded that traditional knowledge is rapidly disappearing due to integration (assimilation) and urbanization. Pieroni and Vanderbroek (2007), agreeing with Volpato *et. al.*, (2009), emphasize the lack of information available about ethnobotanical knowledge in the society of origin, which makes comparison more difficult, especially between rural tropical forest locales and temperate cities where people have settled. Therefore their research is limited because it lacks a baseline to compare the dynamics of TEK *in situ* (immigrants' countries of origin) and *ex situ* (immigrants' host countries).

However, today it is possible to find some information about the ethnobiology and ethnopharmacology of migrant communities in urban settings (Balick *et al.*, 2000; Pieroni *et. al.*, 2005; Johnson *et. al.*, 2006; Waldstein 2006). It is undeniable that people crossing borders do not go “brain dead” [sic] and instead bring along their own cultural practices, beliefs, and artifacts including TEK.¹⁰⁹

TEK is continually transformed, is highly adaptive, and remains essential to the preservation of Pjiekakjoo's autonomy in their native homeland and to the survival of their livelihood and communal forests. These forests are tragically threatened by current social, political and environmental conditions. I have found that despite migration and increased reliance on remittances, TEK still plays a role in the livelihood of the Pjiekakjoo, as most of the families practice multiple use of the forest including consumption of wood, fodder, insects, birds,

¹⁰⁹ I thank Professor Devon Peña for welcoming and supporting my ideas in this topic as far back as 2003. I agree with his argument that Indigenous trans-migrants bring not just their biotic, cultural, and political “baggage”, they also bring their “cognitive mapping” abilities.

and edible and medicinal wild plants and mushrooms. For example, I have recorded more than 80 species of edible mushrooms that in the rainy season represent the main income of at least 20% of the families of Teocalcingo. Most of the families in fact, practice multiple use of natural resources, such as: wood, birds, and edible and medicinal wild plants, among others. It has been decades since Tlahuicas were first incorporated into the market economy, but they have done so according to their own cultural patterns. They have been migrating to Mexico City and the US for decades but they have been able to keep their communal organization, their annual calendar of festivities and their relation with the forest.

The present study is pioneering in exploring the relation between international migration and Traditional Environmental Knowledge. This is of particular relevance, as most Mexican ethnobiological research has used the framework of place-bound communities or local cultures and this does not correspond to the reality that Indigenous people are experiencing as they become deterritorialized. This notion challenges the traditional definition of TEK based in observations within a restricted geographic scope (Toledo, 2003). Bicker *et. al.*, (2004) consider the locally situated character of TEK one of its weaknesses. In the present research we present some evidence that TEK is no longer so locally restricted, in a world that has shrunk thanks to modern telecommunications. The changes Indigenous Knowledges is experiencing in cases involving transnational place-making must now be examined (Peña 2003).

The perseverance of Indigenous knowledge in the globalization era challenges the "...direct relationship between the expansion of knowledge, the expansion of trade and the expansion of the empire" (Smith, 1999: 88). It is undeniable that at least some colonizing relationships continue, labeled now as globalization, the expansion of economic opportunities and "the market". Contrary to what was affirmed in the 1970's and 1980's, that migration implied a process of *proletarianization* of the rural sectors of Mexico, it has been precisely migration and the remittances of migrants that has allowed some sectors of Indigenous communities to maintain a relation with nature that is an expression of their *cosmovisión* and ethnic identity (Rivermar, 2004).

In Mexico, Native (ethnic and place-based) cultures are still very prevalent, but we must counter the idea that they live in isolated places beyond the reach of modernity, when instead they have been involved in the world economy very actively and are living just around the corner from cosmopolitan cities. This challenges the traditional labels that tend to impose static ideas around concepts like Indigenous, peasant, migrant, etc (Kearney

1996). Transnationalism does not always spell the death of Indigenous culture and knowledge systems; people change, but they do not have to “die”.

A better understanding of the phenomena of the migration of Indigenous people will realize benefits for both the receiving and sending countries. There are structural and procedural conditions in place in these communities to take advantage of diversity and face the challenges that this movement of people implies for individuals, families and the regions they come from as well as the places where they are going (Pieroni and Vanderbroek 2007).

Transnational Pjiekakjoo Knowledge

“What stays the same even when you travel? A lot. But its significance may differ with each new conjuncture.”

“What is brought from a prior place? And how is it both maintained and transformed by the new environment?”

(Clifford, 1997:44)

There is some evidence that Pjiekakjoo environmental knowledge has become transnational. Some migrants reported how certain traditional healing practices are performed in the U.S. I will in briefly mention them.

Pjiekakjoo migrants consume some teas they used to consume in Mexico. They do not take seeds with them, as most of them cross the border illegally, but many familiar medicinal herbs can be found at Mexican stores in the U.S.

One migrant related an interesting anecdote that exemplifies the dialectical relation among different worldviews. Once someone made his boss very angry and that the boss started feeling a pain. The migrant told him to drink an *ajenjo* (*Artemisia absinthium*) tea, and prepared it for him, who was surprised that the pain disappeared. The migrant really liked this story, as it showed that migrants have something valuable to teach and share with the “Americans” people.

Another healing practice still very common among migrants is to place parts of certain plants on a child’s temple, this are used when it is believed that the children have their “head open”, so you can see them to play around with their “parches”.

This dialectical relation may exist not only between the dominant society and Indigenous groups, but also among different Indigenous migrants. For example, when a Pjiekakjoo worker hurt his leg falling off a stair, he was taken to a Mixtec healer who healed him. Research is needed here as these interactions take place not only north of the border but also in the community itself, as there are interethnic marriages, I learned of at least four: one Hña Hñu woman, one Zapotec and another from Puebla, married to Pjiekakjoo men, and a Mazatec man married to a Pjiekakjoo woman.

Another place where inter-ethnic interactions are happening is the Intercultural University of Mexico State (UIEM), an important option for students. Most of its student population is Indigenous.

Interactions among the knowledge of different ethnic groups offer a whole sphere of research that has not still very common approached and that could be very significant. Cano *et. al.*, (2009) documented that though Lacandones did not base their traditional therapeutic practice on the use of plants and animals, they have learned from other Indigenous groups that live in the region to identify and use some.

To these local interactions we should add those of the families that have migrated to cities such as México, Cuernavaca or Toluca, and even some introduced by commerce. There are sellers of medicinal plants and traditional remedies who come to town from time to time. As Rabey (2005) asserted:

“Each family when they move to a different place, they bring a stock of knowledge with them to the new place, where there are already a diversity of practices, some developed locally and others come from the place of origin. In all cases people tested their knowledge through intentional experiments”.

Clifford (1997) affirms that while traveling people acquire complex knowledge, histories, political and intercultural perceptions, Durand (2008) approaches this issue in relation to how environmental perspectives are carried by individuals who move within a geographical spectrum in which the social, cultural and economic context is transformed. These concepts are also applicable to knowledge. Environmental perspectives, as well as TEK, may be maintained as a cultural element without being anchored to a particular place or belonging exclusively to a single cultural identity or group, as they may move with people across geographical and cultural space as a consequence of globalization.

One of the best examples I have of this among the Pjiekakjoo was narrated by a *delegado* and by some *comandantes* as well. They remembered noticing some mushrooms while working in California one rainy season. After they finished their work they decided to collect some that they recognized as edible, as they appeared to be the same or very similar to those they eat back in Mexico. There were a lot of them, as local people do not collect them. The other workers and their boss tried to discourage them, saying they would get sick if they ate those mushrooms. They just laughed. How ignorant could they be about such a familiar resource and how happy they were that the others did not want the mushrooms so they could eat them all. They say that though many are the same, others that look very similar are not the same. They applied the same criteria they apply for those of their home forest: a) they observed if they have been eaten by animals, because if animals eat them, then they can be considered edible, and 2) they cook them with garlic. If they changed color, the mushrooms were not edible.

Just as some concepts are taken to the U.S., other are learned in the U.S. In discussing the *chincolo* (*Microtus mexicanus mexicanus*), before I knew the species, I asked if it was a shrew. They categorically denied it, as they have seen shrews at "the *gabacho*" (U.S.) running very close to the ground (*al ras del suelo*).

The constant change that Pjiekakjoo knowledges experience is undeniable, and the challenge that it represents for researchers as a source of variability is greater than is normally recognized. As Martínez-Alfaro *et. al.*, (1983) one of the main ethnobiological researchers in Mexico asserted, the level of traditional knowledge varies according to age, sex, socioeconomic position and level of transculturation, to which I would add other variables such as schooling and migratory experience. This is caused at least partially by what Castillejas (2009) defined as gaps between how one acquires knowledge and practice. On the one hand there is local knowledge that is practical and transmitted in an informal way, and on the other, knowledge of a more general and abstract character that is not necessarily integrated into everyday life and that responds to parameters regulated by public institutions. It occurs between them, a rationalities de-encounter, The same happens to Indigenous people who attend the university and those who, due to their national or international migratory experience, have had access to other forms of knowing.

How Indigenous knowledge is changing should be carefully analyzed; but change does not mean the death of Indigenous cultures. The adoption of foreign practices and values, even with their negative impact, does not imply a passive response by Indigenous people to the impositions of hegemonic life models. Instead it is about dynamic changes, re-

interpretative processes through which people negotiate their participation in such models and appropriate other frameworks (Cano et. al 2009). Escobar (1995) and Canclini (1990) have studied the hybridization process taking place in Latin America, and conceptualize them as a means to alterity and cultural affirmation. Escobar asserts that hybridization is:

“A way of crossing the boundary between the traditional and the modern and of using both local and transnational cultural resources to create unique collective identities. Cultural hybridization involves complex processes of identity production in transnationalized environments where the local nevertheless retains significant vitality”
(Escobar, 1999:13)

I consider this defines the process that the Pjiekakjoo create and recreate in their everyday lives.

The Pjiekakjoo have adopted migration as one of their survival strategies. Their communities are transnational, with complex connections, not only at the international level, but also at the regional and national scales. This has been facilitated and intensified by the technological development that are now available.

Pjiekakjoo Knowledge is in a constant state of production, reproduction, and adaptation to the always changing circumstances their owners face. These dynamics have not been studied thoroughly, but should be in order to obtain a deeper comprehension of the cultural heritage that this knowledge represents.

The information obtained in this research with respect to the interaction between migration and Pjiekakjoo knowledge does not allow us to draw definitive conclusions, but it does place this knowledge in a wider context than is typically the case.

There are clear tendencies, such as the erosion of Pjiekakjoo language and the intergenerational gap that is not necessarily or exclusively due to migration.

The Pjiekakjoo migratory experience is useful for exploring the dynamism of Pjiekakjoo knowledge, along with other variables such as intra-community variability, inter-ethnic interactions, the impact of formal education and of new technologies, all of which should be carefully analyzed.

The present research is a first step on a long road to more detailed research that will allow us a better understanding of the Pjiekakjoo transnational lives, their present and possible futures.

A Model of Pjiekakjoo Knowledge Dynamics

In trying to understand in a more exact way what is happening with Pjiekakjoo TEK I conducted some quantitative interviews (20) with the help of a Powerpoint presentation. I included people of different ages, genders and those with and without migratory experience. Due to the small number of interviews I cannot draw definitive conclusions, but some tendencies were clearly observed (See Figure 93).

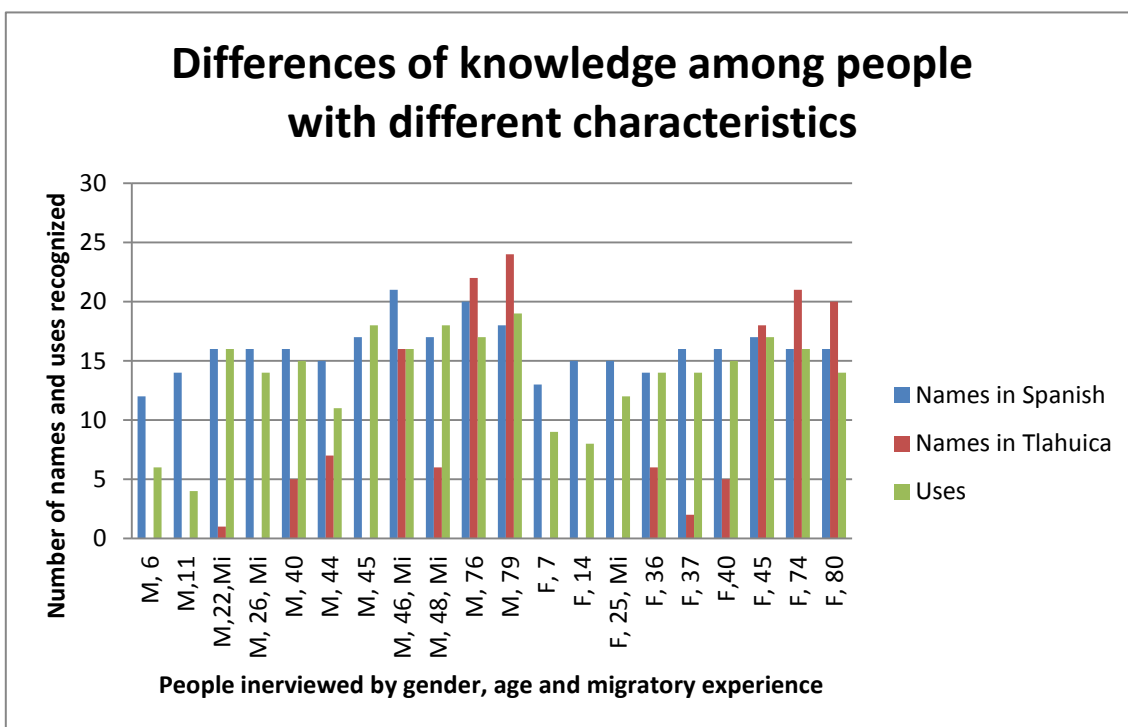


Figure 93. Chart that shows the results from the quantitative interviews, considering people's age, gender (M or F) and migratory experience (Mi).

One of the most evident issues is the erosion of Pjiekakjoo vocabulary among the younger generations, there is a drastic difference between elders and younger people. Adults in their 30s still remembered some Pjiekakjoo vocabulary but teenagers and children know little if any of it. The average number of Pjiekakjoo names known in this sample is 7.6, despite the fact that the elders know as many as 22 to 24 names. None of the children and

teenagers interviewed knew any, to which group we can add some young adults of 25 to 26 years of age.

It is notable that this contrast does not exist with respect to the number of names known in Spanish. Here the average number of names known is 16, with the highest 21 and the lowest 12. Knowledge about uses is more evenly distributed than knowledge of Pjiekakjoo names but is more sharply contrasting than the number of names known in Spanish. The average number of uses known is 13.6; the highest number of uses is 18, the lowest 4).

In this small sample, the migratory experience variable was not a determinant of the amount of knowledge known. One male migrant possessed knowledge comparable to that of the most knowledgeable elder. Hunn (pers. comm.) observed that in San Lucas Quiaviní, a Zapotec community in the Valley of Oaxaca with high rates of migration, migration did not appear to seriously impact ethnobotanical knowledge so long as the people normally migrated at an age beyond that at which they learn the most, i.e., after about age 10. This seems to have been the case for at least some of the Teocalcingo migrants, notably the older ones (age 46 to 48). The younger migrants recognized a good number of names in Spanish and uses, but not the names in Pjiekakjoo. More than the migratory experience, it seems that the intergenerational change variable is determining the erosion of Pjiekakjoo names (but not necessarily knowledge of uses).

More research must be done, with a representative sample, so that tendencies with regard to the conservation or erosion of animal and plant names in Spanish and in Pjiekakjoo as well as knowledge of their uses can be determined. I did not find any evidence of the precocious acquisition of TEK in children that Hunn (2008) found among the Zapotecs of San Juan Gbëë. The children interviewed showed the lowest numbers of names as well as uses recognized, followed by teenagers¹¹⁰. So in Teocalcingo it seems the acquisition of TEK may be more a gradual process that can be interrupted when people migrate at young ages or that the intergenerational transmission process has already be seriously compromised, irrespective of migration. For the migrants interviewed, those who showed the greater knowledge were those who migrated at an older age (after their 20s), while the younger ones migrated as teenagers (a 16 year-old boy and a 14 year-old girl). The big question that remains unanswered is to what extent is TEK retained by the Pjiekakjoo diaspora generation those who have been and are being raised abroad. It has been documented that oral traditions can be transmitted with a certain continuity across several

¹¹⁰This was also observed beyond the quantitative interviews, during the workshops.

generations when there is a territorial base to organize memories. But it also has been shown that diasporic experiences, such as the afrocaribbean, also show a certain levels of continuity, diverse levels of what seems a collective memory (Clifford 1997). We need to investigate if this collective biocultural memory (Toledo and Barrera-Bassols, 2008) survives in the youngest generations of Pjiekakjoo who live beyond the limits of the original communities. One possibility for this was embodied in children from two families who despite having been born and raised in the U.S. were sent back to their grandparents' home during the holidays so they could spend time with the rest of the family. The adaptation of these children is frequently difficult, but I have also seen them learning from their cousins about insects or how to collect wild edible mushrooms.

I included one image of a bird with audio of the bird singing to see how many people would recognize the "*gallina de monte*" (Long-tailed Wood-Partridge): 16 of 20 recognized this bird. This suggests the extent to which people retain contact with the forest, as you have to spend some time in the forest and listen carefully to learn to distinguish bird songs. It seems, then that Pjiekakjoo are still paying attention sufficient to learn this type of TEK.

In a brief analysis of the survey by category there are a few relevant points I will mention. The best recognized category by far, was corn, a pillar of Mesoamerican cultures. Everybody knew corn, but not often the names for the different types of corn, neither in Pjiekakjoo nor in Spanish. I found this worrisome, as this may reflect a lack of interest in knowing how to preserve their agrodiversity which is highly threatened by certain government policies and the interests of transnational companies who promote the use of improved seeds which may in the future include the widespread use of genetically modified organisms.

As the images presented were organized by group of living beings (mammals, birds, amphibians and reptiles, plants and mushrooms) it was possible to identify the best recognized group, and that was the fungi, in which people made fewer mistakes in naming and in which it was more common to find that people knew their names in Pjiekakjoo. Mushrooms have great commercial importance for several families, and as was mentioned in chapter VI, while collecting mushrooms the younger generation has an opportunity to learn about them as well as about forest plants and animals. I can assert that the mechanism for the reproduction of knowledge is guaranteed due to this process. In this sense it is relevant to mention that mushrooms are the only natural resource that people have open access to it. For other resources people may need a permit from the Comisariado de Bienes Comunales (e.g., for wood, *perilla* (*Symphoricarpos microphyllus*),

"*tierra de monte*", mosses) and others are totally banned (all type of animals for hunting). In this regard public policies directly affect the production and reproduction of TEK, as parents no longer teach their children how to hunt animals, nor which animals are edible and which are not, or which may be used as medicines. Some people may still make use of them, but there is a great deal of stigma associated with it, as capturing, hunting, and eating animals is now and has for some years been illegal since the declaration of the Park (1936).

Beyond the illegality issues, I hypothesize that TEK is also transmitted or not according to its relevance for everyday life in the community. I believe that this is something that must be explored in detail. This would be something very difficult to define, as I am not thinking exclusively in practical or utilitarian terms, as I consider the emotional and religious factors also to be essential in the everyday life of the community. I noticed that if some knowledge is eroding, as is the Pjiekakjoo vocabulary, there are other elements of knowledge that are present even at a very early age (something that is not common in the Pjiekakjoo communities in contrast with the Zapotec studied by Hunn (2008)). I noticed this with the example of the belief associated with the Phasmatodea/Mantodea (walking stick and praying mantis) which affirms that if cattle eat them, the animals die. So knowledge associated with such a life and death matter is mastered by children at a very young age, what is logical. I did not find any boy or girl who did not know that the *capulina* (black widow spider, *Latrodectus* sp.) is poisonous. A task left would be to determine to what extent the most common non-utilitarian knowledge about animals is still recognized.

If we assume that TEK is always continuously changing, being produced and reproduced across generations, there would be no alarm about its erosion. But I do not think this is necessarily the case. While it is certain that TEK has not been and will not be static, it is also true that diverse factors of globalization are causing these changes to occur more rapidly than ever before. For example, the relation of the mass media to TEK has not been explored as to when it is determinant in local communities, and as communications experts affirm the mass media promotes culturally homogenous products of urban-industrial origin. It would be fascinating to compare the younger generation's perceptions of their cultural heritage before and after being exposed to TV, for example. This may be possible in a place like San Juan Gbëë, where Hunn (2008) found the precocious acquisition of knowledge, but this was in the pre-TV era....But TV has now arrived in San Juan, and after just one year the changes were apparent, parents complaining about their children not

wanting to take care of the animals or the younger girls wanting to change how they dressed.

The new communication technologies are of very different nature and therefore their impact on Indigenous cultures is of a different character. The last phenomenon related to this issue is how Pjiekakjoo teenagers might use facebook. This tool can be used as they decide and the immediacy of the communication with the members of the community that are far away is just overwhelming. People used to complain of the speed at which gossip traveled from one side to the border to the other and to other communities in the region, such as Cuernavaca or Mexico City, now it travels even faster, despite the Pjiekakjoo not yet having public access to internet in their communities (see Chapter Two). Beyond gossip, some high school students attending our workshops spoke about creating a web/facebook page for the new delegation of Teocalcingo, where among other things we could show the TEK we have recorded. This is one of the projects for the medium term we hope will be developed.

We cannot and do not want to keep communities isolated, rather we should want the younger generations to be able to choose from their heritage which elements to conserve and which to dismiss. I would like to work with them to make these decisions conscious and well informed decisions, at least in relation to the part of the Indigenous cultural heritage with which I work, their Environmental Knowledge.

Modernization and change in the Pjiekakjoo communities

Mora (1989) mentioned a few studies done in San Juan Atzingo that report on the cultural changes occurring, and that the community was undergoing a "modernization" process, as Mexico was experimenting with the penetration of capitalist ideology. She identified the 1970s as when it started penetrating San Juan Atzingo and that in her opinion the Indigenous communities disintegrate in the face of urbanization process, as they suffer an ideological change through acculturation processes that the dominant culture manipulates.

The notion that Indigenous people were passive agents has since been left behind¹¹¹. Clifford (1997) proposed the concept of *translocal culture* (not global nor universal), and recognizes other theoretical paradigms that explicitly articulate the local and the global, starting with the first historic contacts and including the complexity of the interactions at

¹¹¹ As those of acculturation and syncretism.

different levels: the “five visions” of Appadurai (1996), the “hybrid cultures” of Tijuana of García Canclini (1990) and Tsing’s (1999) “place outside the way.”

Currently more agency is granted them. Some studies have shown how some elements may be adopted and displace those of one’s own culture, while others are adapted to the proper cultural terms of each group. Instead of the extreme proposal that Indigenous people as very conservative or are losing their culture and are being assimilated, I have found that migrants and Pjiekakjoo in general often function somewhere in between these two, in a liminal state, depending on the dynamics they face as they negotiate with their host cultural context. I will approach Pjiekakjoo’s “resilience” at ecological and cultural edges (Turner et. al 2003), that allow them to strengthen their cultural identity.

Introducing the issue of migration in my research on TEK allowed me to appreciate its multiple external conditions. I aim to situate Indigenous cultures in the socioeconomic and cultural conditions in which they live in the present day.

Clifford (1997) states that the wider global world of intercultural importation-exportation in which the ethnographic encounter is always immersed stays hidden. He sharply criticized the classic exoticizing anthropological and orientalist search for “pure” traditions and for clear cultural differences. He affirms that intercultural connection is the norm and has been for a long time. Today, in the XXI century, cultures and identities have to face to an unprecedented degree, local and transnational forces. The cultural action, the configuration and reconfiguration of identities, happens in the contact zones, following the intercultural borders of nations, villages and places (Clifford 1997).

These changes are frequently ignored by academicians who conceptualize Indigenous cultures in a romantic way. I have found the more realistic perspective to be more hopeful than the romantic one, which, in the face of processes such as the globalization, tends to be deeply pessimistic, proclaiming the disappearance of cultures. Mora (1989) even included in the title of her work that the Tlahuica was a culture in extinction. In her conclusions she describes the struggle that people face between tradition and the modern world and its values, between preserving what the ancestors left and the wish to be “civilized”. Today, 22 years later, I am pleased to witness that the culture is still alive and reproducing itself, though of course changing, facing intense pressures but surviving.

Some of the young people Mora complained about wanting to be ahistorical, are now adults serving in *mayordomías*, becoming *compadres*, being *delegados*, fulfilling their duties as *comandantes*, etc. I found it difficult to talk about Pjiekakjoo people as if they were a homogeneous group, another problem frequently found in the ethnographies, essentializing the people. I am sure that some youths wanted to be civilized, to have economic progress, and have left behind some or many of the traditional beliefs and values. But there are also those who wanted to be civilized at some point, but then later changed their minds or who were always proud of their cultural heritage. This is the case with the first *delegados* of La Loma de Teocalcingo and their *comandantes* and team in general. So the struggle goes on... between individualism and capitalist consumption and communal solidarity and the protection of the forest.

Indigenous knowledges and the Future

Scholars have found evidence that Traditional Environmental Knowledge is being eroded on the one hand, and on the other it has acquired new meanings and symbolic value. One of the main questions left is, "What knowledge is important to people to ensure their physical, psychological, cultural and spiritual survival, and what fundamental truths inform that choice and sustain cultural identity?" (Bicker, *et. al.*, 2004). Assuming TEK is part of the identity of *Indigenous* peoples we can also pose these questions: Which elements are deep and which ones are superficial? Which central and which peripheral? Which are good for travelling and which for residence? How do these elements interact in dialogue and tension? (Clifford 1999).

Durand (2000) some years ago was already putting on the table questions such as: How do communities integrate their traditional knowledge to the new knowledge acquired through their interaction with modern society? How is this knowledge modified? What of the modern is most easily assimilated? What of the traditional has more resistance to change? Which elements facilitate or complicate this transition? How are those elements chosen and evaluated? Which techniques or knowledge are considered the most convenient to apply in a certain moment? The author affirms that to answer this it is necessary to consider cultural elements related to knowledge and the use of the environment as dynamic and exposed to continuous change.

As Professor Harrell (pers. Comm) said: we should step away from the idea that TEK either survives or disappears with migration. It is pretty certain that it diminishes somewhat. The

interesting problem is to determine which parts of it remain strong, which weaken, and which disappear.

Conclusions

The recognition of the variability of TEK and its study is one of the most important challenges that ethnobiologists have to face, a more detailed study of how variables such as age, gender, schooling, occupation and migratory experience impact the quality of the TEK held by individuals is one of the main research projects that needs to be developed once the documentation of TEK has been done. The better comprehension of TEK dynamics would allow designing policies for the conservation of this heritage *in situ*.

