Evaluation of Conservation Planning in Mexico: A Stakeholder Analysis Approach

Juan Carlos Guzman-Aranda

Dissertation submitted to the Faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Fisheries and Wildlife Sciences

Steve L. McMullin, Co-Chair

James A. Parkhurst, Co-Chair

James D. Fraser

John O. Browder

Alberto Lafón-Terrazas

June 3rd, 2004

Blacksburg, Virginia

Keywords: Stakeholder Analysis, Conservation Planning, Performance Measures, Natural Protected Areas, Modified Rural Landscapes.

Evaluation of Conservation Planning in Mexico: A Stakeholder Analysis Approach

Juan C. Guzman-Aranda

Steve L. McMullin, Co-Chair

James A. Parkhurst, Co-Chair

Abstract

A conservation planning protocol based on components from successful conservation projects in Mexico and other countries was developed to evaluate conservation planning practices and to serve as a template to guide future conservation planning efforts in Mexico. My research specifically explored stakeholder analysis and performance measurement as currently applied to conservation planning. Twenty-seven natural protected area (NPA) management plans and 6 plans from modified rural landscape projects (MDRL), all within Mexico, were evaluated. Additionally, 38 planning team members from 8 selected case studies were interviewed. I used the Laguna de Babicora Watershed planning process and management plan as the focus of my examination of stakeholder analysis. Seventy-four individuals who represented 5 major stakeholder categories were identified and interviewed. Examples of process-, outcome-, output-, and input-related performance measures (PMs) were developed for the Babicora project using information collected from my interviews, the existing management plan, and my conservation planning protocol.

The approaches used and products generated from NPA and MDRL plans differed substantially. NPA plans often used pre-established planning guidelines dictated by the overseeing or authorizing agency. Institutional rigidity was a limiting factor to development of NPA management plans. NPA plan content suggested that planners focused more attention on inventory and strategic planning than on other planning components, yet recommended operational strategies in NPA management plans still were comprehensive. MDRL planning processes were more sensitive to local conditions, but less comprehensive than NPA plans. With MDRL plans, on-the-ground pilot projects often were initiated concurrent with inventory and strategic planning efforts. As a result, MDRL planning teams often did not complete management plans due to demands imposed by these concurrent projects. Performance measurement systems for both plan implementation and monitoring of planning processes largely were absent in all NPA and most MDRL projects. Only one MDRL case study addressed process-related performance measures.

NPA and MDRL plans both suffered from poor issue identification and problem definition, offering only generic strategic statements that lacked indicators of spatial scale, geographic location, and causative agents. Management plans overall, but NPA in particular, also lacked clear links among identified problems, other key stages of the planning process, and desired or stated outcomes. Unfamiliarity with or failure to use effective diagnostic tools, coupled with a need to comply with existing planning protocols, produced management recommendations that frequently were not justified or related to identified management problems, particularly among NPA plans. MDRL case studies, which typically targeted smaller geographic areas, were not as comprehensive as NPA plans. However, MDRL case studies more often incorporated stronger participatory components. Demands from participatory processes often delayed final development of MDRL management plans. Although NPAs and MDRLs currently follow different planning processes, ultimate success in conservation management may best be served by blending complementary components from each approach.

Stakeholders who participate in conservation planning fundamentally are issue specific. Current environmental literature on stakeholder methodologies endorses use of general categories. Although cross-category stakeholder analysis is useful during inventory and strategic planning, within-stakeholder analysis is necessary for successful plan implementation. My findings suggest that within-stakeholder analysis helps (1) identify problems or needs important to particular stakeholders, (2) identify stakeholders with contrasting behavior within categories, and (3) establish areas for potential collaboration. Stakeholder involvement, tailored to local conditions, should occur in all planning stages. Successful conservation planning in Mexico currently should be addressed more as a question of human organization.

Suggested performance measures to help monitor and evaluate both the planning process and plan implementation were developed. Process-related PMs focused on the 4 major planning stages. Process-related PMs allow planners to analyze and reassess the direction of the planning process; they are not prescriptive, rather statements that recognize planning as a social exercise likely to face areas where trade-offs are likely to occur (e.g., problem identification, sharing decision-making, public involvement). Performance measures for plan implementation should be hierarchical, nested, and include input-, output-, and outcome-related assessment attributes.

Dedication

To my brother, Víctor Manuel, who helped me discover the true meaning of life,
To my parents, Víctor and Lydia, for supporting and loving me unconditionally,
To my brother Arturo, for allowing me to rejoin him in his journey, and for trusting me,
To my sister Lidia, for loving me and reminding me how important family is.

Acknowledgments

I completed this endeavor as a result of the support, sacrifices, and unconditional love of many people. First, I would like to acknowledge the support, patience, and trust of my co-advisors, Dr. Steve McMullin and Dr. James Parkhurst. Thanks so much for the countless opportunities for interaction, sharing, and philosophical discussions. Thanks for seeing at times, through my confusion, the things that really matter. Thanks for always being available, and for never giving up on me. Also, I would like to thank the rest of my committee. Dr. John Browder, thanks for believing in my ideas. Dr. James Fraser, thanks for challenging me to take the next step. Dr. Alberto Lafon, thanks for trusting in me. Thanks to Dr. Karen DePauw for validating me and for showing me how to be true to myself.