The promotion of intercultural education is essential in Mexico, as it is one of the countries with major biocultural diversity.

The Pjiekakjoo migratory experience of some of the individuals with whom I collaborated, indicates that instead eroding TEK, this experience may enhance its conservation, as the migrants showed a particular awareness about the importance of their culture and they showed interest and commitment for the documentation of TEK.

TEK needs to be approached as the dynamic system that is, in continuous change and adaptation.

I have hope in the future, despite the rates of destruction of the forest and/or migration of the Pjiekakjoo; they retain concepts and beliefs that have survived for centuries and that still dictate/guide/inform social and individual behavior. I hope modern urban Mexican society will be able to learn from some of the cultural richness that this ethnic group has to offer.

".....perhaps it is ethnobiology's mission to document "primitive peoples" in their tight environmental embrace while there is still time, but only if we understand "primitive" as neither a pejorative epithet for the resolutely backward nor our fascination with "primitive peoples" as implying a naïve romanticism for a vanished past, but to the contrary as indicative of our fierce commitment to resist the final triumph of global capitalism".
Hunn 2007

VIII. Culture and the Conservation and Management of Natural Resources: Where is the biocultural approach?

Chapter VIII demonstrates the lack of coordination that exists commonly between the academic world and the public policies. While in the former the concept of biocultural diversity has been broadly accepted, discussed and applied; its use for the design of public policies it is far from being real. Through the exploration of the public policies around the Zempoala Lagoons National park, I demonstrated that this is one example of the above explained. As part of the context in which the heirs of CIK live, I have also addressed some of the most important actors in the region related to the environment topic in addition to the potential implications that their presence and interest of these actors may have for the Pjiekakjoo people. Lastly, I give the general framework, in which I situated this research, that is the "New rationality" proposed by De Sousa (2009).

"Indigenous peoples remain on the margins of society: they are poorer, less educated, die at a younger age, are much more likely to commit suicide, and are generally in worse health than the rest of the population".

(IWGIA, 2006)

All around the world it has been observed that the Indigenous people are in a condition of disadvantage in comparison to other sectors of the societies. There is a complex historical link between Indigenous people and poverty, influenced by political, economical, social and environmental factors (Cimadamore *et. al.*, 2006). The International Working Group on Indigenous Affairs of the UN has recognized that the Indigenous People do not have the same opportunity to have access to employment, public and health services, as well as to the justice system¹¹² (Daes, 2000). The lack of participation of Indigenous people in the

¹¹² At the regional level it has been developed the Sistema de Indicadores Sociodemográfico

de Poblaciones y Pueblos Indígenas de América Latina – SISPP, by the CEPAL (Economic Commission for Latin America and the Caribbean); CELADE (Latin American and Caribbean Demographic Centre Population Division). For México it exists the Informe sobre Desarrollo Humano de los Pueblos Indígenas. El reto de la desigualdad de oportunidades. Programa de las Naciones Unidas para el Desarrollo (PNUD):

http://www.cdi.gob.mx/dmdocuments/idh_pueblos_indigenas_mexico_2010.pdf. Recuperated 9 March 2012.

political life and in the governmental process that take decisions that affect them, has been as well documented (Martínez, 1986). While considering this data we should also be careful and critical as some standards that are used to measure the well being of population are frequently considered neither inclusive nor reliable by Indigenous People that have been demanding the development of indicators that reflect their living conditions in a more realistic manner (Rodríguez *et. al.*, 2008).

I have fought the paternalistic/patronizing vision about the Indigenous People that picture them as "poor people" that needs help. The present research is an effort to show how this "poor people" may face hard material conditions but are at the same time the heirs of an immense cultural heritage. This does not preclude the fact of recognizing the necessity to improve their life quality in some cases more urgent than in others.

One of the main risks they are facing nowadays is the destruction of their habitat, which is the source of spiritual and material survival, plus the acculturation processes that put in danger humanity's biocultural diversity (Alderete 2005). Unfortunately, there is more information about the habitats of Indigenous people than about the people themselves. The Pjiekakjoo's case is a good example of this; if you look on the web or even at academic publications, there has been considerably more research about the biological components of the NPZL than about Pjiekakjoo's culture as I will show in the next section.

Neglecting Culture

When I started looking for information on the internet about the region, something immediately called my attention. The Indigenous presence and the entire heritage that the Pjiekakjoo culture represents were neglected.

I will briefly comment on the information that is presented in some of the websites related to the NPZL: a, b) two websites about the Chichinautzin Biological Corridor, one from the Morelos State University (UAEM) and other from the CONANP, c) one on the Morelos State System of Natural Protected Areas, d) The Green World Campaign and d) The Communitarian Tlahuica Ecotourism¹¹³ web site

¹¹³ a) <http://www.cib.uaem.mx/chichinautzin/medio/biotico/biotico.htm>, b) <http://chichinautzin.conanp.gob.mx/index.php>.

The three websites focused on the Corridor (a, b and c) did not acknowledge the presence of the Pjiekakjoo culture in the region. Those of the CONANP and the UAEM are based in the same information that considers only the state of Morelos, leaving outside all the information about the NPZL. The CONANP website, in the section about vulnerable groups, do mention the presence of Indigenous populations, but only of the Nahuatl speakers. On the same webpage under the section titled "What do we do?" Indigenous groups are mentioned, but in the abstract as they never mention who they are. Their discourse is based on the principle of respect for Indigenous people and the organization of activities about the management and use of natural resources in a sustainable way by these groups. The actions they mention include the socialization of the Biological Diversity Agreement. Alternatives of sustainable development are promoted so that these communities would achieve an integral and solid development. Finally, the importances of environmental services that the ecosystems provide are taught as a way to see the possibility of gaining payments from the government¹¹⁴ for the environmental services (*pago de los servicios ambientales*). Naturalia A.C. made a video¹¹⁵ about the situation of illegal logging in San Juan Atzingo. Again, the fact that this is happening in an Indigenous community is totally neglected.

In these websites and video there is not one mention of the basic concept of Biocultural diversity, neither of the importance and richness of the Pjiekakjoo culture and its deep and ancestral relation with the environment that they are obsessed with describing and conserving.

The Green World campaign, does mention that their work is being develop in the last Tlahuica speaking village in the world that has been living in the region since 1000 A.D., and they focus in their objective that was the one of producing 1 million trees annually for reforestation and as a way of creating an ecological sound livelihood.

Finally, the webpage about the Tlahuica Communitarian Ecotourism project obviously mentions they are Tlahuicas, and provides a brief explanation of their customs. This is the minimum I would expect for a project that in as part of its name recognized as Tlahuica

c) http://www.ceamamorelos.gob.mx/secciones/ambiente/a_nat_protegidas/aprotegidas/Paginas/Zempoala.htm,

d) <http://greenworld.org/where-we-work/mexico> and e) <http://www.ecoturismotlahuica.com/>

¹¹⁴ For details see: <http://www.conanp.gob.mx/acciones/programa.php>

¹¹⁵ *Talamontes y violencia en San Juan Atzingo* in Youtube.

affiliated. Nonetheless, though the ethnic group is acknowledged, their Traditional Knowledge is not. In the section on Ecotourism they have a section on Environmental Interpretation, which they mention is a way of sharing their knowledge. I would like to call this “biocultural interpretation,” and I would like to see this, even under the environmental interpretation label, reflected in the site, but this does not happen. There is a description of some of the most relevant biotic elements of the NPZL, but no link to their Traditional Knowledge about those organisms, no Tlahuica names, no stories, no uses. They do have the scientific names in Latin. What makes a Project of Communitarian Ecotourism Tlahuican or not?

This neglect of the cultural diversity in the NPZL should not be surprising, as the Board of the Biological Corridor Chichinautzin includes no one with a social scientist profile. There are just economists, biologists and engineers.



Figure 94 Example of a sign at the Zempoala Lagoons National Park, in which it can be appreciated that the biocultural approach was not used.

It is noticeable that the website of the Biological Corridor does not have a link to nor mentions the Tlahuica Communitarian Ecotourism project. On the CONANP website there is a section about Tourism but it is about Morelos State Route of the Convents. About the NPZL they have a technical description, in which again, there is no mention of the Pjiekakjoo culture in the region.

Management Program

On March 8, 2011 the Official Diary of the Federation, the Management Program for the Zempoala Lagoons National Park, was published by the CONANP under the auspices of the SEMARNAT. Three subzones are established, each with different objectives and environmental characteristics, and the nature of the activities permitted and prohibited is set. It is not the aim here to analyze the proposals of this program. Nevertheless I would like to analyze it from an environmental anthropology perspective, to point out how the proposal approaches the Park only in ecological terms, neglecting once again the biocultural diversity of the NPZL. Alcorn (1994) defines conservation not only as a biological issue, but also a social and political one. Therefore in any conservation program social institutions, economic mechanisms and political factors should be considered.

I will give some concrete examples of this. The specific objectives are presented in six sections: Protection, Management, Restoration, Knowledge, Culture, and Conduct of Affairs. Protection addresses the environment, focused on the fight against the deterioration of the natural resources. The Management section proposes consolidation of sustainable development. Here social terms such as education, training and recreation are considered. The Restoration section focuses solely on ecological issues. The Knowledge section proposes the promotion of research about the ecological system and its regional interactions. I hoped it would include social, political and cultural aspects, as it mentions inter-sectorial participation. The Conduct of Affairs section makes reference to the efficient and organized administration needed to carry out the Management Program.

I intentionally left the Culture section until last, though it appears in fourth place in the document, as it causes me the most concern. I found a lack of an integrative perspective in all of them, as I have mentioned before. Proposals such as the one of Paz (2008) about redefining the Natural Protected Areas (NPA) as socially and historically constructed regions should be considered more. To it, I would like to add that this NPA's are also culturally constructed. Considering the hundreds of years the Pjiekakjoo Culture have existed in this territory, I would expect to have them more prominently considered in a Management Program of a region that is, mostly, their territory. So, in the Culture section I expected their cultural heritage would be mentioned, but it was neglected again. The authorities from the SEMANRANT and CONANP want as part of this objective to *"Promote the conservation culture, and to modify the conceptions and perceptions of the visitants and the communities about the way they relate with natural resources and the*

*environment, through environmental education, training and the promotion of citizen participation*¹¹⁶"

How can some people still question the internal cultural colonization that is still a fact in Mexico? Is this not a clear example of it? This objective is all about the imposition of certain Western cultural values on the local cultures (of which one is the ancestral culture of the Pjiekakjoo). It is openly stated they want to modify conceptions and perceptions, when they have not bothered to learn which are already present. Certainly there may be sectors in which this may be urgent, but that should be specified, and not treat the park as a homogenous place. There is no room in this statement for the conservation and promotion of some Indigenous practices which are considered highly ecologically efficient. They neglect the Pjiekakjoo legacy of a deep and full symbolic relation with the so-called natural resources, and the potential to promote the conservation and management of their cultural legacy, taking as a base the cultural context of the legitimate owners. Contrary to what policy makers think, there is more than one way of protecting ecosystems. Even the proposal of sustainability cannot be conceptualized as a monolithic objective. Durand (2008) proposes to work for diverse sustainabilities. Every proposal for conservation and/or sustainability has the mark of the social group that promotes it, expresses its values and vision of the world (Betancourt 2009), and the Tlahuican vision is not being acknowledged.

Leaving aside the objectives, on the classification of the prohibited and allowed activities, among the latter is mentioned traditional cultural activities. Once more I had some hope that they would recognize certain Pjiekakjoo ceremonies conducted in the park, as the celebration of the Holy Cross on the 3rd of May or the Celebration of the 5th Sun. Sadly it was not the case. They just made reference to the pilgrimages to the Chalma Sanctuary.

According to the Management Program, to conduct any activity in the NPZL, you should have permission from the Directorate of the Park (CONANP), Where was Article Two of the constitution that grants self-determination as well as "the rights to use and enjoy in a

¹¹⁶ Translated by the author, on the original:

Cultura: Promover la cultura de la conservación y modificar las concepciones y percepciones de los visitantes y de las comunidades sobre la manera de relacionarse con recursos naturales y el ambiente, a través de la educación ambiental, difusión, capacitación y el fomento de la participación ciudadana.

(SEMARNAT, 2011).

preferential way all the natural resources located at the places in which the communities live, except those identified as strategic areas¹¹⁷ according to this Constitution"¹¹⁸.

In Mexico there is a difference between what is the law on paper and what happens in reality. So, I wonder if despite the institutional scenario I have presented here, in the end, the CONANP is the one that asks for permission of the Pjiekakjoo to organize something at the NPZL. I have seen that the Pjiekakjoo do exercise a certain measure of control on their territory. Indigenous people effectively control, officially or unofficially, immense areas of natural resources (Toledo 2003). The CONABIO mentions that 60% of the selected priority terrestrial areas are in Indigenous territories¹¹⁹.

On one occasion they found state police from Morelos at the boundary of the park with Mexico State, and the *Comisariado de Bienes Comunales* of the local Indigenous community made them move back into Morelos State. They argued violently and for some minutes. I thought there was going to be physical aggression on one or both sides, but the police ended up moving.

I am aware that the recognition of Indigenous peoples' rights over against the Mexican state with respect to Natural Resources is a major issue to be resolved. Unfortunately the power imbalance is totally in favor of the government, and there are multimillionaire economic interests at the table.

Despite the fact that the Pjiekakjoo are neglected by governmental offices, government policies and actions have direct consequences on their everyday life.

The Park Decree and the Pjiekakjoo

The case of the Pjiekakjoo and The Zempoala Lagoons National Park is one more on the list of Indigenous people that suffer the consequences of conservation policies and the top-down decisions taken, that are centered in untouchable NPAs. When a Park is created on

¹¹⁷ "The State's activities performed within the strategic areas that follow will not be considered monopolies: mail services, telegraphs and radiotelegraphy; oil and all the hydrocarbons; basic petrochemistry, radioactive minerals and nuclear energy production; electricity and other activities expressly out by the Congress".

¹¹⁸ The Political Constitution of the Mexican United States. Translated by Carlos Pérez Vásquez. 2005. Instituto de Investigaciones Jurídicas. UNAM.on line: <http://www.juridicas.unam.mx/infjur/leg/constmex/pdf/consting.pdf>. Recuperated 29 August 2011.

¹¹⁹ And around 300,000 km² of Mexico (15%) are in their possession. Source: CONABIO. Riqueza Cultural. <http://www.biodiversidad.gob.mx/pais/riquezacul1.html>. Recuperado 20 August 2011.

the lands of an Indigenous people, two things happen: 1) suddenly they change from being stakeholders of the commons, to becoming illegal hunters or invaders who should be judged and expelled and 2) there is never recognized the service that ethnoconservation has provided, neither in discourse nor economic terms. What happens regularly is that a certain economic compensation is offered so that they give up their rights of traditional use and practice (Lauriola y Moreira 2006).

The Pjiekakjoo heritage, in particular their Traditional Environmental Knowledge, has been rampantly ignored from the public policies about the Zempoala Lago National Park (NPZL). The question is why?. I wonder if this is a case of just ignorance about Pjiekakjoo culture or a political decision taken with economic interest as a background.

The people complain about the way they are treated by the "Forestales", the environmental police from the PROFEPA. They complain that they take even their machetes and *resorteras*. One old man complained that they do not have the right to take away his tools, which he was not going to hunt; he was going "only to check the traps for the *Jilgueros* (Brown-backed Solitaires, *Myadestes occidentalis*)". The *Jilguero* may be sold in the market for as much as \$1,200 Mexican pesos (in July 2007), of which he was only getting \$200 Mexican pesos.

On April, 2008, a woman told me she was craving wild rabbit (*conejo de monte*), that there was a family that sells them. Depending on the size you could pay \$70-\$80 (around 5-6 USD) for one. I have learned also that people from time to time would eat squirrel. Hunting deer (*Odocoileus virginianus mexicanus*) is now rare, though I have heard that some men still go hunting. Deer have important symbolic value in Pjiekakjoo culture. I fear that under the hunting ban all this knowledge may be lost.

Research is needed to determine what have been the biocultural impacts of the decree. The framework for Pjiekakjoo relations with their forest has certainly changed and some of their productive and traditional Indigenous practices have been banned, as hunting. This has had an impact in the production and reproduction of local Indigenous environmental knowledge. There has been a fracture between the community and some of their resources (Gibson 2006).

The Pjiekakjoo continue to use several forest resources, most of which are legal activities as they fall under the category of non-timber resources. Mushrooms are of great importance, but also moss and *heno* (Spanish moss, *Tillandsia usneoides*) that are sold at Christmas time for the Nativity celebrations as well as pine cones, and sticks of *perilla* (snowberry, *Symphoricarpos microphyllus*) and pine needles for the production of handicrafts for the same season¹²⁰. All these are Non Timber Products, and their use and management should be studied in order to design alternatives to earn a profit while conserving the forest. It has been found that exploiting NTPs has less environmental impact than timber extraction. Policies and strategies should be based on the recognition of diverse cases, and the different property rights over each: exclusion, access, use regulation and alienation rights (Agrawal and Ostrom 2001).

I have not found any consideration or special permission related to the maintenance and conservation of Indigenous cultures as part of the NPAs. As already noted, some people continue to hunt and capture birds illegally. I propose that it would be better to allow certain quotas of animals that can be hunted per year, per community. In this way their cultural importance and all the knowledge about the species harvested may be preserved, and there would be more control over the numbers of animals being killed and/or captured.

The recognition of local initiatives of enforcement would avoid some clandestine activities. Given that the communities have rights to organize and regulate the use of the resources they have, they are viable subjects for their conservation (Merino, 2008). My main concern derives from the fact that the Pjiekakjoo have had to redefine their relationship with the forest and with "nature" in general, and how people conceptualize nature depends on how they use it, how they transform it, and how, in so doing, they develop knowledge about different components of it. If all these respects local action is limited by the state bureaucracy, and local knowledge ignored. This puts at risk an important ancestral heritage.

Moreover, the Pjiekakjoo complain about others not following the rules. For example, having outsiders (mainly urban people from the nearby cities of Mexico and Cuernavaca)

¹²⁰ A little figure could be sold for \$500 Mexican pesos in 2008, a considerable sum of money.

come to hunt in their forest, as they have the economic power to bribe the *guardabosques* (rangers) or even higher authorities in case they are captured.

Lastly I would like to mention the importance of developing our own models of NPA's, based in the Mexican socio-economic, political and cultural context. The diversity of the social, cultural and institutional contexts, in which the management of the natural resources is developed, makes it impossible to propose a unique model. The particular local conditions require the design of particular institutional enterprises that combine the action of the different stakeholders involved (Merino 2008).

Rules for the commons and Pjiekakjoo rights

The collective possession of the communal territory is a fundamental axis of the identity of the communities and their members. They are goods that have an intense patrimonial sense, that represent a strong link between generations around which spaces of organization and communitarian institutions have been developed (Merino 2008). Most Pjiekakjoo believe that the commons is the best way to conserve the forest.

There are different public, communitarian and private interests in the communal lands and among these the interests of the local users have a central importance because of ethical and political reasons that in part rest on the property rights they have over the resources. Additionally, everyday life decisions about the uses of the natural resources have direct impacts on the ecosystems. The "Collective Action Theory" (Ostrom, 1990) considers that the participation of the communities of users in the formulation of the rules of use of their resources is one of the conditions of their sustainable use.

This theory states that the management of natural resources is linked to various factors: 1) land tenure, 2) institutions and organizational forms of this tenure, 3) the strength or weakness of those, 4) the validity of internal norms collectively sanctioned, 5) the distribution of power inside the community, 6) the symbolic or material values that the collective gives to the resources, i.e., the role they play in the formation of collective identities and which are simultaneously part of them. Forests are a common good when they have been defined as such in a collective manner; they have been given meanings and representations and are closely related with collective identities. Once this has happened collective projects are built around them.

It is worrisome to notice that actually the Pjiekakjoo communities are facing challenges in several of these factors. They have had land struggles and still they lack for the titles for several hectares, there have been several efforts to remove the *Comisariado de Bienes Comunales* that is in place by people from the *barrio del Centro* that want to gain the control of it (See Chapter IV), the same people have been questioning the validity of the norms as well as the concentration of power that the *Comisariado* under Zamora's direction has achieved. The only factor that seems to be still intact is the last one (6 in previous paragraph) as the Pjiekakjoo give a great material and symbolic value to their forest.

The Pjiekakjoo satisfy all the hypotheses that Charnley and Poe (2007:312) identified to underline the concepts and efforts to launch a Community Forestry: "(a) a discrete "community" exists that can serve as the locus of community-based forest management; (b) devolution or decentralization of rights, responsibilities, and authority from the state to forest communities occurs to some extent; (c) forest utilization can occur in an ecologically sustainable way and be compatible with biodiversity conservation; (d) greater local control leads to healthier forests and more ecologically sustainable forest use; and (e) greater local control increases local community benefits associated with forests and forest management".

The federal authorities do not always respect these permissions, violating the community's control of their natural resources. A family told me how in April 2007 they were transporting a certain amount of "*tierra de monte*" in a small truck, for which they had the pertinent permission. They were detained by federal police. When they showed their permission letter, the police told them it was not valid, that San Juan Atzingo no longer had communal land!! They were taken to jail for a day and their truck retained. A lawyer managed to get the men free, but they kept the truck for two weeks, and they had to pay in order to get it back. Corruption or ignorance of the environmental law by the police cost this family a substantial amount of money.

On the other hand, one of the most important non-timber forest products (NTFPs), mushrooms, are under open access regime, and it has been like that for generations with no adverse impact on mushroom populations for decades until recently. According to local people, what has really affected the diversity and abundance of mushrooms, rather than local harvests, has been the destruction of the forest, mainly by illegal loggers, and climate change, the drastic alteration of the rainy season.

The access to the mushrooms in the Pjiekakjoo's territory is open not only to these communities, but to anyone. The Pjiekakjoo are aware that people from other communities have started collecting mushrooms in their forests for sale. The *delegados* and the *Comisariado de Bienes Comunales* are considering to abolish open access and start setting some rules for the Pjiekakjoo people that collect wild edible mushroom. The Pjiekakjoo complain the *mestizos* are not so careful to leave *the seed*¹²¹ and to cover it so there will be mushrooms next year. This lack of Traditional Knowledge among the *mestizo* population does have important consequences in the management of the non-timber resource that the mushrooms represent.

Some resources such as firewood, trees and the "*tierra de monte*" are under the control of the *Comisariado de Bienes Comunales*, which is in charge of granting permission so people can make use of the forest. These permissions specify when and how much will be used. This common access system is not a frozen entity but a dynamic one that is adapted to new circumstances. I learned for example, that there were significant quantities of *árnica* [a medicinal herb, possibly *Heterotheca* sp.] growing in some places around the forest. Some people from outside the community started coming to collect it. They started with limited amounts, but eventually they brought a small truck. It was at this point that the community stopped them from coming.

The establishment of new rules and reinforcing existing ones is crucial (Edouard and Quero, 2005), as well as the validation of the shared norms that sustains cooperation. Some community members consider that it is very unfair to prevent local people from using wood while members of neighboring communities are using these natural resources without obeying limits or asking permission.

Another case would be the lack of agreement and/or regulation of mushrooms prices. Some people argue that price regulation is necessary as some people "do not know how to sell them." People complain some people sell the mushrooms too cheap and as nowadays as the number of people collecting wild edible mushrooms has drastically increase; the people that want to sell them at higher prices have to go farther from the community to do it. If the prices would be regulated then the people's profits would depend more on their abilities as merchants than on the distance they travel to sell the mushrooms.

¹²¹ The base of the mushrooms, that is important to leave part of the mycelium.

In relation to NTFPs, it has been determined that the effects of their commercialization depend on: the frequency and intensity of harvest, timing of the harvest, size of harvested individuals, harvest techniques, and the context in which harvesting takes place. The levels of extraction determine the impact on biodiversity at the species and landscape scales. As harvesting intensity increases, so does the likelihood of negative ecological effect (Belcher *et. al.*, 2005). The absence of regulation of resource extraction often results in unsustainable practices (Charnely and Poe, 2007). Research is needed to determine the impact of commercialization on the wild edible mushrooms, but in general, the Pjiekakjoo commons is a good example of how it is not the use of resources that causes ecological deterioration, but the form in which the use is organized and controlled by the community (Ostrom, 1990). Common property is not the problem, but the corruption of local rules. Communities must be careful about the formation of local power groups that may impose their interests over those of the collective, a scenario under which it becomes difficult to arrive at agreements inside the community as the communitarian basis of trust, respect and commitment are eroded (Paz, 2008). If the rules for governing the commons are not respected, then it exist the risk of instead a common property regime it becomes an open access regime.

On the other hand the communities should take care of the social capital that they posses (Merino 2008), represented by the trust and reciprocity relations between the commoners, the shared vision of the forest as a collective resource of patrimonial value, the experience of the participation in the traditional organization, and the successful experience confronting illegal logging and of the agrarian struggle. This social capital which resulted from historical and recent processes has been negatively affected by the marginalization in which many of the inhabitants of the region live, the devaluation of the rural and communitarian life and the growing emigration of the younger generations. National and international conservationist organizations and urban society do not value these efforts, limiting the achievements of communitarian conservation, endangering its future (Merino 2008). Pjiekakjoo efforts to protect their biocultural diversity are even more praiseworthy, as they are very few communities that belong to this ethnic group and the only one in the area, therefore the one Indigenous group that has a peculiar vision and knowledge about the forest. In states as Chiapas and Oaxaca, there are organizations that represent several communities of the same Indigenous group and even from different groups; the Indigenous populations are considerably bigger. The Pjiekakjoo do not have this

advantage, they are surrounded by *mestizo* populations. They have been isolated and still they have defended their forest.

The local rules, practices and cultural values are very important, but not all the responsibility is local. In the case of the NPZL which is so close to the metropolitan area, the Pjiekakjoo have complained that hunters are not from the local community, and because of the extent of their territory they find it impossible to enforce the rules.

Indigenous People's Rights

The second article of the Mexican constitution recognizes that Mexico is a multicultural country, but in discourse as well as in practice only some of the cultural rights of the ethnolinguistic groups are recognized. It is urgent to grant these groups also their political, economic and social rights, not only in the law but in the reality they face in their everyday life. For their future generations they have been demanding the right to exercise control over their natural, cultural and social heritage, but Mexican society, with its post-revolutionary ideology, is not ready to admit exclusive cultural heritages (Bonfil, 1986).

The interaction between Indigenous People's Rights (IPR) and the communal resources is crucial; as it is through the management of them that the Indigenous people's physical, social and cultural existence may be achieved. This interaction covers key concepts, such as territory, governance, knowledge, development and identity. With a deeper comprehension of these aspects we may be able to understand how the Indigenous people face these times of global change, old and new challenges on top of new opportunities. The IPR are vital for the internal governance in addition to the battle against the nation state, a power that justifies and promotes historically the monopoly of strength and power and coercion in the name of the written law, concepts that most Indigenous people do not embrace. Commons rules are incompatible with the legal systems of modern nation states, which promote the expansion of centralized regulation by the state and privatization models (Lauriola and Moreira 2006).

If the IPR are not reinforced, Indigenous governance may lose its efficacy. The main challenge is to conciliate the sovereignty and laws of the nation state with those of the Indigenous people, always respecting their rights to use and manage their resources according to the customary laws (Gibson 2006; Smith 2006).

One of the main problems is to guarantee the coexistence of Indigenous rights based on common property and the private and state property regimes. It is necessary to promote a dialogue between Indigenous institutions and the different levels of the public administration of the state in order to define appropriate public policies.

If it is understood that something as basic as that each culture defines the natural resources that it uses, the form in which it obtains and transforms them, and the destiny and meaning that it gives to them, it would be easy for governments and other actors to comprehend that Indigenous people demand certain rights over these resources exclusively for themselves, as they consider them an inseparable part of their history, culture and heritage (Bonfil 2006). Therefore the IPR (not as individuals, but as “pueblos”) with respect to the management of resources should be conceived of as an historical right (Ramos-Delgado, 2004) that should be preserved without letting the state privatize parts of it.

The Indigenous people want to make their own decisions about the adequate development, and to be able to alleviate the poverty that most of them suffer. New initiatives should be developed, initiatives that respond to their traditional relation with the land. These initiatives may be developed as market services or public policies (Lauriola and Moreira 2006).

In other Mexican states, such as Oaxaca, some initiatives for the commercial use of the forest have been successful and that has allowed the communities to conserve and finance their communitarian management (Merino 2008). The Comisariado de Bienes Comunales needs to be fortified in their plans for the democratic management of their natural resources, and of productive and sustainable agricultural systems, such as the production and commercialization of medicinal plants, the protection of local cultivars, and the production of ornamental species of commercial and cultural interest may be considered (Bazán *et. al.*, 2009).

Culture´s key role

One of the major challenges for the survival of biocultural diversity is to counter the perspective that there exist different domains of nature and culture that can be approached and managed disconnected from each other. The social, cultural and political relations that exist between the community and the nature that surrounds it must be treated as a whole (Gibson 2006). Therefore, the degree of conservation or degradation of natural resources is due to the cultural interactions with natural resources, local practices,

communal regulations, local institutions that reinforce these and the cultural meanings that orient them (Paz, 2008). It is precisely these cultural meanings which are very different between different communities, and it is these cultural meanings that determine attitudes towards not only natural resources as such, but nature (*el monte*) in general. It is hard for people who do not understand the Indigenous *cosmovisión* that some communities have about nature, to understand that for these communities it is not just about natural resources.

So it has been proposed that culture should be included as another dimension for any sustainable development, besides the social, ecological, political and spatial dimensions. This more inclusive perspective would enhance welfare based on important sociocultural values of the Indigenous communities (Lauriola y Moreira 2006, Paré and Judith 1996, Rendón, 2004). Unfortunately this is not the case in the everyday practice of many regions, with the Pjiekakjoo's case one example.

A relevant task beyond the acceptance of the key role that culture plays in biocultural conservation is to alter the concepts that many people have about Indigenous cultures. Typically, Indigenous cultures are perceived as static, frozen in time, in some occasions they are even required to represent themselves as such, emphasizing folkloric practices only. I will approach this issue in the following section.

Beyond their intrinsic value and importance, Indigenous cultures represent important alternative ways of approaching environmental conservation (Durand 2008). Along with the social, economic and environmental considerations for any project of sustainable development, the culture must be the fourth essential element. Proposals such as cultural ecotourism and the exploitation of non-timber forest products must include the cultural element and work toward the integration of Indigenous people in the formal economy and the global market with more social and economic equity, as economic development is one of the main aspects needed in order to achieve this. As Escobar (1999) mentions: They unavoidably engage with certain forms of commodity and market exchange while resisting a purely capitalist view of nature.

As Hunn (2008) and González (2001) argue with respect to the (Ben'zaa) Zapotecs, Pjiekakjoo have to assure their collective control of adequate land and their traditional knowledge of making a living from that land, while engaging with regional, national and global political economies, through the exportation and importation of labor and its products, which may induce significant and rapid changes in the local subsistence

economy and the diet. The Pjiekakjoo have been experiencing this for decades, and still doubt remains whether they would manage to maintain the equilibrium between the mixed economy of traditional activities and commerce, and manage to develop appropriate cultural, social and economic responses (Smith 2006).

It has been argued that the crucial point is to have communities decide the nature of the “development” they want in order to reduce poverty given the cost that some development projects would incur (Smith 2006, Woodman and Grig, 2008), for example environmental degradation, negative impacts at the social level or diseases. Of course, the validity of these decisions requires that they be well-informed to carry out this process efficiently. This procedure must leave space for the *cosmovisión* of the Indigenous people and their notions of “development” and/or “economy”, as they might be different from the Western ideas which have generated inefficient and damaging mechanisms. More research is needed in order to determine more precisely the physical, mental, social and spiritual consequences of the Western developmental trajectory on Indigenous people. For example there is some evidence that the deterioration of the environment has had a serious impact on their health and that the new market necessities driving consumption do not correspond to the realities of their culture and generate new mechanisms of exploitation and dependency (Alderete 2005). Among the mechanisms that the Indigenous People may develop to satisfy the new market necessities, it exist the possibility, particularly among the youth, of getting involve with criminal activities. This option certainly represents the fastest, and in a country where the narcotraffic has permeated the whole society, this is already a terrible reality.

The predominant options for development projects are the ones based on economic criteria despite being labeled under sustainable, social justice, equality, etc., these projects would keep generating deep sociocultural contradictions. “Intergenerational conflicts arise as the Indigenous communities try to maintain their governance systems based in the commons and the internal sociocultural cohesion, in order to build bridges between the past, the present and the future, rebuild and modernize traditions and identities based in communitarian values and rules for the management of the natural resources” (Lauriola and Moreira 2006:18)¹²². This certainly represents one of the biggest challenges that the communities have been facing; but they have not quit, they are fighting, some people

¹²² Translated by the author

may support this and some others may just exile themselves, in the pursuit of another type of life, based in contrasting values.

In this context, there are theoretical proposals that should be carefully studied and analyzed. Leff's idea of an alternative productive rationality may represent the common ground in which certain economic developments and the Indigenous people's *cosmovisión* may work together to achieve a better quality of life for these populations (Leff, 1986).

The experience of colonialism, assimilation policies and discriminatory practices left Indigenous people in the worst conditions of social and political marginality, worse even than those of other poor people. Therefore it is urgent that they have self-determination and autonomy in the process of decision making (Alderete 2005). Each *pueblo* faces changes in the world and must establish new relations with it. It is based in their culture that each group resists in order to conserve its spaces in all the orders of life. It appropriates external cultural elements that prove useful and compatible, and invents new strategies of accommodation that allow it to survive as a delimited and distinct collectivity, the members of which have access to a common cultural heritage. This is just part of their reality, but it is the reason for the existence of Indigenous people. For them the right to exist is a cultural, political and ecological question that involves an ecological and cultural attachment to a territory (Escobar, 1999; Bonfil 2006).

Several of the conservationist activities (bottled water (*embotelladoras*), sources of pharmaceuticals, gene banks and ecotourism projects) need to be evaluated, as they altered the essence of the traditional productive practices of the Indigenous and peasant communities, some of which have proved to be more efficient for the environment (Betancourt 2009). For example, Monroy and Colin (1999 in Ongay and Peña (without date)) demonstrated that some traditional activities are sustainable with high profitability, such as the extraction of "*tierra de monte*" (forest soil), in contrast with cattle raising and intensive agriculture.

The "development" of Indigenous communities cannot be conceived in reductive economic terms, as other elements must be considered, such as the wellbeing of the whole community, the cultural survival, and the informal mechanisms of community solidarity (Lauriola y Moreira 2006). Indigenous communities are now aware that in the past projects imposed in their communities by the industrial revolution excluded them from sharing in the riches generated, and they are determined that this not happen again. They

want more options than just to be absorbed by the global capitalist system or to stay trapped in poverty, struggling to make a living (Smith 2006). Moreover they should be supported so they can play a key role as main actors on the global stage, a space typically monopolized by nation states and transnational corporations (Lauriola y Moreira 2006).

The role of the Indigenous people for the conservation of biological diversity should be considered beyond the romantic vision of Indigenous people as “natural” ecologists; or on the other extreme, the conservative view that blames them for the depletion of natural resources and that considers them to be primitive. Contemporary Indigenous people and peasants must be recognized as essential element of the binary formula of biological-cultural diversity ¹²³ (Rabey, 2005). If larger sectors of global society fail to understand this, the existence of Indigenous People will continue to be dismissed. Besides the negative impacts this would have on the conservation of the world’s biodiversity, it would mean also a great loss of the cultural richness of humanity

The Creation and Re-creation of Pjiekakjoo’s Culture

The historic Pjiekakjoo culture is in constant change, it must respond and adapt to the rapid changes that the global world experiences and the pressures they exercise on the Pjiekakjoo people. This culture is constantly reconstructed and redefined with different objectives; it has different meanings and connotations for different actors. I have perceived in the young generations the need to negotiate between the modern world while not losing their roots and identity. In this struggle they come up with new ways of keeping certain cultural elements, and sadly lose others. There are also sectors more worried about the political and potential marketing connotations of being Pjiekakjoo. After the separation of Loma de Teocalcingo from the center, the authorities from the center have organized what can be considered a campaign to embrace their Pjiekakjoo identity. It is hard, as most of the speakers of the Indigenous language live in Teocalcingo. The *delegados* of San Juan Atzingo have in general a very patronizing attitude towards their Indigenous companions; they may use expressions such as: “my poor Tlahuicas are

¹²³ “If we consider **the hypothesis** according to which the environmental heterogeneity in the time and space increases biodiversity, the bigger the complexity of the human culture, bigger would be the conditions to build biodiversity”. Rabey (2005). Emphasis added. On the other hand Nietschmann has proposed since 1992 the Biocultural Axiom: cultural and Biological diversity are mutually dependent and geographically overlapping, and several studies have supported it (e.g. Maffi, 2005)

manipulated, they do not really know what they want", or "We have also some Tlahuicas here in the center". There is a political manipulation of the identity and culture in order to guarantee the economic support of the federal and state governments earmarked for Indigenous communities.

Pjiekakjoo culture certainly was a rallying flag in the agrarian struggle. But it is one thing to claim to be Tlahuica and quite other one to be willing to work to conserve their cultural heritage. I was disturbed that the *Comisariado de Bienes Comunales* failed to participate in the second round of the workshops I organized. They participated in the first round, which was organized with their participation, but as soon as the Teocalcingo authorities got involved, they left all the responsibility in their hands. Some of their families claim this is due to the lack of time, maybe, but I wish they would be aware that if they do not work to preserve their cultural heritage it will be impossible for them to keep claiming they are Indigenous people. Also because they are an example to follow, as a child once questioned them, half joking he asked them why they were not actively and constantly participating? I do not like the younger generation getting the idea that it is good to be Indigenous only in order to get economic benefits, as in the control over forest resources or as marketing for the Ecoturistic project.

It would be fascinating to explore what is understood and perceived by different local people as to their identity as Pjiekakjoo, how is it defined and what it implies. There were two situations I would like to mention. The first is how they have redefined their traditional clothing, as these have basically disappeared. They have been using traditional clothing, made of *manta* but mostly from Oaxaca. At official events and for ecotourism they would wear these clothes. Is this something they come up with themselves or was it suggested by someone else. What does it mean? Is it a response to the expectations of non-Indigenous people who wants them to be "real Indians". The second, example is the recording of a video about their traditions. I was invited as a spectator. The *Comisariado de Bienes Comunales* wanted to represent an essentialized vision of the Pjiekakjoo culture, removing everything that might situate the people in the contemporary world! So they removed cans from the scene and a couple of coca cola bottles. They wanted to project this atemporal vision of what an Indigenous culture is, one some social scientist have been trying to destroy.

The *Comisariado de Bienes Comunales* even tried to simplify their political economy of nature when they used a discourse that would be easy to recognize and adopt, in order to get the support of international organizations to conduct the struggles (Descola, 1998).

The *Comisariado de Bienes Comunales*, for example, is familiar with the discourse of Greenpeace and/or Naturalia A.C. which is not easily translated into their traditional concepts and perspectives. They have also responded to the state's and general society's concepts of what an Indigenous group should be and look like, a static situation that they do not really live in their everyday life, a simplified community identity, created artificially and mobilized in order to improve their chances of getting support or attention to face different challenges, from cultural survival to illegal logging.

A similar situation was documented by Ellen (1999) among the Nuaulu of Indonesia, who changed their original perspective of environmental transformation and degradation for an environmentalist one, one that was prominent in the national political discourse. The idealized and romanticized conceptualization of the community as harmonious, traditional and egalitarian, has sometimes had the practical political economic effect of allowing people to sustain claims to territory, resources, and subsistence livelihoods (Cherneley and Poe, 2007).

A contrasting situation is the more realistic perspective of the new *delegados* of the Indigenous Tlahuica Delegation of Teocalcingo.

They are aware of the dynamic of their culture as well as the things that threaten it. Some members of the *Comisariado de Bienes Comunales* are even relatives of the *delegados*, still their vision is different. I consider that this may be due to the migratory experience of the *delegados*, absent in most, but not all of the *Comisariado de Bienes Comunales* members. Once again we found that there is a considerable heterogeneity inside the community, and that cultural identity is in constant transformation, subject to continual re-negotiation.

The Ghost of Biopiracy

Biodiversity is a strategic resource for capitalism, therefore it is crucial for the countries¹²⁴ involved in the development of bio-technologies to have control over it, and this includes

¹²⁴ I would talk about countries being involved in Biopiracy instead of corporations because as I explained in a following paragraph, this activity can exist only under the complicity of the nation state, and in some cases it has gone beyond this as some projects count with money from the government (Betancourt and Cruz, 2009). Another important point: USA have not signed the Convention on Biological Diversity (CDB) that gives some rights to the Indigenous people over their collectives knowledges, therefore for any company in its territory is compulsory to follow the CDB (Alarcón, 2011). Rural Advancement Foundation International (1999) stated that "": Since 1993, the US government's ICBG has awarded 11 grants (3 are renewals) for bioprospecting

management, access, administration, conservation, use and the direct and indirect usufruct. In order to detect quickly and effectively biodiversity with commercial potential, it is necessary to appropriate the traditional Indigenous and peasant knowledge that allows reducing the costs of the search (Shiva, 1997, Alarcón, 2011). These facts are frequently hidden behind the sustainable development and conservationist discourses, disguising the theft of the natural resources of the peripheries and subjecting the Indigenous *cosmovisión* to the dynamic of capitalism. The new model implies also the establishment of cognitive, methodological and technical analogies related to the forms of representation of nature and the ways to conceptualize, use and manage it in the economic terms of the market (Machuca, 2009). Traditional knowledge and local resources are appropriated through their physical elimination or cultural transformation to become goods of international economic value (Gibson 2006).

Even though biodiversity conservation *ex situ* in botanical gardens and germoplasm banks is very important, biodiversity *in situ* is of greater importance, and now the subject of geoeconomic and geopolitical dispute. It allows obtaining more extensive and detailed information about the species, considering that the territory "contains" the associated knowledge of the Indigenous and peasant communities (Ramos-Delgado, 2004).

A substantial fraction of biological diversity *in situ* is situated in Natural Protected Areas, one of the main strategies used by *bioprospecting* countries is the attempt to privatize them. This privatization implies the exploitation of both CIK and the Indigenous labor force to be used by transnational corporations for bioprospecting or ecotourism activities (Cruz, 2009). Machuca (2009) argues that a neocolonization is taking place, which requires territorial restructuring, this is to have the territories under the surveillance and control of international organizations such as the World Bank and the Interamerican Development Bank, to open new fields of exploitation.

Traditional Environmental Knowledge has contributed to the well being of humanity by virtue of numerous pharmaceutical, industrial, agricultural and food products though few

totaling US \$18.5 million in 12 countries of the South (Mexico, Peru, Chile, Argentina, Panama, Suriname, Madagascar, Vietnam, Laos, Nigeria, Cameroon, Costa Rica). Commercial partners in ICBG-funded projects include transnational pharmaceutical and agrochemical companies Glaxo-Wellcome, Bristol Myers Squibb, Shaman Pharmaceuticals, Dow Elanco Agrosociencias, Wyeth-Ayerst, American Cyanamid, and Monsanto". In the News Release: Biopiracy Project in Chiapas, Mexico Denounced by Mayan Indigenous Groups <http://www.etcgroup.org/en/node/348>. Recuperated 28.February 2012.

of the pharmaceutical laboratories recognize the Indigenous origin of this knowledge, nor do they share their profits with the Indigenous people. Some of these projects are justified by the necessity of the systematization of Traditional Knowledge and its validation by Western science, in order to “rescue” it in the face of the disappearance of the communities that created it. Also it is said that this includes the “recognition” of traditional medicine (Ramos-Delgado, 2004, Maya *et. al.*, 2009).

Traditional Knowledge is used in diverse activities, for example, directories of traditional experts, collections for the integration of germoplasm banks, formation of herbariums and botanical collections, use of informants to complement cartographic information, use of knowledge and cheap Indigenous labor in productive and restorative projects (Betancourt 2009). In Mexico Indigenous Knowledge has been used to make data bases for CONABIO that do not take responsibility for what is done with this information. Data bases may be one of the main mechanisms used to fragment, isolate, and later patent and commercialize IK (Betancourt 2009). It is also considered that the “translation” of this knowledge makes it more susceptible of commercial exploitation (Maya *et. al.*, 2009).

Biotechnology companies have taken advantage of the limitations of the law pertaining to biological diversity and property rights. These companies have exploited the impossibility of registering knowledge that has been collectively produced; they argue that this is public knowledge and they do not pay royalties (*regalías*) (Posey 2000).

In Mexico it is urgent to approve a law against biopiracy that would avoid having more cases such as the Christmas Flower, some orchids and diverse types of cacti that have been taken away by companies to modify them genetically and then are taken back to Mexico to sell them with high profits (Salinas, 2010).

Other examples are the cases in which substances with a potential for commerce have been combined with other active substances to avoid payments (Bazán *et. al.*, 2009). In general the contribution of biodiversity and traditional knowledge are undervalued by the companies which results in making Indigenous groups vulnerable to exploitation (Rosenthal, 2006).

The activity of searching for substances and genetic structures with a commercial potential that includes research on biodiversity as part of scientific activities has been called *bioprospecting*. It is a branch of the biotechnology focus in the collection, classification and use of biological diversity (Ramos-Delgado, 2004; Bazán *et. al.*, 2009).

Based on this term another one was created: "Biopiracy" in 1993 by Pat Mooney: "The utilization of the systems of intellectual property to legitimize the property and the exclusive control of knowledge and biological resources without recognizing or compensating or protecting the contributions of the Indigenous and peasant communities" (Ramos-Delgado, 2004). It includes the search, collection, acquisition, looting and patenting of Indigenous and peasant Knowledge, a live animal or the use of germplasm with the objective of making money at a massive level under the institutional parameters of the universalization of the system of patents imposed by the World Commerce Organization and the World Intellectual Property Organization. These would be parallel to a "world system of biopiracy", created to regulate the competition among countries for the appropriation and exploitation of biodiversity (Ramos-Delgado, 2004). There is evidence that global organizations fulfill their objectives on the expenses of local populations (Smith, 2006).

Bioprospecting projects can take place if they promote the general well being and if the benefits are distributed with justice. The problem is that the contracts do not establish clearly the amounts and ways in which the royalties would be distributed. The maximum percentage that laboratories have given is 1.2 or 1.5%, in the ICBG¹²⁵ they manage to get between 5% and 13.5% (Bazán *et. al.*, 2009). Even though there were never profits as the project was cancelled, the main complaint is that the percentages of profits that is regularly negotiated is very low, being the laboratories the ones keeping most of the economic benefits. Of course, under the capitalist system this is plenty justified as they are the ones that have the means for the massive commercialization of the substances, at the end we know they do not invest in these projects for charity purposes.

The projects of commercial character may offer besides the money, other benefits such as technical equipment, scientific qualification and programs of social/environmental development. The value of this is way under the value of the biodiversity appropriated.

Researchers and companies can centralize and use the information, thanks to the monopolies that are formed. This is done through a process in which the knowledge becomes completely autonomous from the Indigenous knowledge (*saberes*), a privatization of communitarian knowledge

¹²⁵ International Cooperation Biodiversity Group. It was created in 1993 by the National Institutes of Health (NIH), the National Science Foundation (NSF) and the US. Department of Agriculture (USDA). They look for pharmaceutical products and have conducted projects in 12 countries (Rosenthal, 2006).

Capitalist logic seeks to transform Indigenous Knowledge about biodiversity into merchandise, modifying the essence of the traditional cultural praxis. According to Riberiro (2002) twenty five percent of the medicines sold by prescription in the USA came from plants; and that as much as forty percent of the medicines under clinical tests were also substances obtained from plants, of which seventy five percent were used by Indigenous people. Finally, she gave the data that the profits for drugs derived from plants were of sixty eight millions of dollars per year. The Rural Advancement Foundation International (RAFI) estimated that the underdeveloped countries lose around five and a half million dollars per year in royalties that are not paid to them by the pharmaceutical companies.

Bioprospecting converts the traditional wisdom into merchandise or food supplements, new medicines and environmental services, subsumed in the logic of "development" that reproduces environmental destruction (Bazán et. al., 2009).

Biopiracy can be done only with the complicity of the nation state and/or other national actors such as research institutions. It involves stealing important resources or exchanging them for insignificant amounts of money or equipment. It is an interchange of "green gold" for mirrors. When denounced, biopiracy projects are justified as being of mere scientific character. However, one of the main problems is the lack of transparency, as they do not clearly explain why institutions such as the World Bank or companies dedicated to the commercialization of biodiversity, are involved (Ramos-Delgado, 2004).

There have been some cases in Mexico in which the looting of Indigenous and peasant knowledge did not succeed due to opposition from the local people and their political organizations. The EZLN made its position clear in 2001, at the National Indigenous Congress, where they declared: *"The natural resources of Mexico are not merchandise to be sold or bought, because we do not accept the destruction of our territories by the imposition of projects and megaprojects in the state. We demand a moratorium in all the bioprospection projects related to the biodiversity and also to all the biopiracy acts that are taking place in our territories and in the country until the Indigenous people have discussed in their own time and with their own conditions the adequate manner for the control of their resources"*¹²⁶.

¹²⁶ Translated by the author.

Another example is the declaration of the *Consejo de Organizaciones de Médicos y Parteras Indígenas Tradicionales de Chiapas (COMPITCH)* (2000 in Castro, 2000):

“Para el Compitch todos los proyectos de bioprospección con fines comerciales o que tienen como propósito adquirir una protección bajo el sistema de patentes y propiedad intelectual, son incompatibles con el marco jurídico nacional que regula las bases de la vida y la cultura asociada a ella, lo que es particularmente claro respecto a la cultura, usos, costumbres, formas de organización colectiva de los pueblos y comunidades indígenas”.

Sadly, in many cases, given the precarious conditions of life to which they have been submitted, the communities are deceived with discourses and promises of better conditions of life, just in exchange for their knowledge about the biodiversity that surrounds them (Ramos-Delgado, 2004). Once the information has been acquired (genetic and cultural) by the transnational pharmaceutical companies and cultural industries. They go to the next stage, of dispossession and devaluation of their resources (Machuca 2009). Subsumed by the logic of the market and of permanent innovation, the important “Indigenous knowledge” that had a strategic value in the first place, would lose part of its value, once it has been registered and used by these companies. It should be considered though, that this knowledge would not lose its value in the original context and in traditional market, and may have to face the fact that after patented, its use, commercialization or collection of the resources may be prohibited for the communities. If this would be the case, still there would be a social capital associated to this knowledge, the one rooted in a determined sociocultural context, and that represents a key component of its value. This cultural intangible resource is the one that adds new value and guarantees the possibilities of its renovation (Machuca 2009).

Naturalia A.C. and the Pjiekakjoo

In order to be able to carry out the research with the Pjiekakjoo people, we signed an agreement, in which some of the issues that were of concern to them were addressed, such as the use, academic or commercial, that I may give to the information (See chapter II). After separation of La Loma de Teocalcingo as a separate delegation, I had a strong disagreement with the new delegados of the Center. They did not want me to work with both delegations. In the discussion, they raised again the old concerns about

the use of the information and of giving back the information to the community, etc. When I explained to them that my commitments had been stated clearly in the agreements I signed with them, they said they had not signed anything as such with me. I showed them the copy, to their total surprise. After looking in their archives, they found their copies. This short experience was shocking for me, besides being unpleasant. It proved to me one of my greatest fears, that they did not carefully review what they signed. It might have been the agreement for a biopiracy project, and they would not have noticed. This has been an old concern for me that dates from 1999 when I started working with Indigenous communities. I realized there was no protocol to prevent this from happening, in contrast with other countries such as Brazil that have established very strict protocols. It is urgent to have the communities and their authorities deeply informed about the protection of their cultural and biological heritage.

I would like to link this with a worrisome situation in the Pjiekakjoo communities. I learned about their collaboration with Naturalia A.C., and I started looking for information about this organization. I found their webpage, and something there that made me very worried was the fact they have as one of their collaborators Novartis laboratories. I was concerned for the potential that this may have of a surreptitious biopiracy project. I wondered if anyone from the communities would benefit. I shared my concern with the delegados of Teocalcingo, and asked them to pay attention on the deals they were making with this organization. Interestingly, some days later, I looked at their webpage and the announcement of collaboration with Novartis was not there anymore. Despite the fact that the alliance Novartis-Naturalia A.C. is no longer shown in the Naturalia webpage, on the web it is easy to find information about their relationship¹²⁷. In January 23 of 2009 *Milenio*, announced the donation by Novartis of 20,000 dollars for the conservation campaign of the Mexican wolf¹²⁸. This pharmaceutical company controls along with Monsanto, DuPont, Aventis and Astra Zeneca most of the trade in genetically modified crops (Mgbeoji, 2006), and has been related to biopiracy and biofraud cases¹²⁹. I have no evidence that Naturalia A.C., intended doing biopiracy, but it is true is that it is through triangular relations like this that some of it is done (Riberiro, 2007). For me is an

¹²⁷ Princeton University Digital Library: <http://puddl.princeton.edu/objects/v118rd748>. Periódico Mi Ambiente <http://www.miambiente.com.mx/?p=694>. Novartis: ciudadano corporativo responsable: <http://www.imagenoptica.com.mx/pdf/revista26/12.pdf>

¹²⁸ Salvan con lágrimas a lobos mexicanos. Novartis donará 20 mil dólares de sus ventas a Naturalia para cuidar la especie <http://impreso.milenio.com/node/8523300>

¹²⁹ Electronic Journal of Comparative Law. October 2002. EQUITABLY SHARING BENEFITS FROM THE UTILIZATION OF NATURAL GENETIC RESOURCES: <http://www.ejcl.org/63/art63-2.txt>. Berne Declaration. NGOs condemn Biopiracy by Swiss University: <http://www.evb.ch/en/p25000454.html>.

example of how any NGO may have agreements with pharmaceutical companies without the people with whom they work having an idea of this relations; even when they are on the internet. It is a cruel reality that these communities are totally unprepared to face the challenges that the modern world may bring related to this issues. The problem is that they had no idea this organization was partnered with a laboratory the size and importance of Novartis. The question that is in the air is if the decree of the National Park in the Pjiekakjoo territory and the interest of national and transnational organizations (Greenpeace, Naturalia A.C., World Campaign and World Bank) in the area would support the survival of the Pjiekakjoo knowledge or if it would make it more susceptible to isolation, fragmentation and privatization?

Certainly we are witnessing a direct relation between transnational entities and Indigenous communities without the intervention of the nation state, and again the challenge would be under which legal frame would be these projects be conducted.

It is necessary to devise and promote mechanisms that allow communities to negotiate equitable collaborative projects. There is a legal hole in these topics, both in Mexican and international law.

At the national level, some Indigenous people have rejected the prohibition by the health Secretary of certain plants, the Law for the Access and Use of the Genetic Resources and the reforms to the Law of Industrial Property that opened the possibilities to patent living organisms and to register "traditional knowledge" for exclusive use (Machuca 2009). Some Indigenous people's organizations from Chiapas State have made important statements clarifying that their resources are inalienable, and they have demand to have a law to protect them, made with their participation (Valadez, 2000). It is urgent to establish a legal framework about the use of genetic resources and biodiversity (Bazán *et. al.*, 2009; Salinas, 2010). This legal framework would have the obligation of determining the protocols that should have been already in place to conduct research about Indigenous knowledge as it exists in other countries.

In the international realm, the Convention on Biological Diversity (CBD) only establishes that the bioprospecting projects should have fair profit sharing, but does not establish the mechanisms for this. The distribution of benefits represents only a partial solution for the potential conflict of interests, as many communities would fight for, not even the

percentage of them, as it is generally believed, but the control over their resources (Machuca 2009). The Convention only makes suggestions; to not assume its fulfillment does not generate judicial consequences. It requires previous informed consent for the use of traditional knowledge or for the collection of samples from lands of the local population involved in bioprospecting projects. This consent should result from a presentation of the goals and methods. It is very unfortunate that the Convention does not establish a protocol for the research about Traditional Knowledge, as well as a mechanism for fair distribution of profits. (topic addressed in Chapter II)

The international standards of intellectual property do not consider aspects as biopiracy, misuse of cultural expressions, and use of the information with a previous, free and informed consent by the community (Gibson, 2006). At the international level, the UN is limited in protecting TK, as it cannot recognize the collective nature of it, and considers human rights as an individual issue. Moreover, it protects overall the sovereignty of the nation state (Smith, 2006).

It is uncertain if Traditional Knowledge would really be protected as an immaterial cultural heritage or non-visible resource by the Convention for the Safeguarding of the Intangible Cultural Heritage (2003) of the UNESCO. It has been considered that this "protectionism" may asphyxiate the spontaneity of the cultural manifestations, as their protection may avoid the benefits of socialization and the free diffusion of knowledge as a condition for its preservation. There is a double challenge to protect and socialize (Machuca 2009).

The World Organization of Intellectual Property does not recognize collective property in which the subjects are the people, and where the knowledge is transmitted from generation to generation. I consider overall, it is basic to respect and consider the customary law, preexistent to the relatively new systems of intellectual property.

Machuca (2009) proposed seven steps for the protection of natural and cultural goods:

- a) It is important to visualize the protection of IK in relation to the territories that have environmental resources, due to their mutual dependency and the form of ethnocultural conservation based in the communitarian management of resources.
- b) It is basic to develop the autonomy of the communities so they can use their traditional medicine and exercise control over their resources under their own management plans.

- c) It is basic to repair habitats, and avoid having the ANP only for private interests
- d) It is necessary to make laws about cultural heritage and IK to protect resources that cannot be protected in an environmental matter. It would allow advancing the protection of biodiversity from a cultural perspective. A cultural law would allow protecting the environmental and cultural goods:
- e) Important that Indigenous People could have access to the "inventories" that are made about TK and that this could be used for their development.
- f) A system of protection of cultural rights should be developed, based in the recognition of the collective property of them.
- g) Basic to protect some traditional uses that represent qualitative advantage, as an economic cultural option in front of the patented medicines. It is urgent to review the law about IK under the light of the new UNESCO conventions and the cultural rights (not only environmental) recognized in diverse laws.

Future Projects

The same interest that exists in the globalization of biodiversity has been present on the homogenization of the research about it, among which the private sector has been having a stronger influence.

The NGOs CASIFOP¹³⁰ and RAFI¹³¹, created the term; *Biomaquila* and *Bioprivatización* of natural resources. The former makes reference to the way Third World scientists are just collecting samples and following orders from the First World country research institutions. We have been unable to develop our own principles of research, with our own objectives, and are trapped in the world system of producing and publishing papers, leaving behind any ethical principles and being happy with scrums of money and equipment.....mirrors. We change for the "green gold"(Shiva, 2007).

Mexican scientists should not be merely cheap labor, but should start designing their own projects and doing the most complex and profitable processes. For this, it would be necessary to develop the technology that would allow us to be independent of foreign universities, and train Mexican scientists and technicians who can work with their own visions and particular perspectives, having the Mexican reality as base. The projects designed outside the country without the intervention and or opinion of the Mexican

¹³⁰ Centro de Análisis Social, Información y Formación Popular (CASIFOP).

¹³¹ Rural Advancement Foundation International (RAFI).

government, the scientific and Indigenous communities have in general neoliberal or utilitarian criteria. They do not approach the solution of social conflicts or the expansion of Indigenous rights, therefore they do not promote social justice. We can design projects that would guarantee the existence of our majestic landscapes, promote the development of the Mexican sciences, the vitality of the IK and the preservation of the national sovereignty (Betancourt 2009).

The issues around biopiracy are linked to the methods and purposes of research, topics that is addresses in Chapter II.

A speck of Political Ecology

Wolf used the term "political ecology" in 1972 to stress the necessity of contextualizing local ecological realities within the broader political economy (Stonich, 1999). I want to contextualize Traditional Environmental Knowledge likewise, to situate it in the midst of the environmental and political forces that interact to produce changes in the environment and society through the actions of diverse social actors acting at different levels.

The case presented here is a good example of one of the main aspects of political ecology: the tight relation between conservation and models of social development (Betancourt y Cruz 2009).

Certainly, in the face of the crisis in human-environment relations, working to link the cultural and biophysical worlds in modern societies might allow them to coexist (Cleveland, 1999). We have the perfect teachers for this, the traditional cultures of the world, but we need to be wise enough to learn from them.

A New Rationality

The present research intends to be a contribution to the work of translation needed for the new rationality proposed by De Sousa (2009) to stop wasting social wealth. He calls the new rationality *cosmopolitan reason* and is the opposite of the Western reason Leibniz called *indolent reason*. Cosmopolitan reason is established on three metasociological procedures, the sociology of absences, the sociology of emergences and the work of translation, as I have already mentioned. This new rationality proposes the expansion of the present by the sociology of absences and the contraction of the future by the sociology of emergences. The main aim of the work of translation is to create a mutual intelligibility between the possible and the available experiences, without destroying their identity.

Indolent reason is what supports to a considerable extent hegemonic knowledge, and has not considered other types of knowledge that are neither scientific nor philosophical. De Sousa states it is necessary to defy the indolent reason that transforms the hegemonic interests in true knowledge and to create a new space-time (*espacio-tiempo*) that would allow us to identify and value the richness of the world and the present.

To start the expansion of the present De Sousa proposes the sociology of absences that transforms the impossible objects into possible ones, transforming absences into presences, focusing on the fragments of the social experience not socialized by the dominant reason. There is a production of non-existence always that an entity is disqualified and forced to be invisible, unintelligible or disposable. The author's suggestion corresponds to the reality faced by Indigenous people and their knowledge in relation to the dominant reason; it is not that they do not exist, but that there has occurred a production of non-existence about them, they are treated as disposable. The five modes of production of non-existence are easily related to Traditional environmental knowledge and its holders: 1) the logic of the monoculture of knowledge (transforms modern science and the elite culture into unique criteria of the truth and of esthetic value), 2) the logic of the monoculture of lineal time (this logic declares backward everything that according to the temporal norm is asymmetric in relation to what is considered advanced. This way Western modernity has created the non-contemporaneity of the contemporary which is labeled in different ways such as primitive, traditional, premodern and underdeveloped, 3) the logic of the social classification (non-existence is created under the shape of an insurmountable inferiority, that cannot be an alternative to what is superior), 4) the logic of the dominant scale (it privileges the entities or realities expanded across all the globe, and designates other realities as local and particular. The entities or realities defined as such are limited to scales that do not allow them to be credible alternatives to what exists at a universal or global mode, and lastly 5) the productivist logic (imposes the criteria of capitalist production. The non-existence is produced under the form of the unproductive which applied to nature implies sterility and applied to work laziness).

The Pjiekakajoo Knowledge is produced as non-existent by the logic of the monoculture of knowledge, it is labeled as traditional and local by the monoculture of lineal time, and its holders are treated as an inferior and lazy race that do not want to exploit their natural resources. The five forms of non-existence can be applied to the Pjiekakajoo and their heritage: ignorant, disposable, inferior, local and unproductive.

The antidote for this is the expansion of the present, amplifying what is considered contemporary, in such a way that all the practices and experiences that exist simultaneously can be considered contemporary, in their own way. This supports one of my main interests, to situate the Pjiekakjoo knowledge and everyday life in the real dimension in which it exists, not in a static time trapped in a bubble, as many people conceptualized Indigenous societies, but immersed in intense social, economic and cultural dynamics embedded in the modern world.

De Sousa states that monocultures can be replaced by ecologies, these being aggregation practices of diversity through the promotion of sustainable interactions among partial and heterogeneous practices. He outlines five ecologies:

Ecology of types of knowledge (saberes) questions the monoculture of scientific knowledge. It means developing the idea that there is neither general ignorance nor general knowledge (idea also expressed by Freire and mentioned in the chapter II). It is crucial, as part of this ecology, to question if what is going to be learned is valid or should be forgotten or unlearned. Ignorance is just a form of disqualification when the facts that are going to be learned are more valued than what is about to be forgotten. The utopia of the interknowledge (*interconocimiento*) is to learn new knowledge without necessarily having to omit the previous acquired and the own that belongs to the own culture. This is something that the Indigenous people have had to do as soon as they enter formal education. In Mexico bilingual schools rarely imply a bi-cultural education, and the only factor considered is language, leaving aside the heritage that Indigenous knowledge represents. Furthermore, this knowledge is not only ignored in the formal education, but also dismissed and underestimated. De Sousa (2009) claims it is urgent to contrast the social injustice that underlies cognitive injustice, there are only certain groups that have access to the knowledge considered legitimate that they use for their benefit. Social scientists must work for the recognition of the fact that scientific knowledge has limits and that it recognizes alternatives forms of knowledge and relates to them in equal terms. The Ecology of different types of knowledge does not imply discrediting of scientific knowledge, but to use the former as part of counterhegemonic practices, and the creation of a new relation between the different types of knowledge that gives equal opportunities to all, looking for the maximization of the contributions of each of them to the construction of another possible world, of a more just and democratic society, with a more equilibrated relation with nature. The debate about the ecology of different knowledge should be accompanied by cognitive, ethical and political judgements.

The ecology of different types of knowledges (*saberes*) can be a key element of the emancipatory struggles that are taken place mainly in the south; these give voice to the resistance to the global capital and in doing so makes visible the social and cultural realities in which knowledge that is neither scientific nor Western persists.

Ecology of temporalities confronts the monoculture of lineal time, proposing that it is only one of many conceptions that exist of time. If this is recognized, then the peasants' agricultural activities are not residual but contemporary to high tech agriculture. I consider that this has important implications, it implies a new logic under which to consider and face the ever changing developmental policies, which neither recognize different types of knowledge nor different modes of production, which has had serious consequences on the environment.

Ecology of recognitions implies the recognition of social and cultural diversity. It promotes the concept of an individual or collective multicultural citizenship that acquires a more relevant meaning in the struggles for cultural and political recognition, as well as economic and social redistribution.

Ecology of transcales, it implies the simultaneous recovery of the hidden universal aspirations and of the local/global scales that do not result from hegemonic globalization. This is a term that indicates the specific impact of hegemonic globalization on the local: globalized localism. The ecology of transcales includes the links that have been created among local formations as points of resistance and generation of an alternative globalization.

Ecology of the Productivities proposes the recuperation and valorization of alternative systems of production. This is the most controversial one as it questions the infinite economic growth and development paradigms.

These ecologies are the proof that reality cannot be reduced to what exists; it is about an amplified version of realism, that includes the absent realities that are silenced and the marginalized realities that are actively produced as non existent.

The greater the multiplicity and diversity of the available and potential experiences, the greater the expansion of the present and the contraction of the future. This multiplicity and diversity will be more evident in certain fields, one related to the experiences of different types of knowledge. In this there are conflicts and possible dialogues between the different

forms of knowledge. The most important experiences are those in the domain of biodiversity (between biotechnology and traditional and Indigenous knowledge).

The works of translation are those that allow creating mutual intelligibility between the different available and potential world experiences. Translation between two or more cultures has the objective of identifying the concerns and potential approaches of one to the other. It operates under the diatopic hermeneutics: the idea of the impossibility of cultural completeness. The work of translation is possible among different types of hegemonic knowledge and non-hegemonic knowledge, as well as among different non-hegemonic types of knowledge, the latter crucial, as it is the aggregation of the non-hegemonic knowledges that makes possible building a counter-hegemony in a cognitive and practical way. The work of translation is therefore an intellectual and political work.

De Sousa (2009) suggests *contact zones* in which this translation should be done, these are social fields in which practices, norms and different types of knowledge meet each other. The contact zones of Western modernity are the epistemologic zones where modern science and other type of knowledge meet, characterized by the unequal power relations between them. It corresponds to each type of knowledge and practice to decide what is set and with whom in a contact zone. One of the main contact zones is the one represented by biodiversity, as it is here that biotechnological knowledge and the traditional/Indigenous/local knowledge meet. Social and Indigenous movements seek to remove the imperial relation between scientific knowledge and the traditional/Indigenous, by creating new zones of contact in which the relations are more horizontal. This is possible due to an unprecedented work of translation.

One of the dangers in this new zone of contact, De Sousa warns us, is the erasure of history. It is necessary to remove the label "residual" that has been given to certain practices and knowledge, and reposition them within contemporaneity. This is very important in contact zones where power imbalance has been very disproportionate, and there is a risk to consider that the history of certain knowledge or practice starts with its presence in the contact zone. For example it would be totally wrong to consider CIK existence and importance started at the point when it became relevant for the management and conservation of natural resources and the development of biotechnology. For the specialists on CIK this may sound impossible, but for scientist in the area of biotechnology or conservation biology it may not as their interest and training is considerably different.

De Sousa (2009) firmly states that translation should be done in such a way as to create an alternative to indolent reason, a cosmopolitan reason that proposes that global social justice is not possible without global cognitive justice. It is necessary to create solid constellations of different types of knowledge and practices that become credible alternatives to neoliberal globalization, and its zeal to include the whole world in its trade logic.

“The possibility of a better world does not belong to the distant future, but in the reinvention of the present. The objective of the translation work among different types of knowledge is to create a cognitive justice based on the epistemological imagination. The work of translation creates the conditions for the concrete social emancipations of concrete social groups.....”

Sousa Santos, 2009:151

Conclusions

Through an analysis of some of the public policies design for the National park and the most important actors that have been present in the Pjiekakjoo Communities, I demonstrated that the concept of biocultural diversity has not been applied to address the environmental, social and cultural issues that exist in the region. The Pjiekakjoo should be ready to face the challenges that the external interests, particular and governmental, may have in their knowledge and natural resources. Through this chapter I showed the importance of getting to know the context in which the CIK is produced and reproduced in order to get a deeper understanding of the actions that can be taken to guarantee its survival. Finally, I proposed De Sousa (2009) new rationality as a theoretical framework where to situate the present research, my aim was that my research be a work of translation needed to contribute through the sociology of the emergences to achieve cognitive justice.

IX. General Conclusions

The Pjiekakjoo (Tlahuica) people and their culture live in the middle of an ever more globalized world, in which they are immersed through complex economic, political, social and cultural relations. The Pjiekakjoo culture is dynamic and has been able to adapt to the always changing conditions and has managed to survive for generations. These generations have inhabited the same territory and developed a deep knowledge-practice-belief system about it, commonly called Traditional Environmental Knowledge (TEK) and that in the present research I will also refer to as Indigenous knowledges or Contemporary Indigenous Knowledges (CIK), in an effort to recognize their contemporaneity and diversity always locating them in their historical context. These systems of knowledges represent part of the living immaterial cultural heritage of this ethnic group and of the country that is characterized by a biological and cultural diversity that together constitute what is termed biocultural diversity.

The Pjiekakjoo communities have been in the middle of a fight to keep control over their territory and to continue their cultural survival. They have undertaken an agrarian struggle for decades against the neighboring towns that claim part of their land; they have been denouncing and combating the illegal logging and the powerful economic and political interests behind it; with the Zempoala Lakes National Park, located in part of their territory, they have faced state intervention in their internal affairs and public policies based on outdated concepts of biological conservation that have dismissed their cultural heritage. To these threats should be added the potential threat of bioprospecting projects, visible in the constant attentions of different NGOs and companies.

The Pjiekakjoo communities have reacted in different ways to the above mentioned pressures. An important part of the population is actively resisting by defending their communal organization and fighting to maintain the independence of their communal authorities, such as the *Comisariado de Bienes Comunales*. The other communitarian proposal has been the implementation of an Ecotourism project that struggles to establish a more holistic biocultural approach.

The present research addresses one of the most relevant demands addressed to ethnobiologists by the communities with which we work, and that is to document their knowledges in a more holistic manner and to contextualize them in the economic, social, political and cultural realms in which their holders have to live and negotiate their everyday lives.

The present research documented the Pjiekakjoo knowledges in their context through a collaborative research project that responded to my academic interests as well as to those of the communities and that fully recognized Indigenous people as subjects. In doing so we have clearly stated that ethnobiological research should be formulated in relation to the potential benefits it can bring to the Indigenous communities, especially because of the contributions it represents for the continuous production and reproduction of their knowledge, or what has been called its conservation *in situ*, and the improvement of their quality of life. The proposed methodology was developed around workshops geared around a "diálogo de saberes" (knowledge dialogue) based on mutual trust and equality among the different participants, an empowering framework. The methodology was also organized such that the Pjiekakjoo could visualize living conditions different than the ones they actually face; this demanded that the research team not only document the knowledge and its status but that it also promote concrete actions that would help to accomplish one of the main objectives, the re-socialization of the Pjiekakjoo environmental knowledges and its revalorization among different groups within the communities. One of the main objectives of the workshops was to emphasize the communal nature of Pjiekakjoo knowledge and rights over it, something frequently dismissed by researchers who tend to focus at the individual level and dismiss communal property rights. The production of didactic materials for the delivery of the results to participants was one of the successes of the project and an important precedent for future projects. The production of CDs, vocabulary lists, pictures, banners and exhibitions guaranteed that the people interested can have access to the systematized information.

The participative research was essential to move beyond the mistrust that Indigenous people have in relation to research and researchers. As active participants in the project the power that they wielded was different, as they had control over the information that was being recorded, the ways the process was developed and the type of results desired. A written agreement that clearly established the responsibilities and commitments of the communities as well as those of the researcher was one of the key design elements that permitted the development of the project. Such a process has no antecedents in Mexico, therefore it represents an important contribution for the development of the field that points to the lack of regulation that the country suffers at the level of the communities, educational institutions and the state. The collaborative methodology allowed the holders of the knowledge to keep control of the type and amount of recorded information, the manner that the process was undertaken as well as its final objectives. This prevents the

misuse of the information as there are no compulsory legal protocols for researchers to work with Indigenous knowledge systems in Mexico.

Using Freire's proposal of education as practice of freedom, workshops were held and also activities organized in the primary, middle and high schools of the communities. I consider that Pjiekakjoo knowledge is a perfect tool for people to become aware of, and think thoroughly, through some of the issues that they are facing, such as natural resource management, Indigenous people's rights, cultural survival, biocultural conservation, and in general the present and future of the Pjiekakjoo people.

It was mainly the co-research, through extensive participant observation in the everyday life of the communities and open and closed interviews, that made it possible to register an impressive amount of Indigenous knowledge about a wide range of biological groups and of which exist few comparable antecedents in Mexico (e.g., Hunn, 2008) at the national level. This more holistic view responds to the local reality more than fragmented research that only touches upon certain parts of their knowledge system. This was a first step that will allow us to continue with more detailed research. The holistic perspective embraced in the present project demonstrates the necessity of conducting inter disciplinary work, and this was possible thanks to the participation of diverse colleagues from each of the areas studied.

The participatory methodology assured that the research was conducted under a democratic framework and that the information documented and systematized would be useful for the people, and it resulted in an empowering process as Pjiekakjoo participants got a better comprehension of their knowledge and its value.

In anthropological research it is necessary to discuss and be aware of how certain variables such as gender may affect the process. As a woman researcher I have to face and overcome obstacles that are not the same as those a male anthropologist would have to deal with. The micropolitics of the communities and all the internal struggles should also be considered more carefully in the discussions about research as they have direct impacts on the way it is conducted, and anthropologists should define their role/participation in them. In the present case I had to pass beyond the constraints of being a woman who wanted to work in a male dominated arena: all the *delegados*, *comandantes* and members of the Comisariado de Bienes Comunales are men for whom in more than one sense I represented a social/conceptual challenge; and I was also limited by security issues. The other important issue I had to overcome was the political

division of the community during my research and the tensions and adjustments that it produced in the region.

The present research documented the names, uses, myths and stories that the Pjiekakjoo people give to an extensive variety of living organisms: mushrooms, invertebrates, vertebrates and plants. This implied an enormous challenge, but I am certain that it was only in this way that we could get a fair representation of the depth and complexity of the Pjiekakjoo knowledges. Moreover, this complex and broad approach responded to the interest of the people involved in the project, as they clearly express their opposition to recording only fragments of what they know; due to time constraints we did so nonetheless, as we did not delve into the knowledge they have about domestic organisms.

We documented 77 taxa that include at least 74 species of wild edible mushrooms, and the knowledge associated with them in relation to the times of collection and requirements for their preparation. Of the mushrooms recorded we obtained 64 names in Pjiekakjoo and 112 in Spanish.

In respect to known invertebrates, we documented 70 taxa, taxonomically distributed in three phyla: Arthropoda (65), Mollusca (2) and Annelida (1). For these organisms, we documented 56 names in Pjiekakjoo and 66 in Spanish. Only 35 categories received at least one of the following uses: edible, medicinal, recreational, ornamental, aphrodisiac and flavoring. Nine categories were found to be associated with a belief or as an omen. I argue that the relations with the invertebrates, mostly arthropods, is a complex one that goes beyond utilitarian interests, and that also the perceptions about them, contrary to what prevails in modern societies, are not negative.

Only two fish were registered, the carp and the *mexcalpique*, of the taxon *Liju*. Twenty taxa of amphibians and reptiles were recorded which correspond to 22 scientific species; out of which four species are edible, two associated with beliefs, one of which has also a medicinal and ornamental use (the rattlesnake). We documented 59 taxa which correspond to 58 species of birds. The Pjiekakjoo use 66 names in Spanish and 53 in their own language for this group of living beings. Thirty taxa of birds are considered edible, four as medicine, nine have an ornamental use and six a commercial interest. Two taxa are used as amulets and 12 are associated with a belief or considered omens. The Pjiekakjoo recognized 23 taxa of mammals, which correspond to 27 species of which 15 receive a name in Pjiekakjoo. We documented eight categories that are edible, ten that are used as medicine, eight that are used for ornamental purposes and four associated with beliefs.

Based on the information recorded I can assert that the utilitarian approach is not the determinant variable in the naming and recognition of the animal kingdom by the Pjiekakjoo, and I can sustain my proposal that if this kingdom may have less practical value than that of plants, it does have an impressive amount of symbolic importance.

We decided to include the basic knowledge about *the milpa*, therefore the cycle for planting the corn was documented as well as the basic nomenclature around the corn plant and the types of corn they know. The production of corn has kept its cultural importance despite no longer being a profitable activity, and it is around that production that much of communitarian life is organized and social ties are reinforced through the rituals associated with it.

The most important categories of useful plants were documented. In total 103 taxa were recorded, which receive 101 names in Spanish and 63 in Pjiekakjoo. These categories correspond to 22 edible plants, 63 medicinal and 18 of an ornamental nature.

With the exception of the initial interest that some of the Spanish colonizers had for the documentation and systematization of Indigenous knowledges (e.g. Fray Bernardino de Sahagún), in general these systems have been dismissed through history by Western Science. This has limited the opportunity of having access to different forms of understanding about the world. Social scientists researching TEK should commit themselves to assuring that these systems of knowledge become fully recognized as valid and that their inheritors have the possibility to decide to what extent, and how, they want to use them. Part of this process demands a dialogue that challenges the traditional divisions of sciences as it requires holistic perspectives that include the biological, cultural, economic, political, social and technical spheres.

Indigenous knowledges confront some of the ideological pillars of the capitalist economic system which operates under the premise that there is a dichotomy between humans and "nature." In this respect, the study of TEK may contribute to the evaluation and redefinition of public policies, development projects and the destructive objective of economic growth at any cost.

The Pjiekakjoo culture-forest relationship embodied in their knowledge is an example of a respectful way of relating with the environment. Several of the community members are aware of the close links that exist between the forest and human survival. What for them is a basic premise is frequently overlooked by modernizing projects.

The Pjiekakjoo knowledges are also a pillar for the management and maintenance of Common Property Systems. It has been proposed worldwide that the documentation of Indigenous knowledge systems should represent a tool in the struggle that many communities face in order to keep control over their cultural and natural heritage and the recognition of their rights.

Indigenous knowledges represent the deep relationship that Indigenous people have established with their environment through many years and they represent an essential resource not only in economic terms, but also in an emotional and psychological sense, as it is through this relationship that the *cosmovisión* of a culture is in part developed and that gives sense and cohesion to the group. This does not preclude the study and analysis of these knowledge systems for the development of projects that would help to improve the living conditions of their owners, as long as such studies and analysis also clearly include the Pjiekakjoo knowledges as a whole and the cultural heritage they represent over all. This type of proposal could include such things as the establishment of wildlife management units and the cultivation of resources like wild edible mushrooms and edible insects.

The dialogue between different types of knowledge or "*interculturalidad*" is one of the main proposals for giving all this knowledge its correct value and place in society. It includes developing an adequate educational system in which there would be room for different epistemes.

Some of the main challenges that research in ethnobiology should address with greater emphasis are issues such as the way that Indigenous knowledges are actually produced and reproduced and the intracultural variability of them due to variables such as gender, age and schooling as well as inter-ethnic relations and the migratory experience. Even though we did not gather quantitative data to address the intracultural variability of Pjiekakjoo knowledges, there are some trends that the data recorded allowed us to identify. In general men are considered to be more knowledgeable about "*el monte*" (the forest) than women, as men spend more time in that habitat. An important exception would be the mushrooms, as the knowledge about them is comparable between men and women in relation to the recognition of species. However, women know more about preparing them. Women are considered to be more knowledgeable about plants and healing practices, especially married women and those who have already raised their children, as they are considered to have more experience.

Sadly there is evidence of a trend toward the erosion of Pjiekakjoo knowledges,. The gap between generations is considerable but this also shows some variation according to the group of living organisms. For example, the Pjiekakjoo vocabulary for most living beings is hardly known by the younger generations, but in contrast the wild edible mushrooms are widely known, as are many of the symbolic value related to several animal species. Through the intergenerational interactions that occurred through the workshops it was easy to perceive how the younger generation's concepts about the living world are very much informed by their formal education and how it tends to displace the "traditional" concepts.

The main aspects of the migratory experience were documented, as it is of particular relevance to the field of study because of the debate about the future of the Indigenous systems of knowledge. On the one hand there is the view that TEK is eroding and its practical value has declined as communities become dependent on remittances and are ever more immersed in the globalized world. On the other hand there is the view that sees knowledge systems as adaptive, an essential part of the multi-sited place-making experience and relevant to redefined ethnic identities. In the present research I did not gather enough evidence to faithfully describe the particular dynamic that Pjiekakjoo knowledges are following within the Pjiekakjoo communities, but I did find that the migratory experience enhanced the possibilities of this knowledge being preserved, as the migrants with whom I collaborated are more aware than the non-migrants of the importance of their cultural heritage. This change of attitude and level of awareness in some community members has already shown its relevance, as several of them have led the effort for the independence of the *delegación* of Teocalcingo and have agreed to work actively on the documentation of their environmental knowledge.

I did find some evidence that suggests that at least part of this knowledge continues to be used on the other side of the U.S. border. Thus I can define Pjiekakjoo knowledges as placed based but not place attached. Other issues, such as the effect of long absences of the parents, need to be carefully analyzed, as on the one hand this may imply the lack of a teacher to pass on Pjiekakjoo knowledge, but on the other, the direct learning of the children may revert to the grandparents.

More detailed research needs to be done to understand more deeply the production and reproduction of the Pjiekakjoo knowledges and their interaction, not only with Western knowledge but with other Indigenous knowledges, as in the contemporary society the Pjiekakjoo are in close relation with people from other Indigenous groups more intensely

than ever before, though this interaction has certainly occurred historically to an unknown extent.

The changes that Indigenous Knowledge experience should be carefully analyzed; but certainly they do not mean, the death of the Indigenous cultures. The adoption of foreign practices and values, even with their negative impact, does not imply a passive response of the Indigenous people to the impositions of hegemonic life models. Instead it is about changes, of re-interpretative processes through which this people negotiate their participation in those models and they look to appropriate other frameworks (Cano et. al 2009

Social scientists need to adopt more flexible positions in relation to their analytical tools and the labels they use. How "traditional" is traditional knowledge? How adaptable are contemporary Pjiekakjoo knowledges?, To what extent are Pjiekakjoo knowledges exclusively Pjiekakjoo?, Are Pjiekakjoo peasants, migrants, traders, professionals or are they all these at different times and places? Are systems of knowledge eroding or surviving? I think the contemporary societies demand flexible frameworks instead of tight labels, which would allow us to better comprehend the fluid mosaic that these social phenomena are.

The present and future of the vast amount of knowledge that was documented in the present research is determined by the context. which I have described in relation to the existence of a national park in part of the Pjiekakjoo territory, the land struggles they have been facing for decades, the environmental issues such as the illegal logging, the development of their communitarian ecotourism project and the national and transnational migration that results from diverse failed public policies in the country.

The national park and its policies operate under a biological conservation agenda that considers mostly the biological heritage of the region and has not successfully incorporated the cultural heritage. I hypothesize that TEK is also transmitted or not according to its relevance for everyday life in the community, therefore the banners about the use of animals should be reconsidered as they may be affecting the reproduction of CIK as the younger generations do not have access to this resources anymore. I propose that beyond the mere utilitarian aspect, it is necessary to develop more holistic public policies that consider the cultural/symbolic value of the use of some species for the cultural survival, as has occurred in other countries. For example, the Pjiekakjoo do not need to hunt deer to feed themselves, but if they would be allowed to hunt a few per year, this

would allow for the continuity of all the knowledge that exists around this practice and that is also related to the reinforcing of communitarian ties.

Land struggles, illegal logging and the intra communitarian conflicts over the control of the forest are also affecting the Pjiekakjoo Knowledge systems, as people for security reasons cannot have access to the forest as much as they used to some generations ago. To the extent that the Pjiekakjoo do not control their natural heritage and are not supported effectively by the government and civil society against illegal logging and environmental degradation in general, they will not have a more unified vision of what they want to do in relation to their natural and cultural heritage and it will not be possible to promote the preservation of their systems of knowledge and the biological diversity of their forest, as well as their cultural survival and access to better life conditions.

This project addressed several of the most important issues with regard to Indigenous people's demands. We worked for the revitalization of the Pjiekakjoo culture. This encompassed education and community-based programs. We promoted connectedness within the community and with other external actors. We emphasized humanizing methods throughout the research process, treating the participants at all times with respect. We worked to develop different representations of Indigenous people than those that predominate in the society at large. These are of particular importance, as these new representations are created by the Pjiekakjoo themselves. We worked toward envisioning different and more favorable conditions for present and future Pjiekakjoo generations. We promoted the possibility that the Pjiekakjoo people would continue to name the world in their own language and to protect their cultural heritage;. We worked on developing our creativity to face new challenges and achieve different goals. We explored the bridges that can be constructed between Pjiekakjoo knowledges and science in different realms, such as education and community development projects. Finally, through the project we shared knowledge, demystifying research, and will continue sharing the results, but this time with a wider audience.

Our work is a contribution to the translation work needed, along with the sociology of absences and the sociology of emergences, to adopt *cosmopolitan reason*, as proposed by De Souza (2009), to replace *indolent reason*. The former represents a new space-time in which there is room for different types of knowing that question the logic of the monoculture of knowledge through the ecology of types of knowledge, and that appeal for cognitive justice.

The Pjiekakjoo knowledges represent an immense living cultural heritage for its inheritors that should be valued at the community, regional and national levels and included in the public policies of the region. The present project contributed significantly to achieving this through the documentation and contextualization of the Pjiekakjoo knowledges which can definitely contribute to the development of projects that can be designed in consideration of the human-nature continuum in this particular ecological and cultural context. These processes would be possible only through the active and empowered action of the Pjiekakjoo people with the work and support of academicians. Together we can manage to extend the limits of Indigenous cultures, contribute to the blooming of the enormous potential of the immaterial cultural heritage of Indigenous people and fight against the injustice and highly asymmetric living conditions actually present in Mexican society.

“Another world is possible, let's keep working to get it”

List of References

- Aboytes, R. D. (1998). *Exploración Etnoentomológica en el Ejido X' hazil sur y anexos, Quintana Roo, México*. Resúmenes del III Congreso Mexicano de Etnobiología. Asociación Etnobiológica Mexicana. México.
- Agrawal, A. & E. Osroteom. (2001). *Collective Action, Property Rights and Decentralization in Resource use in India and Nepal. Politics and Society*. Washington, D.C.
- Agrawal, A. & Gibson, C. (1999). Enchantment and Disenchantment: The role of community in Natural Resource Conservation. *World Development*, 27 (4), 629-649.
- Agrawal, A. (1995). Dismantling the divide between Indigenous and scientific knowledge. *Development and change*, 26, 413-439.
- Agrawal, A. (2002). Indigenous knowledge and the politics of classification. *International Social Science Journal*, 54(3), 287-297.
- Aguilar, M. X., (Coord). (2007). *Vertebrados del Estado de México*. Universidad Autónoma del Estado de México. México.
- Aguilar, M. X., & Casas, G. A. (2009). Anfibios y Reptiles. In: Ceballos, G., L., Rurik, Garduño, G., López, R., Muñózcano, M. J., Collado, E. and E., Jaime. *La Diversidad Biológica del Estado de México. Estudio de caso*. Colección Maydor. CONABIO. Gobierno del Estado de México. México.
- Alarcón, L. R.R. (2011). La biopiratería de los recursos de la medicina indígena tradicional en el Estado de Chiapas, México —El caso ICBG-MAYA—. *Revista Pueblos y fronteras digital* 6 (10):151-180.
- Alcántara, G. (2003). *Las Aves según la percepción en importancia actual para los zapotecos de San Miguel Tiltepec (Distrito de Ixtlan), Oaxaca: Un estudio etnozoológico*. Master Tesis. Universidad Nacional Autónoma de México.
- Alcorn, J. (1994). Noble savage or noble state?: northern myths and southern realities in biodiversity conservation. *Etnoecológica* 3:7-19.
- Aldasoro, E. M. (2009). *Etnoentomología*. In: La diversidad biológica del Estado de México. Estudio de Estado. (Comp.): G. Ceballos, R. List, G. Garduño, R. López, M.J. Muñozcano, E. Collado y J. Eivin. Colección Mayor. Estado de México Patrimonio de un Pueblo. CONABIO. Gobierno del Estado de México. UNAM. 299-304 pp.
- Aldasoro, E. M. (2001). *Etnoentomología de la comunidad Hñähñu El Dexthi-San Juanico, Ixmiquilpan, Hidalgo, México*. Tesis de Licenciatura. Universidad Nacional Autónoma de México. Facultad de Estudios Superiores de Iztacala. México. 125 pp.
- Aldasoro, E.M. (2007). *The Nuu savi (Mixtec) ethnozoological knowledge in a transnational community*. 30th Annual Conference. Society of Ethnobiology. University of California-Berkeley. USA.
- Aldasoro, E.M. (2010). *Insectos útiles en la Cultura Pjiekakjoo (Tlahuica)*. XLV Congreso Nacional de Entomología. Sociedad Mexicana de Entomología A.C. Puerto Vallarta, Mexico. 56-62.
- Aldasoro, E.M. & Maya, B.R.G. (2010). *La Conservación in situ del conocimiento ambiental Pjiekakajoo (Tlahuica) a través de actividades técnico-pedagógicas*. In: Moreno, F. A., Pulido, M.T., Mariaca, S. R., Valadez, M. R., Mejía, P. C., Gutiérrez, T.V. 2010. *Sistemas Biocognitivos Tradicionales. Paradigmas en la Conservación Biológica y el Fortalecimiento Cultural*. Asociación Etnobiológica Mexicana A.C., Global Diversity Foundation. Universidad Autónoma del Estado de Hidalgo. El Colegio de la Frontera Sur. Sociedad Latinoamericana de Etnobiología.
- Aldasoro, E.M. & Hunn, E. (2003). *Ethnoentomological Knowledge of teenagers in San Juan Mixtepec, Oaxaca, Mexico*. 26th Annual Society of Ethnobiology Conference. Ethnobiology and Sustainability. March 2003. University of Washington, Seattle.
- Alderete, E. (2005). *Los pueblos indígenas en el contexto global*. En: Alderete, Ethel (Wara). *Conocimiento indígena y globalización*. Abya yala. Ecuador.

- Álvarez-Fabela, L. (2006). *Tlahuicas, Pueblos indígenas del México contemporáneo*. Comisión Nacional para el Desarrollo de los Pueblos Indígenas
- Álvarez F., R. L. & Monterrosas, F. J. (1996). *San Juan Atzingo. El caso de una minoría étnica en el Estado de México*. Tesis de Licenciatura en Antropología Social. Toluca: Facultad de Antropología de la Universidad Autónoma del Estado de México.
- Alves, R., R.N. and H. N. Alves . (2011). The faunal drugstore: Animal-based remedies used in traditional medicines in Latin America. *Journal of Ethnobiology and Ethnomedicine* 2011, 7:9. Retrieved January 7 2012. <http://www.ethnobiomed.com/content/7/1/9>.
- Amils, R., Quintanilla, J.C., Cleaves, H.J., Irvine, W.M., Pinti, D., Viso, M. & Gargaud, M.(editors). (2011). *Encyclopedia of Astrobiology*.Springer.France
- Anderson, E. (1995). *Political Ecology in a Yucated Maya Community*. University of Arizona Press.
- Anguiano, M. (2003). *Las culturas indígenas vistas por sus propios creadores*. Capacitación para el desarrollo cultural indígena. Miguel Ángel Porrúa. México.
- Antweiler, C. (1998). Local knowledge and local knowing. An anthropological analysis of contested "cultural products" in the context of development. *Anthropos* 93, 469-494.
- Appadurai, A. (1996). *Modernity at large. Cultural Dimensions of Globalization*. Minneapolis, Minn. University of Minnesota Press.
- Ardón, M. (2001). Métodos e instrumentos para la investigación Etnobiológica participativa. *Etnoecológica* 6(8), 129-143.
- Argueta V., A, Corona-M, E. & Hersch, P. (Coord.)(2011). *Saberes colectivos y diálogo de saberes en México*.UNAM. México.
- Argueta V., A, Corona-M, E. , Alcántara, G. S., Aldasoro, E.M. & Serrano-Velázquez, R. (2011). *Historia y situación actual de la Etnozoología en México* .II Congreso Latinoamericano de Etnobiología, VIII Simpósio Brasileiro de Etnobiología y Etnoecología, y II Encuentro Pernambucano de Etnobiología y Etnoecología. Noviembre de 2010. Recife, Pernambuco.
- Argueta V. A. (2008). *Los Saberes Purhépecha. Los Animales y el Diálogo con la Naturaleza*. Universidad Michoacana de San Nicolás de Hidalgo. Universidad Nacional Autónoma de México. Gobierno del Estado de Michoacán. Universidad Intercultural Indígena de Michoacán. Gobierno del Estado de Michoacán. Programa de Naciones Unidas para el Medio Ambiente.
- Argutea, A., Corona, E. M., Alcántara, S.G., Aldasoro, M.,E.M., Serrano V., R., Teutli, S.C., Santos-Fita,D., & Astorga, D.M. on press. *Historia, situación actual y perspectivas de la Etnozoología en México*.
- Arita, H. T. & Rodríguez, G. (2004). *Patrones geográficos de diversidad de los mamíferos terrestres de América del Norte*. Instituto de Ecología, UNAM. Base de datos SNIB-Conabio proyecto Q068. México, D.F.
- Armstrong, A. & Banks, S. (2011). *Co-inquiry and related participatory and action approaches to community-based research*. Report Centre for Social Justice and Community Action, Durham University.
- Balick, M. J., Kronenberg, F., Ososki, A.L., Reif, M., Fugh-Berman, A., B. O` Connor, M., Roble, P. Lohr & Artha, D. (2000). Medicinal plant used by Latino healers for womens health conditions in New York City. *Economic Botany*. 54, 344-357.
- Bannister, K. 2006. Commentary on Rosenthal, J.P. (2006).Politics, Culture and Governance in the Development of Prior Informed Consent in Indigenous Communities. *Current Anthropology*, 47(1), 119-142.
- Barabas, A. (2001). *Traspasando Fronteras: Los migrantes indígenas de México en Estados Unidos*. *Cuadernos del Sur. Ciencias Sociales*, 7(16), 97-110.
- Barnhardt, R. & Kawagley, A.O. (2005). Indigenous Knowledge Systems and Alaska Native Ways of Knowing. *Anthropology and Education Quarterly*, 36 (1), 8–23.

- Barragan T.D. (2009). Si no la haces, ¿De qué vives? Le vamos a enseñar poco tlapaneco": Un desplazamiento lingüístico en proceso entre migrantes mi'phaa (tlapanecos de Tlacoapa) en Tlaquepaque, Jalisco, México. Cuadernos Interculturales, 7(12), 21-46.
- Barragàn T. D. (2010). De cómo realicé mi primer trabajo de campo con migrantes me'phaa en Tlaquepaque: compartiendo estrategias metodológicas para abrir los ojos. No. 6 de Estudios Sociales Nueva Época.
- Barreda, A. n/d. *Biopiratería, bioprospección y resistencia: cuatro casos en México*. Retrieved from http://rimd.reduaz.mx/coleccion_desarrollo_migracion/enfrentando_la_globalizacion/Enfrentando11.pdf.
- Barrera B. D. & Oehmichen, C. B. (2000). Migración y Relaciones de género en México. UNAM. IIA (Instituto de Investigaciones Antropológicas).GIMTRAP A.C. México.
- Bautista-Nava, E. A., Moreno-Fuentes, Ma. T., Pulido S., Valadez, R., Ávila, R. P. (2010). *Bases Bioculturales para el aprovechamiento y conservación de los Hongos Silvestres Comestibles en el Municipio de Tenango de Doria, Hidalgo, México*. In: Moreno, F.A., Pulido, M.T. S., Mariaca, R. M., Valadez, R. A., Mejía, P. C., Gutiérrez, T.V. (2010). *Sistemas Biocognitivos Tradicionales. Paradigmas en la Conservación Biológica y el Fortalecimiento Cultural*. Asociación Etnobiológica Mexicana A.C., Global Diversity Foundation. Universidad Autónoma del Estado de Hidalgo. El Colegio de la Frontera Sur. Sociedad Latinoamericana de Etnobiología.
- Bazán E., M.J., Olvera, C.I. & Pohlenz de Tavira, A. (2009). *El ICBG-maya y los riesgos de la bioprospección en Chiapas*. In: Del saber indígena al saber transnacional. A. Betancout P. and José E. Cruz M. Universidad Nacional Autónoma de México.
- Beletsky, L. (2007). *The Bird Songs Anthology*. San Francisco: Chronicle Books.
- Bellon, M. R. (1993). Conocimiento tradicional, cambio tecnológico y manejo de recursos: saberes y prácticas productivas de los campesinos en el cultivo de maíz en un ejido del estado de Chiapas, México". In: E. Leff and J. Carabias (Coord.). *Cultura y Manejo Sustentable de los Recursos Naturales*, Vol. II. México. CIIH-UNAM. Miguel Ángel Porrúa. México. Pp. 297-328.
- Belsky, J.M. (1999). Misrepresenting Communities: The Politics of Community-Based Rural Ecotourism in Gales Point Manatee, Belize. *Rural Socology*, 64(4), 641-666.
- Benz, B. Cevallos, J., Santana, F., Rosales, J. & Graf, S. (2000). Losing knowledge about plant use in the sierra de Manantlán Biosphere Reserve, Mexico. *Economic Botany*, 54: 183-191
- Berkes, F. (1999). *Sacred Ecology*. Traditional Ecological Knowledge and Resource management. Taylor and Francis. USA.
- Berkes, F. & Folk, C. (1998). *Linking social and Ecological Systems*. New York: Cambridge University Press.
- Berlin, B. (1992). *Ethnobiological classification: principles of categorization of plants and animals in traditional societies*. Princeton University Press.
- Besserer, F. & Kearney, M. (Ed). (2006). San Juan Mixtepec una comunidad transnacional ante el poder clasificador y filtrador de las fronteras. Universidad Autónoma Metropolitana (UAM), Casa Juan Pablos, Fundación Rockefeller, Universidad de California Riverside. México.
- Besserer, F. (2004). Topografías transnacionales. Universidad Autónoma Metropolitana (UAM). Plaza y Valdés Editores. México.
- Betancourt, P. A. (2009). *El corredor Biológico Mesoamericano: tecnologías apropiadas, conservación de la biodiversidad y saberes indígenas*. In: Del saber indígena al saber transnacional. A. Betancout P. and José E. Cruz M. Universidad Nacional Autónoma de México.
- Betancourt, P., A. & Cruz, E. (2009). Introducción del Saber Indígena al Saber Transnacional. La apropiación supranacional de conocimientos tradicionales sobre ecología. In: Del saber indígena al saber transnacional. A. Betancout P. and José E. Cruz M. Universidad Nacional Autónoma de México.
- Bicker, A.,P., Sillitoe & J. Pottier. (Eds.) (2004). *Investigating Local Knowledge. New Directions, New Approaches*. Ashgate.

- Birol, E., Rayn, E. & Smale, M. (2007). *Farmer Preferences for Milpa Diversity and genetically Modified Maize in Mexico*. A Latent Class Approach. International Food Policy Research Institute Discussion Paper. Retrieved 4 June 2011 <http://eprints.ucl.ac.uk/18722/1/18722.pdf>
- Blancarte, R. (1987). Diccionario biográfico e histórico de la revolución mexicana en el Estado de México. Instituto Mexicano de Cultura / Colegio Mexiquense A. C. / Gobierno Estado de México.
- Blumenfield, T. (2010). *Scenes from Yongning: Media Creation in China's Na Villages*. University of Washington Department of Anthropology. Doctoral Dissertation.
- Bock, P. (1980). Tepoztlán Reconsidered. *Journal of Latin American Lore*, 6(1), 129-150.
- Boege, E. (2008). *El Patrimonio Biocultural de los pueblos indígenas de México. Hacia la conservación in situ de la biodiversidad y agrobiodiversidad en los territorios indígenas*. Instituto Nacional de Antropología e Historia. Comisión Nacional para el Desarrollo de los Pueblos Indígenas. México.
- Bonfil-Batalla, G. (1986). *México Profundo. Una Civilización Negada*. Grijalbo. México
- Bonilla-Barbosa J. R. (1995). *Vegetación acuática*. In: Contreras-MacBeath, T. and F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Bonilla-Barbosa J. R. (1995). *Vegetación*. In: Contreras-MacBeath, T. and F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Brodth, S. (2001). A systems perspective on the conservation and erosion of Indigenous agricultural knowledge in central India. *Human Ecology*, 29(1), 99-120.
- Brown, C. H. (1979). Folk Zoological Life-Forms: Their Universality and Growth. *American Anthropologist* 81 (4): 791-817.
- Brown, M. (1998). Can Culture be copyrighted?. *Current Anthropology*, 39(2), 193-222.
- Burgos, S. A. (1995). *Artrópodos (insectos y arañas)*. In: Contreras-MacBeath, T. & Urbina, F. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. Mexico.
- Butcher, J. (2007). *Ecotourism, NGOs and development: a critical analysis*. London: Routledge. 208 pp.
- Cameron, D., Frazer, E., Harvery, P. (1993). Ethics, advocacy and empowerment: issues of method in researching language. *Language and Communication*, 13(2), 81-94.
- Cancian, F. (1965). *Economics and Prestige in a Maya Community*. Stanford, CA: Stanford University Press.
- Cancian, F. (1967). Political and Religious Organization. In Handbook of Middle American Indians, Vol. 6, Robert Wauchope, gen. ed., pp. 283-298. Austin: University of Texas Press.
- Cancian, F. (1974). New Patterns of Stratification in the Zinacantan Cargo System. *Journal of Anthropological Research*, 30(3), 164-173.
- Cano, M., B. De la Tejera, A. Casas, L. Salazar & R. García-Barrios. (2012). Migración rural y huertos familiares en una comunidad indígena del centro de México. *Botanical Sciences* 90 (2): 1-18
- Cano, C. E., Erosa, S. E. & Mariaca, M.R. (2009). *Tu chien k'am. UN recorrido por la cosmovisión de los lacandones del norte desde las mordeduras de serpiente*. Universidad Intercultural de Chiapas. México.
- Carrasco, P. (1961). The Ladder System in Mesoamerica. *American Anthropologist*, 63, 318-344.
- Castañón, M. C. (2006). Diagnósticos de los Pueblos Indígenas. Páramo del campo y la ciudad. Año 4, No.9.
- Castells, M. (1997). *The Power of Identity*. Malden, MA : Blackwell.

- Castillejas, v G.A. (2009). Sistemas de Conocimiento en Competencia: un estudio en pueblos purépecha. In: Argueta, A. V., Corona, E.M & P. Hersch (coordinadores). Saberes locales y diálogos de saberes. CRIM, UNAM. Centro INAH-Morelos. México.
- Castro-Franco, R. & Bustos-Zagal, G. (1995). *Reptiles*. In: Contreras-MacBeath, T. and F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Castro-Soto, J. (2000). *Pukuj. Biopiratería en Chiapas*. REMALC/CIEPAC/COMPITCH, San Cristóbal de Las Casas, Chiapas. Pp. 52,
- Ceballos-Lascurain, H. (1987) The future of ecotourism. Mexico Journal (January), 13–14. In: Lück, M. 2002. Large-scale Ecotourism – A Contradiction in Itself?. *Current Issues in Tourism*. 5 (3 & 4), 361-370.
- Chance, J.K. & Taylor, W.B. (1985). Cofradías and cargos: an historical perspective on the Mesoamerican civil-religious hierarchy. *American Ethnologist*, 12 (2), 1-26.
- Charnley, S. & Poe, M. R. (2007). Community Forestry in Theory and Practice: Where Are We Now?. *Annu. Rev. Anthropology*, 36, 301-336.
- Chatwin, M.E. (1988). Subtle Interactions: First, Second and Third Degree Ethics in Anthropology. *Human Organization*, 47(2), 176-180.
- Chávez, C., Ceballos, G., List, R., Salazar, I., & Espinosa, L.A. (2009). *Mamíferos*. In: G. Ceballos, R. List, G. Garduño, R. López, M.J. Muñozcano, E. Collado and J.E. San Román. La diversidad biológica del Estado de México. Estudio de Estado. CONABIO. Gobierno del Estado de México. UNAM.
- Chick, G.E. (1981). Concept and Behavior in a Tlaxcalan Cargo Hierarchy. *Ethnology*, 20 (3), 217-228.
- Cimadamore, A. D., Eversole, R., & McNeish, J. A. (2006). Pueblos indígenas y pobreza. Una introducción a los enfoques multidisciplinares. *En publicación: Pueblos indígenas y pobreza. Enfoques multidisciplinares*. Cimadamore, A. D., Eversole, R., McNeish, J. A. CLACSO, Consejo Latinoamericano de Ciencias Sociales, Buenos Aires.
- Cleveland, D.A. (1999). Commentary on Escobar, A. (1999). After Nature. Steps to an Antiessentialist Political Ecology. *Current Anthropology*, 40(1), 1-30
- Clifford, James. (1999). *Routes: Travel and Translation in the late twentieth century*. Harvard University Press.
- Comisión Nacional para el Desarrollo de los Pueblos Indígenas. 2005. *Índice de Reemplazo Etnolingüístico (IRE) 2000-2005*. Retrieved 6 August 2011. http://www.cdi.gob.mx/index.php?option=com_content&task=view&id=1075&Itemid=54
- Contreras Mc-Beath T. & Clarisó, Xavier C. (1995). *Hidrología*. In: Contreras-MacBeath, T. & F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Contreras-MacBeath, T. & Urbina, F. (1995). Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Contreras-McBeath T. (1995). *Ictiofauna*. In: Contreras-MacBeath, T. and F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Corbett, J., Musalem, M., Ríos, O., & Vázquez, H. (1992). *Migración y etnicidad en Oaxaca*. Vaenderbilt Univesity. Publication in Anthropology.
- Costa-Neto, E. (2005). Entomotherapy, or the medicinal use of insects. *Journal of Ethnobiology*, 25(1), 93-114.
- Costa-Neto, E. (2010). *La investigación etnoentomológica: Registro, análisis y valoración de los saberes y costumbres tradicionales*. In: Moreno, F.A., M.T. Pulido S., R. Mariaca M., R.

- Valadez A., P.Mejía C., T.V. Gutiérrez S. Sistemas Biocognitivos Tradicionales. Paradigmas en la Conservación Biológica y el Fortalecimiento Cultural. Asociación etnobiológica Mexicana A.C., Global. México.
- Covantes, T. L. & Alfonso, R. (2006). *Glosario de Términos sobre diversidad, recursos biológicos y bioseguridad*. In: L. Concheiro B. and F. López B. Biodiversidad y Conocimiento Tradicional en la Sociedad Rural. Entre el bien común y la propiedad privada. Colección Estudios e Investigaciones. Centro de Estudios para el Desarrollo Rural Sustentable y la Soberanía Alimentaria. cámara de Diputados. LX Legislatura.
- Cruz M., J.E. (2009). Interacción entre biodiversidad y pueblos indios. In: Del saber indígena al saber transnacional. A. Betancourt P. & José E. Cruz M. Universidad Nacional Autónoma de México.
- Crystal, D. (2000) *Language Death*. United Kingdom: Cambridge University Press.
- Cuevas, S. (1985). *Ornitología amuzga: un análisis etnosemántico*. Instituto de Antropología e Historia. México D. F.
- Daes, E. (2000). *Prevention of Discrimination and protection of Indigenous peoples* (New York: ONU).
- De Foliar, G.R. (1995). Edible insects as minilivestock. *Biodiversity and Conservation*, 4, 306-321.
- De Sousa S. B. (2009). Una epistemología del Sur. Consejo Latinoamericano de Ciencias Sociales. Siglo XXI editores. México.
- De Sucre M. A., P. Ramírez B., Gómez de Silva, H., & Ramírez, S. V. (2009). Aves. In: G. Ceballos, R. List, G. Garduño, R. López, M.J. Muñozcano, E. Collado and J.E. San Román. La diversidad biológica del Estado de México. Estudio de Estado. CONABIO. Gobierno del Estado de México. UNAM.
- Delgado C., F. (1994). *Estudio Avifaunístico de la región de Ocuilán de Arteaga, Edo. De México*. Facultad de Estudios Superiores Iztacala UNAM. México.
- Delgado-Ramos, G. C. (2002). La amenaza biológica. Mitos y Falsas promesas de la biotecnología. México. Plaza y Janés.
- Delgado-Ramos, G. C. (2004). Biodiversidad, Desarrollo Sustentable y Militarización. Esquemas de saqueo en Mesoamérica. UNAM. Plaza y Valdes. México.
- Deloya. C., A. Burgos S., J. Blackaller and J.M. Lobo. (1993). Los Coleópteros Lamellicornios de Cuernavaca, Morelos, México (Passalidae, Trogidae, Scarabeidae y Melolonthidae). *Boletín de la Sociedad Veracruzana de Zoología* 3 (1):15-55.
- Descola, P. & G. Pálsson. (Eds.). (1996). *Nature and Society. Anthropological perspectives*. Londres, Routledge.
- Descola, Philippe. (1998). Estrutura ou sentimento: A RELAÇÃO COM O ANIMAL NA AMAZÔNIA. *MANA*, 4(1), 23-45
- DeWalt, B. R. (1975). *Changes in the Cargo Systems of MesoAmerica*. *Anthropological Quarterly*, 48(2), 87-105.
- Dewalt, B. (1994). Using Indigenous Knowledge to Improve Agriculture and Natural Resource Management. *Human Organization*, 53 (2), 123-130.
- Díaz-Barriga, V.,H. (1995). Hongos Macromicetos comestibles, venenosos, medicinales y destructores de la madera, de la reserva de la Biósfera de la mariposa Monarca, Sierra Chincua, Michoacan. Fundación Produce Michoacán, A.C., Comisión Forestal del Estado de Michoacán. México.
- Durand, L. (2002). La relación ambiente-cultura en antropología: recuento y perspectivas. *Nueva Antropología*, 18(61), 169-184.
- Durand, L. (2000). Modernidad y Romanticismo en Etnoecología. *Alteridades*, 10(019), 143-150.
- Durand, L. (2008). De las percepciones a las perspectivas ambientales. Una reflexión teórica sobre la antropología y la temática ambiental. *Nueva Antropología. Ambiente y Cultura*, 21 (68), 75-87.
- Edouard, F. & Quero, R. (2005). *Hongos silvestres comestibles*. In: López, C., S. Chanfón and G. Segura (editors). La Riqueza de los bosques mexicanos: más allá de la madera.

- Experiencias de comunidades rurales. Secretaría del Medio Ambiente y Recursos Naturales (Semarnat), Centro de Educación y Capacitación para el Desarrollo Sustentable (Cecadesu), Comisión Nacional Forestal. Center for International Forestry Research (CIFOR).
- Ellen, R. (1989). *Environment, Subsistence and System. The Ecology of Small-scale Social Formations*. UK. Cambridge University Press. In: Durand, L., 2002. La relación ambiente-cultura en antropología: recuento y perspectivas. *Nueva Antropología*, 18(61), 169-184.
- Enciclopedia Digital de la Medicina Tradicional Mexicana. (2009). *Cascabel*. Retrieved December 6 2011. <http://www.medicinatradicionalmexicana.unam.mx/index.php>.
- Engel, P.G. (1995). *Facilitating Innovation An Action-Oriented Approach and Participatory Methodology to Improve Innovative Social Practice In Agriculture*. Wageningen.
- Escalante, R. (1976). *Clasificación Matlatzinca de plantas y hongos*. 1er simposio de Etnobotánico, México. In: Mapes, C., G. Guzmán & Caballero, J., 1981. Etnomicología Purepecha. El conocimiento y uso de los hongos en la cuenca del lago de Pátzcuaro..Dirección General de Culturas Populares y Sociedad Mexicana de Micología, A.C.
- Escobar, A. (1995). Encuntering Development: The Making and Unmaking of the Third World. In: Finnis, E., 2004. *Anthropology and Participatory Research: Ethical Considerations in International Development*. *NEXUS*, 17, 32-62.
- Escobar, A. (1999). After Nature. Steps to an Antiessentialist Political Ecology. *Current Anthropology*, 40(1), 1-30.
- Etkin, N. (2002). Local knowledge and biotic diversity and its conservation in rural hausaland, Northern Nigeria. *Economic Botany*, 56 (1), 73-88.
- Fatnowna, S. & Pickett, H. (2002). *Indigenous Knowledge Development through Research*. In: C.A. Odora H. *Indigenous Knowledge and the Integration of Knowledge Systems*. New Africa books. Pp: 209-235.
- Figueroa V. A. (1996). *Los Yaquis, Tradición, Cultura y Ecología*. In: L., Paré, Q. and M. Judith S. *El Ropaje de la Tierra. Naturaleza y Cultura en cinco zonas rurales..UNAM. Plaza y Valdes. México*.
- Fine, M. & Barreras, R. (2007). *To be of use*. In Smith, 2010. *Analyses of Social Issues and Public Policy* 1:175.183.
- Finnis, E. (2004). *Anthropology and Participatory Research: Ethical Considerations in International Development*. *NEXUS*, 17, 32-62.
- Fox, J. (2006). Reframing Mexican Migration As A Multi-Ethnic Process. *Latino Studies* 4, 39–61.
- Fox, J., Rivera-Salgado, G. (2004). *Indigenous Mexican Migrants in the United States*. The Center for Comparative Immigration Studies. University of California, San Diego. USA.
- Franco, M.S., & Burrola A. (compiladores). (2010). *Los Hongos Comestibles del Nevado de Toluca*. Universidad Autónoma del Estado de México. México.
- Freire, P. (1970). *Pedagogy of the Opressed*. 30th Anniversary edition..Continuum. USA.
- Freire, P. (1973). *Education for Critical Consciousness (Impacts)*.Continuum. USA.
- Frutis M., I. & Valenzuela, R. (2009). *Macromicetos*. In: G. Ceballos, R. List, G. Garduño, R. López, M.J. Muñozcano, E. Collado and J.E.San Román. *La diversidad biológica del Estado de México. Estudio de Estado*. CONABIO. Gobierno del Estado de México. UNAM.
- García-Canclini, N. (1990). *Culturas híbridas*. México, D.F. Grijalbo.
- García-Vázquez, U, O. & Mendizábal-Beverido, N. *Camaleones endémicos de México*. Retrieved May 18 2010. <http://www.sociedadherpetologicamexicana.org/uri/museo/phrynos.pdf>.
- Garibay-Orijel, R., Cifuentes, J., Estrada-Torres, A. & Caballero, J. (2006). People using macro-fungal diversity in Oaxaca, Mex. *Fungal Diversity*, 21, 41-76.
- Gibson, J. (2006). *Un modelo de recursos comunitarios: sistemas de propiedad intelectual, conocimiento tradicional y la autoridad global legal de la comunidad local*. In: Merino, L. & J. Robson. *El Manejo de los recursos de uso común: derechos indígenas, desarrollo económico e identidad*. Consejo Civil Mexicano para la Silvicultura Sostenible A.C., The

- Christensen Fund, Fundación Ford, Secretaría de Medio Ambiente and Recursos Naturales, Instituto Nacional de Ecología.
- Godbole, A. (2000). *Participatory ethnobotanical research for biodiversity conservation: experiences from Northern Nagaland, India*. In: Friis-Hansen, E. and B. Sthapit (editors). *Participatory approaches to the conservation and use of plant genetic resources*. International plant Genetic Resources. Italy.
- Gonzalez, J. A. (1995). *Autotopographies*. In *Prosthetic Territories: Politics and Hypertechnologies*. G. Braham and M. Driscoll, Ed. Boulder : Westview Press.
- González, R. 2001. *Zapotec science*. Austin: University of Texas press. USA.
- Gracia Canclini, N. (1996). *Culturas Híbridas. Estrategias para entrar y salir de la modernidad*. Grijalbo, México.
- Gragson, Ted, Ben Blount, Ed. (1999). *Ethnoecology. Knowledge, Resources, Rights*. Athens, Ga: University of Georgia Press.
- Greenberg, L. (2003). *Women in the Garden and Kitchen: The role of Cuisine in the Conservation of Traditional House Lot Crops among Yucatec Mayan Immigrants*. In *Women and Plants*. Edited by: P. Howard, pp.51-65. New York: Zed Books.
- Guisper C. M. (2010). *El proceso cognitivo: Un punto de vista etnobotánico*. In: Moreno, F.A., M.T.Pulido S., R. Mariaca M., R. Valadez A., P.Mejía C., T.V. Gutiérrez S. 2010. *Sistemas Biocognitivos Tradicionales. Paradigmas en la Conservación Biológica y el Fortalecimiento Cultural*. Asociación etnobiológica Mexicana A.C., Global.
- Gutiérrez-Santillán, T., Moreno F., & Goyenechea M. (2010). *Cosmos, Corpus y Praxis: Estudio comparativo entre nahuas y otomíes del estado de Hidalgo, México: El caso del "Camaleón"*. In: Moreno, F.A., M.T.Pulido S., R. Mariaca M., R. Valadez A., P.Mejía C., T.V. Gutiérrez S. 2010. *Sistemas Biocognitivos Tradicionales. Paradigmas en la Conservación Biológica y el Fortalecimiento Cultural*. Asociación etnobiológica Mexicana A.C., Global Diversity Foundation, Universidad Autónoma del Estado de Hidalgo, El Colegio de la Frontera Sur, Sociedad Latinoamericana de Etnobiología. México.
- Gullan, P.J. & Cranston, P.S. (2010). *Insects. An outline of entomology*. Fourth edition. Wiley-Blackwell. UK.
- Gupta, A. & Ferguson, J. (1997). *Culture, power, place: explorations in critical anthropology*. Duke University Press. USA.
- Gutierrez, D. (1996). *Between 2 worlds. Mexican immigrants in the United States*. Wilmington, Del.: Scholarly Resources.
- Guzmán, G., Medel, R. & F. Ramírez G. (2009). *Hongos*. In: G. Ceballos, R. List, G. Garduño, R. López, M.J. Muñozcano, E. Collado and J.E.San Román. *La diversidad biológica del Estado de México. Estudio de Estado*. CONABIO. Gobierno del Estado de México. UNAM.
- Haenn, N. (1999). The power of environmental knowledge: ethnoecology and environmental conflicts in Mexican conservation. *Human Ecology*, 27(3), 477-49.
- Halfster, G. (1994). Las reservas de la biósfera: conservación de la naturaleza para el hombre. *Acta Zoológica Mexicana*, Nueva Serie 5:3-30.
- Hampe, A. & Petit, R. J. (2005). Conserving biodiversity under climate change: the rear edge matters. *Ecology Letters*, 8, 461-467.
- Hardin, G. (1978). *Political requirements for preserving our common heritage*. In Brokaw, H.P. (ed.). *Wildlife and America*. Council on Environmental Quality, Washington, D.C. pp. 310-317.
- Hardin, G. (1968). The Tragedy of the Commons. *Science*. 162, 1243-1248.
- Hawksworth, D.L., P.M. Kirk, B.C. Sutton & D.N. Pegler. (2008) *Dictionary of the Fungi*. 10th Edition, International Mycological Institute.
- Heller, N. E. & Zavaleta E. S. (2009). Biodiversity management in the face of climate change: A review of 22 years of recommendations. *Biological Conservation*, 142, 14-32.
- Hernandez-Diaz, J. (2001). *Reclamos de la identidad: La formación de las organizaciones indígenas en Oaxaca*. Miguel Ángel Porrua. Universidad Autónoma Benito Juárez de Oaxaca.

- Hill, J. D. (1999). Commentary on Escobar, A. (1999). After Nature. Steps to an Antiessentialist Political Ecology. *Current Anthropology*, 40(1), 1-30.
- Hinton, L. (2001). *Green Book of Language revitalisation in Practice*. In: Muntzel, M. 2004. The Role of Literacy in Language Revitalisation. Foro Universal de las Culturas. Barcelona, España.
- Hirabayashi, L. R. (1993). Cultural Capital. Mountain Zapotec Migrant Associations in Mexico City. The University of Arizona Press. USA.
- Hoang, C. (2009). Forest thieves?: *the politics of forest resources in a northwestern frontier valley of Vietnam*. Thesis (Ph. D.) University of Washington.
- Hunn, E., Johnson, D. R., Russell, P.N. & Thornton, T.F. (2003). Huna Tlingit Traditional Environmental Knowledge, Conservation, and the Management of a "Wilderness" Park. *Current Anthropology*, 44, 79-103.
- Hunn, E. (1999). *The Value of Subsistence for the Future of the World*. In Ethnoecology: Situated knowledge/ located lives, ed. V. Nazarea, pp. 23-36. University of Arizona Press, Tucson.
- Hunn, E. (2002). Traditional Environmental knowledge: Alienable or inalienable intellectual property. In Ethnobiology and biocultural diversity, eds. J.R. Stepp, F.S. Wyndham and R.K. Zarger, pp.3-10. University of Georgia Press, Athens.
- Hunn, E. (2007). Ethnobiology in four phases. *Journal of Ethnobiology*, 27(1), 1-10.
- Hunn, E. (2008). A Zapotec Natural History. Trees, herbs and flowers, birds, beasts and bugs in the Life of San Juan Gbëë. The University of Arizona Press. USA.
- Hunn, E. (1977). Tzeltal Ethnozoology: The Classification of Discontinuities in Nature. New York: Academic Press. Pp: 412.
- INEGI. (2009). Prontuario de información geográfica municipal de los Estados Unidos Mexicanos. Ocuilan, México. Clave geoestadística, 15063
- Inglis, J. T. (1993). Traditional Ecological Knowledge. Concepts and cases. International Program on Traditional Ecological Knowledge. International Development Research Center. Canada.
- Instituto Nacional de Lenguas Indígenas. (2008). Catálogo de las Lenguas Indígenas nacionales: Variantes Lingüísticas de México con sus autodenominaciones y referencias geoestadísticas. Diario Oficial de la Nación. Primera Sección. Lunes 14 de enero de 2008.
- International Council for Science (ICS). (2002). Ciencia, conocimiento tradicional y desarrollo sustentable. (Declaración de Budapest). París. In: Pérez, M.L. & A. Argueta, 2011. Saberes Indígenas y Diálogo Intercultural. *Cultura y Representaciones Sociales*. Vol. 5, no. 10.
- International Working Group on Indigenous Affairs (IWGIA). (2006). *The Indigenous World 2006*. ECOSOC Consultative Status, p. 10. Retrieved 6 April 2010. http://www.iwgia.org/iwgia_files_publications_files/IW_2006.pdf
- IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <<http://www.iucnredlist.org>>. Downloaded on 6 December 2011.
- Johnson, L., Strich, H., Taylor, A., Timmermann, B., Malone, D., Teufel-Shone, N., Drummon, R., Woosley, Pereira, R. E. & Martínez, A. (2006). Use of herbal remedies by diabetic Hispanic women in the Southwestern United States. *Phytotherapy Research*, 20, 250-255.
- Juan-Martínez, V.L. (2011). Ciudadanía y resistencia: los "usos y costumbres". La Jornada del Campo núm. 44.21 de mayo de 2011
- Kearney, M. (1996). *Reconceptualizing the Peasantry. Anthropology in Global perspective*. Boulder, Colo.: Westview Press.
- Kirsch, S. (2001). Lost worlds: Environmental disaster," culture loss", and the law. *Current Anthropology*, 42(2), 167-198.
- Korsbaek, L. & Álvarez F. R.L. (2002). Lengua y Etnicidad: Dos casos en el Estado de México. *Convergencia*, 9(29), 181-216.
- Lauriola, V. M. & Moreira, E. (2006). *Introducción Temática. Los derechos indígenas y los recursos de uso común: tierra, gobernanza, desarrollo e identidad*. In: Merino, L. and J. Robson. El Manejo de los recursos de uso común: derechos indígenas, desarrollo económico e identidad. Consejo Civil Mexicano para la Silvicultura Sostenible A.C., The Christensen Fund,

Fundación Ford, Secretaría de Medio Ambiente y Recursos Naturales, Instituto Nacional de Ecología

- Lazos, C. E. (2008). La invención de los Transgénicos: ¿ Nuevas relaciones entre naturaleza y cultura?. *Nueva Antropología. Ambiente y Cultura.* 21(68), 9-35.
- Lee, E. A. (2008). *International Migration and Ecological Conservation: The Transformation of a Rural Community in Neoliberal Mexico*. Ph.D. Dissertation. University Of California, Riverside.
- Leff, E. (1986). *Los problemas del conocimiento y la perspectiva ambiental del desarrollo*. Siglo XXI. México.
- Leff, E. (1999). Comment on Escobar. A. After Nature. Steps to an Antiessentialist Political Ecology. *Current Anthropology*, 40(1), 1-30.
- Leff, E., A. Argueta, E. Boege & C.W. Porto G. (2002). Más allá del desarrollo sostenible. La construcción de una racionalidad ambiental para la sustentabilidad: una visión desde America Latina. In: E. Leff, E. Escurra, I. Pisanty and P. Romeo Lankao. *La Transición hacia el desarrollo sustentable. Perspectivas de America Latina y el Caribe*. INE-UNAM.PNUMA. México. pp: 479-578.
- Lewin, P. & Guzmán, E. (2003). *La migración indígena*. In Los pueblos indígenas de Oaxaca. Atlas etnográfico. Edited by: A. Barabas, M.A. Bartolomé, B. Maldonado. CONACULTA, Fondo de Cultura Económica. Secretaria de Asuntos Indígenas del Gobierno del Estado de Oaxaca. Etnografía de los pueblos indígenas de México.
- Llorente-Bousquets, J. & Ocegueda, S. (2008). *Estado del conocimiento de la biota, en Capital natural de México*, vol. I: Conocimiento actual de la biodiversidad. Conabio, México, pp. 283-322.
- Lozano-García, M.A. & Santillán S. (1995). *Mamíferos*. In: Contreras-MacBeath, T. and F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. Mexico.
- Machuca, J. A. (2009). *La privatización de la biodiversidad y la cultura a través de los "conocimientos tradicionales"*. In: Del saber indígena al saber transnacional. A. Betancout P. and José E. Cruz M. Universidad Nacional Autónoma de México.
- Maffi, L. (2001). On the Interdependence of Biological and Cultural Diversity. In: Maffi, L. On Biocultural Diversity. Linking language, knowledge and the environment. Smithsonian Institution Press. Pp: 1-50.
- Mapes, C., Guzmán, G. & Caballero, J. (1981). *Etnomicología Purepecha*. El conocimiento y uso de los hongos en la cuenca del lago de Pátzcuaro. Dirección General de Culturas Populares y Sociedad Mexicana de Micología, A.C.
- Marcelli, E. & Cornelius, W. (2001). The changing profile of Mexican migrants to the United States. *Latin American Research Review*, 36(3), 105-131.
- Marcus, G. & Fischer, M. (1986). *Anthropology as Cultural Critique: An Experimental Moment in the Human Sciences*. Chicago: University of Chicago Press.
- Mares, T. & Peña, D. (2010). Urban Agriculture in the Making of Insurgent Spaces in Los Angeles and Seattle. In *Insurgent Public Space*, ed. J. Hou. New York: Routledge.
- Mares, T. & D. Peña. 2011. Environmental and Food Justice. In: A. Hope A. & J. Agyeman. *Cultivating Food Justice: Race, Class, and Sustainability*. Cambridge, Mass.: MIT Press.
- Martínez C. J. (1986). *Study of the problem of discrimination against Indigenous populations*. (New York: ONU) UN Doc. E/CN.4/Sub.2/1986/7.
- Martínez-Alfaro, M.A., Pérez-Silva, E. & Aguirre-Acosta, E. (1983). Etnomico y Exploraciones Micológicas en la Sierra Norte de Puebla. *Boletín Sociedad Mexicana de Micología*. 18, 51-63.
- Mattiace, S.L. (2002). *Una nueva idea de nación: autonomía indígena en México*. In: Mattiace, S.L., R:A:Hernández and J. Russ. *Tierra, libertad y autonomía: impactos regionales del zapatismo en Chiapas*. CIESAS. IWGIA.

- Maya, F. Nirvana, M. M. Maravilla, T. Peralta, C. Rosas & Valdez, C. (2009). *La etnoecología como puente entre dos mundos: el Atlas etnoecológico de México y Centroamérica*. In: Del saber indígena al saber transnacional. A. Betancout P. and José E. Cruz M. Universidad Nacional Autónoma de México.
- Mcguire, S. A. (2001). *Crossing myriad borders: A dimensional analysis of the migration and health experience of Indigenous Oaxacan woman (Mex)*. PhD Dissertation. University of San Diego.
- Mead, A. (1993). *Cultural and Intellectual Property Rights if Tangata Whenua*. In: *Nga Tikanga Nga Taonga*. Cultural and Intellectual property Rights of Indigenous Peoples. Research Unit for Maori Education. Monograph 23. University of Auckland. In: Smith, L.T. 1999. Decolonizing methodologies. Research and Indigenous Peoples. Zed Books. Univeristy of Otago Press. USA. New Zealand.
- Merino, L. (2008). Conservación comunitaria en la cuenca alta del Papaloapan, Sierra de Norte de Oaxaca. *Nueva Antropología. Ambiente y Cultura*, 21 (68), 37-49.
- Mgbeoji, I. (2006). *Global biopiracy: patents, plants and Indigenous knowledge*. The University of british Columbia Press. Canada
- Monroy G., J.F. & Escobar, A. I. (2010). *Diccionario español-otomí, matlalzinca, tlahuica, mazahua y náhuatl*. Gobierno del Estado de México. Universidad Intercultural del Estado de México, CEDIPIEM, Plaza y Valdés Editores. México.
- Monroy, R. & Colín, H. (1999). Costos ambientales y sociales en el Corredor Biológico Chichinautzin. In: *Perspectivas para el desarrollo social de la microcuenca del río Apatlaco*. Unidad Cental de Estudios para el Desarrollo Social. UAEM. Pp.119-125. In: Ongay and D., Enrique and L.A. Peña H. 1995. Contexto Socioeconómico. In: Contreras-MacBeath, T. & F. Urbina. *Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin*. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Montoya, A., Hernández-Totomoch, O., Estrada-Torres, A. & Kong, A. (2003). Traditional knowledge about mushrooms in a Nahua community in the state of Tlaxcala, México. *Mycologia*, 95(5), 793–806.
- Mora L., M.I. (1989). *La Cosmovisión Tlahuica. Una cultura en proceso de desaparición*. Licenciatura en Antropología Social. Universidad Autónoma Metropolitana Iztapalapa.
- Morales, V., T. E. (2006). *Las Aves de los Comcáac (Sonora, México)*. Monografía to obtain the degree of biologist. Facultad de Biología. Universidad Veracruzana. Jalapa, México.
- Muntzel C., M. (2000). *Bosquejo etnográfico del grupo pjiekakjo (ocuilteco)*. Estudios de cultura otopame. núm. 2, México, Universidad Nacional Autónoma de México / Instituto de Investigaciones Antropológicas.
- Muntzel, M. (2004). The Role of Literacy in Language Revitalisation. Foro Universal de las Culturas. Barcelona, España.
- Nabhan, G. (1998). *Passing on a Sense of Place and Traditional Ecological Knowledge between Generations: A Primer for Native American Mueum Educators and Community-Based Cultural Education Projects*. People and Planst handbook, 4:30-33.
- Nabhna, G.P. (2003). *Singing the turtles to the Sea. The Comcáac (Seri) art and science of reptiles*. University of California Press.
- Nagengast, C. & Kearney, M. (1990). Mixtec Ethnicity: Social identity, Political Consciousness and Political Activism. *Latin American Research Review*, 25(2), 61-91.
- Nash, M. (1958). Political Relations in Guatemala. *Social and Economic Studies*, 7, 65-75.
- Navarijo, O., M. de L. (2004). Presencia e Importancia de la Medicina Tradicional de los Grupos Otopames. Estudios de Cultura Otopame 4. UNAM, Instituto de Investigaciones Antropológicas. México.
- Nazarea, V. ED. (1999). *Ethnoecology situated knowledge/located lives*. Tucson : University of Arizona Press.

- Nietschmann, B.Q. (1992). The interdependence of biological and cultural diversity. Ocase. Paper 21. Center for World Indigenous Studies.
- Norget, K. (2007). Decolonizing and the Politics of Syncretism: The Catholic Church, Indigenous Theology and Cultural Autonomy in Oaxaca, Mexico. *International Education*, 37(1), 78-96.
- Nuño, G. M. (1996). La relación naturaleza-cultura en una comunidad purépecha a través de sus expresiones orales. In: Paré, L. Q. & Judith . M. S. El Ropaje de la Tierra. Naturaleza y Cultura en cinco zonas rurales.
- Ohmagari, K. & Berkes, F. (1997). Transmission of Indigenous Knowledge and Bush Skills among the Western James Bay Cree Women of Subarctic Canada. *Human Ecology*, 25(2), 197-222.
- Oliver, G. R. (1995). Geología. In: Contreras-MacBeath, T. & F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. Mexico.
- Ongay, D. E. & Peña, L.A. (1995). Contexto Socioeconómico. In: Contreras-MacBeath, T. & F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO). (2010). *Qué es el patrimonio cultural inmaterial?* Retrieved January 8 2012. http://portal.unesco.org/culture/es/ev.php-URL_ID=34325&URL_DO=DO_TOPIC&URL_SECTION=201.html
- Ostrom, E. (1990). *Governing the Commons. The Evolution of Institutions for Collective Action*. Cambridge University Press.
- Pacheco-Ladrón de Guevara, L. C. & Navarro-Hernández María del R. (2010). *La escuela en el medio indígena*. In: Pacheco Ladrón de Guevara, Lourdes C. (coord). Saberes Indígenas y educación en Nayarit. Universidad Autónoma de Nayarit. Juan Pablos Editor.
- Pacheco Ladrón de Guevara, L. C. & González P. (2010). *Saberes sobre el territorio*. Juan Pablos Editor. In: Saberes Indígenas y educación en Nayarit. Universidad Autónoma de Nayarit.
- Pacheco Ladrón de Guevara, L. C. (2010). Introducción. Saberes Indígenas y educación en Nayarit. Universidad Autónoma de Nayarit. Juan Pablos Editor.
- Pain, R. & Francis, P. (2003). Reflections on Participatory Research. *The Royal Geographical Society*, 35(81), 46-54.
- Pain, R. (2004). Social geography: participatory research. *Progress in Human Geography*, 28 (5), 652-663.
- Palomino, N. A. (1990). *Etnomicología Tlahuica de San Juan Atzingo, Estado de México*. Tesis de Licenciatura para obtener el título de biólogo. UNAM, FES Iztacala.
- Paré Q. L. & Sánchez, M. J. (coord). (1996). Introducción. *El Ropaje de la Tierra. Naturaleza y cultura en cinco zonas rurales*. UNAM. Plaza y Valdes. México.
- Paz Salinas, Ma. F. (2008). De áreas naturales protegidas y participación: Convergencias y Divergencias en la Construcción del interés público. Nueva Antropología. *Ambiente y Cultura*, 21(68), 51-74.
- Penguilly, M., Moreno, A. F., Goyenechea M-G., & Espinza, G. P. (2010). *Percepción acerca de las Lagartijas consideradas nocivas por algunos tmés, nahas, tepehuas y mestizos en el estado de Hidalgo, México*. In: Moreno, F.A., M.T. Pulido S., R. Mariaca M., R. Valadez A., P. Mejía C., T.V. Gutiérrez S. 2010. Sistemas Biocognitivos Tradicionales. Paradigmas en la Conservación Biológica y el Fortalecimiento Cultural. Asociación etnobiológica Mexicana A.C., Global
- Peña, D. (2003). *Identity, Place and Communities of Resistance*. In *Just Sustainabilities. Development in an unequal world*. Edited by: J. Agyeman, R. Bullard, and B. Evans. London: Earthscan.
- Peñafiel, A. *Nomenclatura geográfica de México*. Columbia University Libraries. Retrieved September 5 2010.

http://www.columbia.edu/cu/lweb/digital/collections/cul/texts/ldpd_6859750_002/pages/ldpd_6859750_002_00000256.html

- Pérez, Q. J. (1995). *Contribución al estudio mastofaunístico de la región de Ocuilan de Arteaga*. Estado de México. Facultad de Estudios Superiores Iztacala UNAM. México.
- Pérez, R. M. L. & Argueta, A. V. (2011). Saberes Indígenas y Diálogo Intercultural. *Cultura y Representaciones Sociales*. 5 (10), 31-56.
- Peterson, R.T. & Chalif, E. L. (1989). *Aves de México*. Guía de Campo. Diana. México.
- Pieronì, A. & Vandebroek, I. (Eds). (2007). *Traveling Cultures And Plants : The Ethnobiology And Ethnopharmacy of Migrations*. New York : Berghahn Books.
- Pieronì, A., Muñiz, H., Akbulut, M., Baser, K.H.C. & Durmuskahya, C. (2005). Traditional phytotherapy and transcultural pharmacy among Turkish immigrants living in Cologne, Germany. *Journal of Ethnopharmacology*, 102, 69-88.
- Poe, R. M. (2009). *Wild Mushrooms, Forest Governance, and Conflict in the Northern Sierra of Oaxaca*. Ph.D. Dissertation. University of Washington.
- Portes, A. Guarnizo L. & Landolt, P. ED. (2003). *La Globalización desde abajo: Transnacionalismo, inmigrante y desarrollo. La experiencia de EU y LA*. Miguel Ángel Porrúa, Facultad Latinoamericana de Ciencias Sociales (FLACSO).
- Portes, A. & Rumbaut R. (2001). *Ethnicities. Children of immigrants in America*. Berkeley : University of California Press. .
- Posey,D. (1988). *The Declaration of Belem*. In Proceedings of the First International Congress of Ethnobiology, eds.D.A. Posey and W. Overal. Museu Paraense Goeldi, Belem.
- Posey,D. (2000). *Amazonia 2000: Development, Environment and Geopolitics*. World Bank.
- Pottier, J., Bicker, A., & Sillitoe, P. (2003). *Negotiating Local Knowledge. Power and Identity in Development*. Sterling, Va: Pluto Press
- Proceso. (2007). *Tala sin castigo*. June 27 2007.
- Rabey, M. (2005). *Construcción de Conocimientos y Cuidado de la Biodiversidad*. In: Alderete, Ethel (Wara). Conocimiento indígena y globalización. Abya yala. Ecuador.
- Ramírez N. M. & Reynoso-Campos, C. (2001). *Las Fiestas Religiosas en la comunidad de San Juan Atzingo*- Tesis de Licenciatura en Historia. Universidad Autónoma del Estado de México.
- Ramos Elorduy, J., Pino, J. M., Vázquez, M. A., Landero, I., Oliva-Rivera, H. & V. H. M. Camacho. (2011). Edible Lepidoptera in Mexico: Geographic distribution, ethnicity, economic and nutritional importance for rural people. *Journal of Ethnobiology and Ethnomedicine* 7:2.
- Ramos Elorduy, J. and J.M. Pino M..1988.The Utilization of Insects in the Empirical Medicine of Ancient Mexicans. *Journal of Ethnobiology*, 8(2),195-202.
- Ramos Elorduy, J. (1982). *Los insectos como fuente de proteínas en el futuro*. Ed. Limusa, México.
- Ramos-Elorduy, J., Costa-Neto, E.M., M. del S. Cuevas C., J. garcía-Figueroa & Zetina, D.H. (2007). Conocimiento de la entomofauna útil en el poblado La Purísima Palmar de Bravo, Estado de Puebla, México. *Biotemas*, 20(2), 121-134
- Ramos-Elorduy, J. & Pino J. M. (2004). Los Coleoptera comestibles de México. *Anales Instituto de Biología de la Universidad Nacional Autónoma de México, Ser. Zool.* 75 (1), 149-183.
- Ramos-Elorduy, J., Pino J. M. & Cuevas, S. (1998). Insectos comestibles del Estado de México y determinación de su valor nutritivo. *Anales Instituto de Biología de la Universidad Nacional Autónoma de México, Ser. Zool.*, 69(1), 65-104.
- Ramos-Elorduy, J. (1989). *Los insectos comestibles en el México antiguo*. Estudio Etnoentomológico. AGT editor. México.108 pp.
- Reaka-Kudla, M.L., Wilson, D.E. & Wilson, E.O. (editors). (1997). *Biodiversity II. Understanding and Protecting our Biological Resources*. Joseph Henry Press. Washington D.C. and Oxford.
- Reason, R. (1998). *Three Approaches to Participative Inquiry*. In: Denzin, N.K. and Lincoln, Y. (eds), *Strategies of a Qualitative Research*. London: Sage: 261-291.
- Rendòn M. J. (2004). *Taller de Diálogo Cultural. Metodología Participativa para estudiar, diagnosticar y desarrollar las culturas de nuestros pueblos*. Universidad de Guadalajara.

- Universidad Iberoamericana León. Centro de Estudios Antropológicos, Científicos, Artísticos, Tradicionales y Lingüísticos Ce-Acatl, A.C. 3a edición. México.
- Ribeiro, S. (2002). *Medicina Tradicional, patentes y biopiratería*. La Jornada, p. 19, 3 de agosto. México.
- Ribeiro, S. (2007). *Genómica, biopiratería y pueblos indígenas*. La jornada sábado 31 de marzo de 2007.
- Rivera-Salgado, G. (1999). *Migration and Political Activism. Mexican Transnational Indigenous Communities in a Comparative perspective*. PhD Dissertation. Sta. Cruz. University of California.
- Rivermar, P., Ma. L. (2004). *Santa María de la Encarnación Xoyatla, Una comunidad nahua de campesinos y migrantes*. In: Cortina, R. and M. Gendreau. Poblanos en Nueva York. Migración rural, educación y bienestar. Universidad Iberoamericana Puebla. México. Pp:187-207.
- Rocheleau, D. E. (1994). Participatory research and the race to save the planet: Questions, critique and lessons from the field. *Agriculture and Human Values*, 11 (2-3), 4-25.
- Rodríguez, N. J., Rubio, M.A., Sánchez, C. & Zolla, C. (2008). *Los Pueblos indígenas y los indicadores de bienestar y desarrollo "Pacto del Pedregal"*. Informe Preliminar. Documento de Trabajo. Programa México Nación Multicultural. UNAM.
- Romero C., Viesca, G., Hernández, T. (2010). *Formación del patrimonio gastronómico del Valle de Toluca, México*. Ciencia Ergo Sum, vol. 17, núm. 3, noviembre-febrero, 2010, pp. 239-252.
- Romo de Vivar A., Urbina, T. (2003). *Cantos y llamados de aves: Del Área de Protección de Flora y Fauna Silvestre Corredor Biológico Chichinautzin*. Universidad Autónoma del Estado de Morelos.
- Romo de Vivar, A. & Urbina T. (2003). CD. *Cantos y llamados de aves: Del Área de Protección de Flora y Fauna Silvestre Corredor Biológico Chichinautzin*. Universidad Autónoma del Estado de Morelos. México.
- Rosenberg, J. (1998). Documenting and Revitalizing Traditional Ecological Knowledge: Seri Survey. People and Plants Handbook. Retrieved April 12 2010. <http://peopleandplants.org/whatweproduce/Handbooks/handbook4/advice.htm>.
- Rosenthal, J.P. (2006). Politics, Culture and Governance in the Development of Prior Informed Consent in Indigenous Communities. *Current Anthropology*, 47(1), 119-142.
- Roth, A. (2007). *Introducción: la hegemonía se vuelve cultura*. In: F. Gómez (ed). Paisajes Mexicanos de la Reforma Agraria. Homenaje a William Roseberry. El Colegio de Michoacan. Benemérita Universidad Autónoma de Puebla. CONACYT. México. In: Castillejas, A. 2009. Sistemas de Conocimiento en Competencia: un estudio en pueblos purépecha. In: A. Argueta V., E.M-Corona and P. Hersch (coordinadores). Saberes locales y diálogos de saberes. CRIM, UNAM. Centro INAH-Morelos. México.
- Rouse, Roger. (1991). Mexican Migration and the Social Space of Postmodernism. *Diaspora* 1(1), 8-23.
- Ruan-Soto, F., Garibay-Orijel, R. & Cifuentes, J. (2004). Conocimiento micológico tradicional en la planicie costera del Golfo de México. *Revista Mexicana de Micología*. 19:57-70.
- Sabino N. R. (2010). *¿Somos Ocuiltecos, Atzincas, Tlahuicas o Pjekakjo?*. Estudios de Cultura Otopame. Vol 7. núm. 1, México, Universidad Nacional Autónoma de México / Instituto de Investigaciones Antropológicas. 189-207.
- Sahagun, F.B. (1980). *Códice Florentino*. Fascimular Archivo General de la Nación Libro XI. México.
- Salinas C. J. (2010). Necesaria en México, ley contra la biopiratería: investigador. La Jornada Martes 19 de Enero.
- Salinas, C.J. (2010). Necesaria en México, ley contra la biopiratería: investigador. La Jornada. 19 Enero 2010.
- Sánchez, C. (1999). *Los Pueblos Indígenas en México*. Siglo XXI editores. México.

- Semanario de la Suprema Corte de Justicia y su Gaceta. (2010). Tesis Aislada, 1a. XVII/2010, novena época, primera sala, XXXI, febrero 2010, pág. 115
- SEMARNAT (Secretaría del Medio Ambiente y Recursos Naturales) & IMTA (Instituto Mexicano de Tecnología del Agua). (2009). Informe Final. Estrategia General para el rescate ambiental y sustentabilidad de la Cuenca Lerma-Chapala. México.
- SEMARNAT. (1995). In CEAMA (Comisión Estatal del Agua y Medio Ambiente del Estado de Morelos).
- SEMARNAT. (2011). Resumen del Programa de Manejo del Parque Nacional Lagunas de Zempoala. Diario Oficial de la Nación. Primera Sección. Martes 8 de marzo del 2011.
- Shiva, V. (1993). *Monocultures of the Mind*. Zed Books. London. .In: Smith, L.T.1999. decolonizing Methodologies. Research and Indigenous Peoples. Zed Books. Univeristy of Otago Press. USA. New Zealand.
- Shiva, V. (1997). *Biopiracy. The Plunder of Nature and knowledge*. South End Press. Boston, Mss, EUA.
- Shiva, V. 2007. Bioprospecting as Sophisticated Biopiracy. *Signs*, 32(2), 307-313.
- Sillitoe, P., Alan B., & Pottier, J. 2002. *Participating in development. Approaches to Indigenous Knowledge*. New York: Routledge.
- Sillitoe, P. (1998). The Development of Indigenous Knowledge. *Current Anthropology*, 39(2):223-252.
- Simonelli, J. (2006). Commentary on Rosenthal, J.P. (2006). Politics, Culture and Governance in the Development of Prior Informed Consent in Indigenous Communities. *Current Anthropology*, 47(1), 119-142.
- Smith E. A. & Wishnie, M. (2000). Conservation and subsistence in small-scale societies. *Annual Review of Anthropology*, 29: 493-524.
- Smith, L., Bratini, L., Chambers, D., Vance, R. & Romero, L. (2010). Between idealism and reality: Metting the challengues of participatory action research. *Action Research*, 8 (4):407-425.
- Smith, L. (1999). *Decolonizing methodologies*. Research and Indigenous Peoples. Zed Books. Univeristy of Otago Press. USA. New Zealand.
- Smith, P. (2006). El manejo de los recursos de uso común: derechos indígenas, desarrollo económico e identidad. Temas emergentes, conclusiones y recomendaciones. In: Merino, L. & J. Robson. El Manejo de los recursos de uso común: derechos indígenas, desarrollo económico e identidad. Consejo Civil Mexicano para la Silvicultura Sostenible A.C., The Christensen Fund, Fundación Ford, Secretaría de Medio Ambiente y Recursos Naturales, Instituto Nacional de Ecología.
- Soustelle, J. (1937). La familia otomí-pame del México central. Gobierno del Estado de México / Instituto Mexicano de Cultura.
- Stephen, L. (2007). *Transborder Lives: Indigenous Oaxacans in Mexico, California, and Oregon*. Duke University Press.
- Stevenson, G. (1996). Indigenous Knowledge in Environmental Assessment. *Arctic*, 49(3), 278-291.
- Stone, L. (1989). Cultural Crossroads of Community Participation in Development: A Case from Nepal. *Human Organisation*, 48(3), 206-213.
- Stonich, S. (1999). Commnetary on Escobar, A. (1999). After Nature. Steps to an Antiessentialist Political Ecology. *Current Anthropology*, 40(1), 1-30.
- Subramaniam, P. (2008). Outlook for ecotourism in India. *International Forestry Review*, 10(2), 245-255.
- Taboada-Salgado M. (1992). *Temperatura*. In: Contreras-MacBeath, T. & F. Urbina. Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Taylor, J. M., Moran-Taylor, M. & Rodman-Ruiz, D. (2006). Land, ethnic, and gender change: Transnational migration and its effects on Guatemalan lives and landscapes. *Geoforum*, 37: 41-61.
- Thomas, Ch.D., Cameron, A., Green, R.E., Bakkenes, M., Beaumont, L. J., T. Collingham, C., Erasmus, B. F.N., Ferreira de Siqueira, M., Grainger, A., Hannah, L., Hughes, L., Huntley, B., A.

- S. van Jaarsvelds, G. F. Midgley, L. Miles, M. a. Ortega- Huerta, Townsen, A., Phillips, O. L. & Williams, S. (2004). Extinction risk from climate change. *Nature*, 427: 145-148.
- Thrupp, L.A. (1993). La legitimación del conocimiento local: de la marginación al fortalecimiento de los pueblos del tercer mundo. In: E. LEff and J. Carabias (coord.), *Cultura y Manejo Sustentable de los recursos Naturales*. Vol. I. CIIH-UNAM: Miguel Ángel Porrúa. México.
- Thuiller, W. (2007). Climate change and the ecologist. *Nature*, 448, 550-552.
- Toledo, V. M. (1990). *The Ecological rationality of peasant production*. In: M. Altieri and S. Hecht /eds.). *Agroecology and small-farm development*, EUA, CRC press.
- Toledo, V.M. (2000). *La Paz en Chiapas*. UNAM. Quinto Sol. México.
- Toledo, V.M. (1992). *Toda la utopía: el nuevo movimiento ecológico de los indígenas (y campesinos) de México*. En: "Autonomía y nuevos sujetos sociales en el desarrollo rural" (J. Moguel, C. Botey y L. Hernández, eds.). Siglo XXI, México. pp 33-51,
- Toledo, V.M. (2003). *Ecología, Espiritualidad y Conocimiento. De la sociedad de riesgo a la sociedad sustentable*. Universidad Iberoamericana. Programa de las Naciones Unidas para el Medio Ambiente.
- Toledo, V. (2008). *La memoria biocultural: la importancia ecológica de las sabidurías tradicionales*. Icaria Editorial. España.
- Toledo, V.M. (2012). Discurso en la presentación del libro *Saberes colectivos y diálogo de saberes* (A. Argueta, E. Corona & P. Hersch). Feria Internacional del Libro del Palacio de Minería. México, D.F.
- Toledo, V.M., P. Alarcón-Chaires, P. Moguel, M. Olivo, A. Cabrera, E. Leyequien & A. Rodríguez-Aldabe. (2001). El Atlas Etnoecológico de México y Centroamérica: Fundamentos, Métodos y Resultados. *Etnoecológica* 6 (8): 7-41.
- Trac, Ch., Harrell, S., Hinckley, T. M. & Henck, A.C. (2007). Reforestation Programs in Southwest China: Reported Success, Observed Failure, and the reasons why. *Journal of Mountain Science*, 4(4), 275-292.
- Tsing, A. L. (1999). *Becoming a Tribal Elder, and Other Green Development Fantasies*. From Transforming the Indonesian uplands: Marginality, power and production. Tania M Li, ed. PP 159-202. Harwood academic publishers. In *Environmental Anthropology. A Historical reader*. Edited by Michael R. Dove & Carol Carpenter. Blackwell Publishing.
- Urbina-Torres F. (1995). Aves. In: Contreras-MacBeath, T. and F. Urbina. *Historia Natural del área de protección de flora y fauna silvestre, Corredor Biológico Chichinautzin*. SEP/FOMES. Centro de Investigaciones Biológicas, Universidad Autónoma del Estado de Morelos. México.
- Valenzuela -Arce, J. M. ED. (2000). *Decadencia y Auge de las Identidades*. El Colegio de la Frontera Norte. Plaza Valdés. México.
- Vantomme, P. (2010). Los insectos forestales comestibles, una fuente de proteínas que se suele pasar por alto. *Unasylva*, 236 (61), 19-21.
- Varese, S. (2005). *Diálogo Intercultural*. La Afirmación de las identidades más allá de las fronteras. In: Alderete, Ethel (Wara). *Conocimiento indígena y globalización*. Abya yala. Ecuador.
- Velasco-Ortiz, L. (2003). *El regreso de la comunidad: migración indígena y agentes étnicos. Los mixtecos en la frontera México-EU*. EL Colegio de México. El Colegio de la Frontera Norte.
- Velasco-Ortiz, L. (2008). *Migración, Fronteras e Identidades Étnicas Transnacionales*. COLEF. Miguel Ángel Porrúa. Mexico.
- Vogt, E. (1970). *The Zinacantecos of Mexico. A modern Maya way of life*. Holt, Rinehart and Winston. USA.
- Volpato, G., Godínez, D., Beyra, A. & Barreto, A. (2009). Uses of medicinal plants by Haitian immigrants and their descendants in the Province of Camagüey, Cuba. *Journal of Ethnobiology and Ethnomedicine*, 5:16.
- Waldestein, A. (2006). Mexican migrant ethnopharmacology: phramacopeia, classification of medicines, and explanations of efficiency. *Journal of Ethnopharmacology*, 108, 299-310.
- Walter, M. (1998). Participatory Action Research. In: *Social Research Methods*.

- Warren, D. M. (1996). *Indigenous Knowledge, Biodiversity Conservation and Development*. In: V. Udoh J. Sustainable development in third world countries: applied and theoretical perspectives. Greenwood Publishing Group. Pp: 81-88.
- West, P. & Carrier, J.G. (2004) Ecotourism and authenticity: Getting away from it all? *Current Anthropology*, 45, 483–498.
- Williams, N.M., Baines, G. & Brownlee, A. (1993). Traditional ecological knowledge: wisdom for sustainable development. Centre for Resource and Environmental Studies, Australian National University.
- Wilson, E.O. (1989). Threats to biodiversity. *Scientific American* September: 108-116.
- Wolf, E. (1959). *Sons of the Shaking Earth*. Chicago: University of Chicago Press.
- Woodman, J. & Grig, S. (2008). *El progreso puede matar. Cómo el desarrollo impuesto destruye la salud de los pueblos indígenas*. Cultural Survival.
http://assets.survivalinternational.org/static/files/campaigns/PCK_SPANISH_LONG.pdf.
 Retrieved March 5 2011.
- Young, E. (1999) Balancing conservation with development in small-scale fisheries: Is ecotourism an empty promise? *Human Ecology*, 27 (4), 581–620.
- Zabin, C., Garcia, A., Runsten D., & Nagengast, C. (1993). *Mixtec migrants in California agriculture: A new cycle of poverty*. Davis, California: Californian Institute for Rural Studies.
- Zent S. (2001). *Acculturation and ethnobotanical knowledge loss among the Piaroa of Venezuela: demonstration of a quantitative method for the empirical study of TEK change*. In: Maffi, L. (edited). *On Biocultural Diversity*. Smithsonian Institution Press. pp. 190–211.

Appendix I Agreement

Convenio

A celebrase entre las autoridades de La Delegación Municipal Indígena Tlahuica Teocalcingo, Municipio de Ocuilan, Estado de México, delegados _____ y la investigador(a) _____ de la (institución) _____. Este convenio se realiza con la finalidad de que se pueda desarrollar el proyecto titulado El Conocimiento Ambiental Pjiekakjoo.

El presente convenio reafirma el derecho que tenemos los pueblos indígenas a salvaguardar nuestro patrimonio cultural en el sentido más amplio. Los indígenas tenemos derecho absoluto para controlar el uso de nuestro conocimiento/saberes/prácticas/creencias a pesar de estar ya dentro del dominio público.

Todos tienen responsabilidad de resguardar los recursos y conocimientos que forman parte de su patrimonio natural y cultural, y que aseguran su identidad y territorialidad como pueblo.

Por medio de este convenio el investigador(a) adquiere una serie de compromisos con la comunidad:

- a) El proyecto podrá ser iniciado solo después de haber sido presentado a la comunidad y aprobado por esta.
- b) Se deberá entregar informes trimestrales de actividades a lo largo de la realización del proyecto, si este tiene una duración mayor a los 6 meses.
- c) El investigador reconoce que el conocimiento de pueblos indígena Pjiekakjoo es la propiedad intelectual de sus detentores.
- d) Para la colecta de la información se deberán respetar los usos y costumbres de la comunidad.
- e) Se podrá hacer uso de la información colectada solo para fines académicos, y previa revisión de la misma por las autoridades. La información de los registros no podrá ser liberada por la institución local sin el conocimiento y consentimiento de la comunidad.
- f) Para hacer uso del patrimonio cultural Pjiekakjoo con fines económicos se deberá contar primero con la autorización de las autoridades para ello, puesto que la comunidad deberá ser beneficiada con un porcentaje de las ganancias.

- g) El investigador (a) se compromete a dejar dos copias del producto final de la investigación en la delegación municipal y en cada uno de los centros de educación media y media superior de la comunidad.
- h) Se deberán entregar a las autoridades copias de publicaciones, fotos, reportes que sean parte del archivo de la comunidad para que la gente pueda tener acceso a ellos.
- i) No se podrá sacar de la comunidad material biológico sin previa autorización.
- j) Los investigadores que tengan estudiantes tesistas o de servicio social trabajando en la comunidad, deberán presentarlos a las autoridades, junto con su plan de trabajo.
- k) Brindar asesoría sobre temas relacionados con su área de así ser solicitado por la comunidad.
- l) Al investigador se le asignara alguna tarea que realice como servicio comunitario (por ejemplo: que imparta una platica sobre su instigación en las escuelas, capacitación de técnicas de su área a personas interesadas) .

Delegados _____

Investigadora _____

Delegación Municipal Indígena Tlahuica, Ocuilan a ___ de _____ del 20__.

Appendix II. People involved in the Project

Tabla of the people involved in the project. This numbers do not include the students with whom we worked in the schools.

No.	Gender	Age	Community	Activity	Migratory experience
19	Males	20-35: 7 51-70: 4	Teocalcingo	Workshop 6 Power Point	5
11	Females	15, 19: 2 36-50: 1 51-70: 4	Teocalcingo	Workshop 5 Power Point	1
11	Females	8-13	Teocalcingo	Workshop 3 Power Point	
3	Males	13 : 2, 6: 1	Teocalcingo	Workshop	
3	Females	7,37,45	Teocalcingo	Power Point	
7	Males	6,11,14,22,26,40,45	Teocalcingo	Power Point	1
8	Females	20-35: 4 51-70:2	San Juan Atzingo	Interview	
3	Males	53, 55, 67	San Juan Atzingo	Interview	2
9	Males	20-35:4 51-70:2	San Juan Atzingo	Workshops	2
17	Males	20-35:6 51-70:2	San Juan Atzingo (Comm Prop Commit)	Workshops	4
14	Males	7-19: 4 36-50: 5 51-70: 4	San Juan Atzingo	Free Listing Interview	4
20	Females	7-19: 2 36-50: 8 51-70: 8	San Juan Atzingo	Free Listing Interview	
125	Total				19

Appendix III. Organism used in the quantitative interviews

Organisms included in the "Virtual" catalogue used for the structures interviews. Assoc. To a belief or of Cultural Importance

No.		Organism	Uses
1	Mammals	Tlacuache	Edible, Associated to a belief
2		Musaraña	
3		Venado	Edible Associated to a belief
4	Insects	Tetigónido	Associated to a belief
5		Mariposa	
6		Insecto ignorado	
7		Gusano e Tepozán	Edible
8	Birds	Búho?	Associated to a belief
9		Gavilán	
10		Golondrina	Associated to a belief
11	Reptiles	Escorpión	Associated to a belief
12		Cascabel	Associated to a belief
13		Lagartija	Associated to a belief
14	Amphibians	Rana	Associated to a belief
15		Renacuajos	
16		Ajolote	
17	Plants	Planta con barquito	
18		Pericón	Associated to a belief
19		Maguey	Associated to a belief
20		Maíz	Edible Associated to a belief
21	Mushrooms	Clavitos	Edible
22		Mazorquitas	Edible
23		Hongo de Charal	Edible
24		Huevoito	Edible
25	Bird	Canto de Gallinita de Monte. Track 17 in CD "Cantos de Aves del Chichinautzin". Urbina, Fernando.	Edible

Appendix IV. Comisariado elections not included in the Rights of Indigenous People

<http://www.jurisconsulta.mx/index.php/JurisprudenciaSCJN/ViewTesis?iD=225945>

Recuperate December 29th 2011.

EJIDOS Y COMUNIDADES AGRARIAS. AL CONSTITUIR FORMAS DE ORGANIZACIÓN INTERNA ESTABLECIDAS CONSTITUCIONALMENTE, EL FUNCIONAMIENTO DE LA ASAMBLEA GENERAL, ASÍ COMO LA ELECCIÓN DEL COMISARIADO, SON ACTIVIDADES QUE NO FORMAN PARTE DEL EJERCICIO DEL DERECHO A LA LIBRE DETERMINACIÓN DE LOS PUEBLOS Y COMUNIDADES INDÍGENAS.

El artículo 27, fracción VII, primer párrafo, de la Constitución Política de los Estados Unidos Mexicanos prevé la personalidad jurídica de los ejidos y comunidades agrarias, destinando la protección de la propiedad de la tierra, no sólo para actividades productivas sino también para el asentamiento humano; de ahí que acorde con sus funciones, esos núcleos de población constituyen formas de organización interna establecidas por la Constitución. Por otra parte, si bien es cierto que los pueblos y comunidades indígenas tienen derecho a decidir sus formas internas de organización, entre otras, social y económica, también lo es que al decidir por el ejido o por la comunidad de bienes comunales, deben atender a lo que la Ley Fundamental señala en cuanto a su organización y funcionamiento. Así, el penúltimo párrafo de la fracción VII del artículo constitucional citado, señala que la asamblea general es el órgano supremo del núcleo de población ejidal o comunal, con la organización y funciones que la ley disponga, y que el comisariado ejidal o de bienes comunales, electo democráticamente en los términos de la ley, es el órgano de representación del núcleo y el responsable de ejecutar las resoluciones de la asamblea. En esa virtud, se concluye que tanto la organización y funcionamiento de la asamblea general, como la elección del comisariado, son actividades que no forman parte del ejercicio del derecho a la libre determinación de los pueblos y comunidades indígenas, ya que el referido precepto constitucional establece respecto de aquéllas una reserva legal, la cual debe atenderse, pues de lo contrario se correría el riesgo de quebrantar la unidad nacional, límite de aquel derecho.

Amparo directo 3/2009. Alejandro Paredes Reyes y otros. 21 de octubre de 2009. Cinco votos. Ponente: Olga Sánchez Cordero de García Villegas. Secretaria: Ana Carolina Cienfuegos Posada.

Tesis Aislada, 1a. XVII/2010, *Semanario de la Suprema Corte de Justicia y su Gaceta*, novena época, primera sala, XXXI, febrero 2010, pág. 115

Appendix V. Decree of the Zempoala Lagoons National Park

27-11-1936 DECRETO QUE CREA EL PARQUE NACIONAL "LAGUNAS DE ZEMPOALA"

Al margen un sello con el Escudo Nacional, que dice: Estados Unidos Mexicanos.- Presidencia de la República.

LAZARO CARDENAS, Presidente Constitucional de los Estados Unidos Mexicanos, a sus habitantes, sabed:

Con fundamento en los artículos 22 y 41 de la Ley Forestal de 5 de abril de 1926, y atendiendo a lo dispuesto en los artículos 39, 47 y 48 del Reglamento de dicha Ley, y

CONSIDERANDO, que la capital de la República cuenta en la actualidad con una reducida extensión en sus contornos, de sitios forestales amenos y salubres que pueden ser utilizados para el recreo popular, siendo conveniente reservar para dichos usos, mayores extensiones de terrenos que por su belleza natural reúnan las condiciones necesarias para constituir en ellos lugares de sano esparcimiento a sus habitantes y para los turistas en general, creándose así los Parques Nacionales que por acuerdo de las naciones civilizadas se ha convenido en preservar, para conservar las bellezas naturales típicas de mayor interés en cada país;

CONSIDERANDO, que dentro de los lugares cercanos a la capital de la República, la región conocida con el nombre de "Lagunas de Zempoala", en los límites de los Estados de Morelos y México, constituyen una región sumamente interesante, no sólo por los recursos forestales que han logrado conservarse y que se encuentran en forma de tupidos bosques de coníferas, sino al mismo tiempo, porque sus terrenos de gran inclinación, requieren una amplia protección, para evitar que las vertientes inmediatas a las lagunas sufran los perjuicios de la erosión y modifiquen o agoten los manantiales que les dan origen y las azolven;

CONSIDERANDO, que la región de las Lagunas de Zempoala ha sido comunicada por medio de un camino carretero que la hace accesible al turista en cualquier época del año, constituyendo, por tanto, uno de los sitios más pintorescos de fácil acceso y de relativa cercanía a la ciudad de México, cuyos bosques seculares ofrecen un amplio campo de estudio, y cuyas praderas cubiertas de pastos forman un contraste admirable con los enormes contrafuertes que se extienden formando los valles más amplios y de mayor interés, como son el de México por el Norte, el de Cuernavaca por el Sur y el de Toluca por el Oeste; siendo un punto convergente de serranías de gran interés geográfico, dentro del conjunto de relieve que forman el Territorio Nacional, y que conviene a la Nación entera conservar, fomentando los recursos cinegéticos y además, fijando sitios de pastoreo donde puedan llevarse especies finas de ganado mayor para abrir una nueva fuente de trabajo a los habitantes de los pueblos comarcanos;

CONSIDERANDO, que dentro de los trabajos que el Departamento Forestal y de Caza y Pesca tiene asignados para cumplir con el desarrollo de los puntos de acción que le señala el Plan Sexenal, se encuentra la propagación de especies finas de pescado y las aguas de las Lagunas de Zempoala pueden ser aprovechadas a ese fin, no solamente para crear otro atractivo mayor al turismo, sino muy especialmente como medio económico de vida a los pueblos y rancherías cercanos, cuyos habitantes encontrarán en la pesca, la manera de ayudar a mejorar su alimentación; he tenido a bien expedir el siguiente

DECRETO:

ARTICULO PRIMERO.- Con el nombre de "Lagunas de Zempoala", se declara Parque Nacional destinado a la perpetua conservación de la flora y fauna regional, la porción de terrenos comprendidos en los contrafuertes meridionales de las serranías del Ajusco, en los límites de los Estados de Morelos y México, que se delimitan a continuación:

Partiendo del Cerro del Muñeco hacia el Suroeste, el lindero pasa por la cumbre del Cerro de Media Luna y llega al punto más elevado del Cerro del Picacho; de este lugar hacia el Oriente, sigue el lindero hasta la cumbre del Cerro del Ajusco; sigue el lindero en dirección general al Sur, tocando el paraje conocido con el nombre de Agua de Lobos y por el filo de la Sierra de Huitzilac hasta el Cerro de Cuauhtepic; de este lugar, en dirección al Oeste, el lindero pasa por el Cerro de la Leona y Las Majadas hasta llegar al Cerro de la Doncella; sigue el lindero con dirección general al Norte y llega a la cumbre del Cerro de Chalchiuites, de donde, en línea recta, el lindero sigue hasta la cumbre del Cerro del Muñeco que se tomó como punto de partida.

ARTICULO SEGUNDO.- Los límites del Parque Nacional a que se refiere el artículo anterior, serán fijados por el Departamento Forestal y de Caza y Pesca, en el terreno quedando bajo su

dominio la administración y gobierno del mismo Parque Nacional, con la intervención de la Secretaría de Hacienda y Crédito Público respecto a los gastos y productos que el mencionado gobierno y administración ocasionen.

ARTICULO TERCERO.-La Secretaría de Hacienda y Crédito Público procederá conforme a la ley, a la indemnización correspondiente a la expropiación de los terrenos, en la zona que fija el artículo primero del presente decreto, si fuere necesario.

TRANSITORIO:

ARTICULO UNICO.-El presente decreto entrará en vigor tres días después de su publicación en el "Diario Oficial" de la Federación.

En cumplimiento de lo dispuesto por la fracción I del artículo 89 de la Constitución Política de los Estados Unidos Mexicanos, y para su debida publicación y observancia, promulgo el presente decreto en la residencia del Poder Ejecutivo Federal, en la ciudad de México, a los treinta días del mes de septiembre de mil novecientos treinta y seis.- L. Cárdenas.- Rúbrica.- El Jefe del Departamento Forestal y de Caza y Pesca, Miguel A. de Quevedo.- Rúbrica.- Al C. Lic. Silvestre Guerrero, Secretario de Gobernación.- Presente.

"LAGUNAS DE ZEMPOALA". MODIFICACIÓN DE LINDEROS.

19-05-1947

TRANSITORIOS

PRIMERO.- Se modifican los linderos del parque nacional Cumbres del Ajusco fijados por decreto de 26 de agosto de 1936, publicado el 23 de septiembre del mismo año, los que quedarán en la forma siguiente: cota de 3,500 metros sobre el nivel del mar en el cerro de Ajusco (Pico del Águila), quedando con una superficie de 920 hectáreas con jurisdicción en la Delegación de Tlalpan, del Distrito Federal.

SEGUNDO.- Se modifican los linderos del parque nacional Lagunas de Zempoala fijados por el decreto de 30 de septiembre de 1936, publicado con fecha 27 de noviembre del mismo año, los que quedarán en la forma siguiente: Partiendo del cerro de Chalchihuites con rumbo N 90°00' E y una distancia de 5,000 metros hasta el paraje Xotlajio de ese lugar con rumbo S 1°00' E y distancia de 4,450 metros hasta el paraje Las Escalerillas siguiendo con rumbo S 49°45' W y distancia de 4,400 metros hasta el Cerro de Cuauhtepac; se sigue con rumbo S 67°30' W y distancia de 4,100 metros hasta llegar al cerro de La Leona, siguiendo con rumbo N 16°15' W y distancia de 2,450 metros hasta el cerro de Zempoala y de este punto hasta el cerro de Chalchihuites punto de partida, con rumbo N 21°70' E distancia de 7,200 metros. La superficie que comprende el parque nacional es de 4,790 hectáreas de las cuales 3,965 corresponden al Estado de México y 825 al Estado de Morelos.

TERCERO.-...

SEPTIMO.- Este Decreto entrará en vigor a partir del día de su publicación en el Diario Oficial de la Federación.

Dado en la residencia del Poder Ejecutivo Federal, en la Ciudad de México, Distrito Federal, a los veintiún días del mes de febrero de mil novecientos cuarenta y siete.- Miguel Alemán Valdés.- Rúbrica. El Secretario de Estado y del Despacho de Agricultura y Ganadería.- Nazario S. Ortiz Garza.- El Secretario de Estado y del Despacho de Hacienda y Crédito Público.- Ramón Beteta. EL Secretario de Estado y del Despacho de Comunicaciones y Obras Públicas.- Agustín García López. EL Secretario de Estado y del Despacho de de la Economía Nacional.- Antonio Ruiz Galindo. Al C. Héctor Pérez martínez, Secretario de Gobernación.- Presente.

Appendix VI. Tepetongo's Legend

Taken from Mora (1989: 107).

Tepetongo, es un lugar inhabitado que pertenece a San Juan Atzingo, Tepetongo, actualmente es utilizado por algunas personas para sembrar, en donde se han encontrado varios objetos religiosos de origen prehispánico que nos muestra indicios de un adoratorio indígena y donde se dice que hay una campana terrada. En este lugar, según la leyenda: "Vivía una señora **flaca** y alta que visitaba a los matrimonios que tuvieran hijos recién nacidos, la señora hablaba bien la "idioma" y les decía "buenos días ¿cómo amaneció?, nomas iba de pasadita y les pedía que la dejaran abrazar a l o s niños, los matrimonios no sabían que esta mujer se comía a los niños y la dejaban que los abrazara. La mujer se *despedía* y se iba, encargándoles que cuidaran a la criatura. Se anochecía y la criatura, que había sido abrazada **por** la mujer no aparecía. Entonces Dios vió que no era justo y vino a quitar ese *mal diciendo*: "Cordero de Dios que quitas el pecado del mundo". Dicen que esa mujer era la "Odisea". "Había una generación que se comía a la gente, entonces quedó una raíz desde hace tiempo y esa raíz siguió existiendo. Dios ya no quiso que continuara, que no hubiera más pecado en el mundo. Las abejas se encargaron de matarla. La abeja conocida como el "quijote" que se anida debajo de la tierra (plantanal) y produce puro gusano, no produce dulce. El Plantanal se parece al mundo, porque tiene la forma de una bola con espacios que se nombran "lonja" como de 40 cm. El Plantanal, la colmena, la avispa güera, el quijote y el panal, 5 tipos de abejas que se encargaron de matar a la mujer que comía niños. En Tepetongo, en el cerrito, estaba la casa de esta mujer, su comedero, de ahí la sacaron las abejas y la llevaron rumbo a Chalma y ahí acabo todo".

Appendix VII. Categories of Risk for Native Mexican species according to the Official Mexican Norm (Nom 059)

2.2.1 Probablemente extinta en el medio silvestre (E)

Aquella especie nativa de México cuyos ejemplares en vida libre dentro del Territorio Nacional han desaparecido, hasta donde la documentación y los estudios realizados lo prueban, y de la cual se conoce la

existencia de ejemplares vivos, en confinamiento o fuera del Territorio Mexicano.

2.2.2 En peligro de extinción (P)

Aquellas cuyas áreas de distribución o tamaño de sus poblaciones en el Territorio Nacional han disminuido

drásticamente poniendo en riesgo su viabilidad biológica en todo su hábitat natural, debido a factores tales

como la destrucción o modificación drástica del hábitat, aprovechamiento no sustentable, enfermedades o

depredación, entre otros.

2.2.3 Amenazadas (A)

Aquellas que podrían llegar a encontrarse en peligro de desaparecer a corto o mediano plazo, si siguen

operando los factores que inciden negativamente en su viabilidad, al ocasionar el deterioro o modificación de

su hábitat o disminuir directamente el tamaño de sus poblaciones.

2.2.4 Sujetas a protección especial (Pr)

Aquellas que podrían llegar a encontrarse amenazadas por factores que inciden negativamente en su

viabilidad, por lo que se determina la necesidad de propiciar su recuperación y conservación o la recuperación

y conservación de poblaciones de especies asociadas.

2.3 Especie

La unidad básica de clasificación taxonómica, formada por un conjunto de individuos que son capaces de

reproducirse entre sí y generar descendencia fértil, compartiendo rasgos fisonómicos, fisiológicos y

conductuales. Puede referirse a subespecies y razas geográficas.

2.4 Especie asociada

Aquella que comparte el hábitat natural y forma parte de la comunidad biológica de una especie en

particular.

2.5 Especie clave

Aquella cuya presencia determina significativa y desproporcionadamente respecto a su abundancia, la

diversidad biológica, la estructura o el funcionamiento de una comunidad.

2.6 Especie endémica

Aquella cuyo ámbito de distribución natural se encuentra circunscrito únicamente al Territorio Nacional y a

las zonas donde la Nación ejerce su soberanía y jurisdicción.

Appendix VIII. Edible Plants

Species according to ♦Cano et al., 2012, ♣Hunn (2008), ♠EDMTM (2009).

No.	Name in Spanish	Name in Spanish	Name in Pjiekakjoo	
1	Pápalo		Xumxu	<i>Porophyllum ruderale</i> ♠
2	Hierba de Venado		Tsamjali xumxu	
3	Xocoyol		Yilix	<i>Oxalis latifolia</i> Kunth♦
4	Quelite	Nabo	A pux	
5		Rabano	Rabanus	
6		Cenizo	Xitiü	
7		Chipa		
8		Carretilla		
9		Chivatito	Ximatot	
10		Congora	Xiltaa	
11		Pipizca		
12		Ejotes		
13		Quintonil	Xinda ka	
14		Cilantro	Xicmaa?	
15		Vinagrera	Xicmaa?	
16	Chilacayote		Xicmuli	
17	Calabazita		Ndatimuli	
18	Chayote		Xitumulyü	
19	Marranitos		Ñendo petzu	
20	Berros			
21	Mejorana			<i>Origanum majorana</i> L.♦
22	Flor de maguey			<i>Agave</i> sp.

Appendix IX. Medicinal Plants

Especies according to ♦Cano et al., 2012, ♣Hunn (2008), ♠EDMTM (2009).

No.	Name in Spanish	Name in Pjekakjoo	Especies
1	Ajenjo	Ajenju	<i>Artemisia</i> sp.♣
2	Albahacar		<i>Ocimum</i> sp. ♠
3	Arnica		<i>Tanacetum parthenium</i> Schultz-Bip.♠
4	Belladona	Tämä	
5	Bretónica	Xixmuxitaä	
6	Bugambilia		<i>Bougainvillea</i> <i>spectabilis</i> Wild.♦
7	Cáncer, Hierba de		
8	Castilla, R. de		
9	Cempasuchil	Xixnundyeë	<i>Tagetes erecta</i> L.♠
10	Chayote	Xitumulyü	<i>Sechium edule</i> Sw.♦
11	Chia morada	Lac mbii	
12	Contrahierba		
13	Endivias	Quixhanu	
		China	
		Lisa	
		macho	
		hembra	
		se extiende	
14	Epazote de perro	Xincuül/xinkil	
15	Epazote de buey	Tsimbajli xincuül/xinkil: tsimbjali es buey	
16	Estafiate	Ximipi	<i>Ipomea</i> sp.♦
17		Da ximipi	
18	Florifundio		<i>Datura sanguinea</i> L.♦
19	Fuerza, Hierba de		
20	Golpe, Hierba de		
21	Gordolobo		<i>Gnaphalium</i> sp.
22	Guayaba, Hoja de	Ixhbal ñimi (hoja)	<i>Psidium</i> sp.
23	Hoja de liebre	Nzul ka	
24	Jara	Xit salit tää	<i>Barkleyanthus salicifolius</i> (Kunth) H. Rob. & Bretell♦
25	Laurel	Nil mebxitaa	<i>Laurus nobilis</i> L. ♦
26	Lengua de vaca	Nda xitma	<i>Rumex mexicanus</i> L.♦ <i>Rumex crispus</i> L.♦
27	Malva	Malvax/Nit ñiuja	<i>Malva</i> sp.

28	Manzanilla		Manzanillá	<i>Matricaria chamomilla</i> L.♦
29	Mirto		Mirtu	<i>Salvia iodantha</i> Fernald♦ <i>Salvia gesneriflora</i> Lindl.♦ <i>Salvia microphylla</i> Kunth♦
30	Mora, Hierba		Xitzicna	
31	Nispero			<i>Eriobotrya japonica</i> (Thunb.) Lindl.♦
32	Pata de león		Taämo	<i>Geranium seemannii</i> Peyr.♦
33	Pericón		Xindiuu	<i>Tagetes lucida</i> Cav.
34	Piziete		Nluju	
35	Poleo blanco		Xiluxtcho	
36	Poleo morado		Chi lindii moraru	
37	Prodigiosa		Xoteyeench	<i>Brickellia scoparia</i> A.Gray ♦
38	Romero			<i>Rosmarinus officinalis</i> L.♦
39	Rosa de castilla		Rujas	
40	Ruda		Luta	<i>Ruta graveolens</i> L.♦
41	Sábila			<i>Aloe vera</i> L.♦
42	San Nicolás, Hierba de		Xitu mat jutzii	
43	Sapo, Hierba de			
44	Simonillo			
45	Sopa de fideo		Nilxi	
46	Sta María		Altimexa	
47	Tabaquillo			
48	Tapa cola			
49	Tejocote, Puntas de		Mash njombali	<i>Crataegus pubescens</i> Steud.♦
50	Te de maceta			
51	Timbre			
52	Torornjil	Blanco		<i>Cedronella mexicana</i> (Kunth) Briq.♣
53		Morado		
54		Azul		
55	Trébol		Do buü	
56	Zohuapacle		Ximbal ua	<i>Montanoa tomentosa</i> Cerv.♦
57	Xupaxitaä			

Appendix X. Ornamental Plants

Species according to ♦Cano et al., 2012, ♣Hunn (2008), ♠EDMTM (2009)

No.	Name in Spanish	Name in Pjiekakjoo	Latin name
1	Heno (gris)	Xic	<i>Tillandsia usneoides</i> L.♦
2	Ocoxal	Xitixu	<i>Quercus</i> spp.
3	Trebol	Do buu	
4	Lama	Xic ndaa	
5	Ramas Pino		<i>Pinus</i> spp.
6	Ramas Oyamel	Nitubi (oyamel)	<i>Abies religiosa</i>
7	Palma		<i>Syagrus romanzoffiana</i> (Cham.) Glassman♦
8	Tecolome	Xiyuu	<i>Tillandsia</i> spp. ♣
9	Acocintles, Bichitos	Tunkaa	
10	Orquídeas	Yundoo	Orchidiaceae
11	Pitayas	Dinzati	<i>Heliocereus speciosus</i> Britton & Rose♦
12	Platanitos	Ndo tzindyee	
13	Cucharilla		<i>Dasyilirion</i> sp.♣
14	Perilla	Xifalxitoo	<i>Symphoricarpos</i> <i>microphyllus</i>
15	Laurel	Xitaa	<i>Laurus nobilis</i> L.♦
16	Pericon	Xindiuu	<i>Tagetes lucida</i>
17	Carlosanto	Bepenyu	<i>Argemone mexicana</i> ♣
18	Cempasúchil	Xixnundyeë	<i>Tagetes erecta</i>

Appendix XI. Total number of taxa, species and names in Pjiekakjoo and Spanish

Organism	Taxa	Species	Names in Pjiekakjoo	Names in Spanish	Uses
Fungi	77	74	64	112	1
Invertebrates (Arthropoda)	70	8	56	66	6
Fish	2	2	1	2	1
Amphibians and Reptiles	20	22	12	21	4
Birds	59	58	53	66	6
Mammals	23	27	15	24	3
Plants	103		63	101	3
Total	354	191	264	392	6

Vita

Elda Miriam Aldasoro Maya studied biology (1998) at the National Autonomous University of Mexico (UNAM, FES Iztacala). She started her career as ethno-entomologist with her thesis about Hñã hñu ethno-entomology at the Mezquital Valley (Hidalgo, México) that resulted in the book "*Insectos en la cultura Hñã hñu*". Along with this research she developed projects of communitarian development.

As a fellow of the *Fondo Estatal para la Cultura y las Artes del Estado de México* she documented the etno-entomological knowledge of the Jñato (Mazahua) and Hñã hñu (Otomí) of Temascalcingo (State of Mexico, Mexico). Miriam Aldasoro also conducted ethno-entomological research at Puebla State (Mexico) in Zapotitlán Salinas, a community of *popoloca* origins with support from the *Programa de Apoyo a las Culturas Municipales y Comunitarias* (PACMYC-CONACULTA).

She got a scholarship from the Mexican Government to study first a Master (2005) in Environmental Anthropology and later the Ph.D. (2012) in the same program at the University of Washington (Seattle, USA) under the supervision of Eugene Hunn and Devon Peña.

As a graduate student she conducted research about the Zapotec (Oaxaca, México) and Yi (China) ethno-entomology. She also taught a course for UW students in a study abroad program at Costa Rica. She is recipient of award from the Ford and the Jacobs Research Foundations.

She has participated in several conferences at Mexico and some in the U.S.; Miriam is the author of some publications and has an experience of fourteen years doing fieldwork and conducting ethnobiological research.