Thanks to CONACYT (National Council of Science and Technology – Mexico), the Fulbright Foundation, and The North American Wetlands Conservation Council for their economic support. I would have never completed this project without their support. I would like to thank Rocío Esquivel from the National Commission of Natural Protected Areas in Mexico (CONANP) for making their management plans available for my research. Your contribution is greatly appreciated. Also, I want to thank the Dept. of Fisheries and Wildlife Sciences, in particular Dr. Donald Orth and Dr. Brian Murphy for their support throughout my graduate studies. Thanks to Dr. Carola Haas for being my friend, and for supporting me. Thanks to Dr. Patrick Scanlon for always encouraging me. Thanks to Linda Boothe, Carol Linkous, Ramona Shaver, and Valerie Sutherland for always being available when I needed them. Thanks to all my fellow graduate students for the conversations, friendship, and good times!! It was fantastic!!

I want to thank all my friends and extended family for their love and support. Roberto and Olympia Conte, thanks for making me feel at home, and for continuously supporting and loving me. Georgina Wilson, thanks for being such a good friend. I enjoyed our singing gatherings!!! Francisco and Rosario Canales, thanks for caring and looking after me when I needed it most. Paul Davis, thanks for your encouragement, and love. I am a better man because of you. I bless your journey. Julie Delabbio, thanks for holding me together throughout rough times, and thanks for being my friend. I love you. John Forster, thanks for loving me, for helping me to retain integrity, and for supporting me unconditionally. This is my gift to you. Karen Hockett, thanks for being such a delightful friend. Ticha Gama, thanks for helping me with the typing, and for your unconditional love. Lourdes Salcido, thanks for sharing this journey with me, and for always remaining close to me and my family. Mike Lythgoe, thanks for taking the risk of challenging me, and for remaining a part of my life. Nina Sengupta, thanks for being a good friend, and for helping me to remember that I am part of the world. I honor you, and your journey. Dale Jenkins, thanks for your generosity and love. I completed this journey because of you. Tom Brobson and David Brady, thanks for helping me to see that life is full of dreams to be fulfilled. Tim Copeland, thanks for our endless conversations at the computer room. I honor your courage in life. Dora Soto and Monina Dozal, thanks for always being there for me, and for missing me. Finally, I want to thank all participants of the 'Aztec Nights.' It was a wonderful place for reconnecting, and rediscovering the purpose of our stay here at Virginia Tech. We never 'solved' the big problems, but we always had a great time trying!! This entire circle of connections and relationships was created for a purpose. Now it is complete. I bless you all in your personal journeys.

Table of Contents

List of Figures

List of Tables

Chapter 1. Introduction

In the United States (US), comprehensive natural resource planning (e.g., water and public lands management) started during the "Progressive Era" of the early 20th century. As suggested by Hudson (1979), planning for resource development during this period established the general framework used for natural resources and environmental planning today. This philosophy, promoted in the US by Gifford Pinchot (Nelson 1995), had 4 main characteristics: (1) sustained yield was the prevalent paradigm, (2) decisions were based on rational, scientific data, (3) attitudes toward natural resources primarily were utilitarian, and (4) a centralized, top-down decision-making structure predominated (Cortner and Moote 1994). Agencies such as the US Forest Service (USFS), the Bureau of Land Management (BLM), and the US Army Corps of Engineers, even though required by law to pursue a multiple use, sustained-yield approach, often devoted most of their effort to promote sustained use of a single resource (e.g., timber, grazing, water, scenic beauty, and others) (Cortner and Moote 1994).

Mexico followed a similar path. Natural resource planning initially focused on exploitation of forest, water, and grassland resources beginning in the late 19th and early 20th centuries. The first change from planning for resource exploitation to planning for natural resource conservation in Mexico occurred in the late 1910s with the establishment of the first national park (CONANP 2001). During the 1930s, the Mexican government substantially increased the number of national parks, purportedly to protect the aesthetic and environmental values of natural landscapes nationwide. However, most of these national parks were "parks on paper" that failed to achieve conservation goals, due in large to a centralized, top-down administrative system imposed by the federal government upon state governments and local communities (CONANP 2001). During the 1970s, Mexico moved from a resource-use approach (frontier economics) to a focus on preservation of biodiversity (resource management paradigm) (Colby 1991). From the 1970s to the 1990s, the number of natural protected areas (NPAs) and other conservation efforts increased in Mexico mainly due to 5 factors: (1) the development and implementation of a protocol for national parks planning for Latin America developed in 1976 by the Food and Agriculture Organization of the United Nations (FAO) (Moseley et al. 1976), (2) incorporation of the first 2 Mexican Biosphere Reserves in the Man and the Biosphere Programme (MAB) – UNESCO in 1977 (UNESCO-MAB 2002), (3) strong participation of social groups (e.g., NGOs, local communities) and academic institutions, (4) signing of the Earth Summit in 1992 (CONANP 2001), and (5) development of Mexico's first environmental law in 1988 (SEMARNAT 2001a). Since the inclusion of the first 2 Biosphere Reserves to the MAB Programme in 1977, 10 more Biosphere Reserves have been added (UNESCO-MAB 2002) (Table 1.1). Currently, Mexico is home to 117 other NPAs in 6 different categories (Table 1.2).

Even though the MAB Programme calls for a participatory, inclusive conservation planning format, the lack of appropriate involvement of key stakeholders is a frequent shortcoming in natural resource planning in Mexico. According to CONANP (2001), one reason why NPAs in Mexico have failed to achieve their conservation goals is a lack of stakeholder involvement in identifying and designing NPAs. Haenn (1999b) noted that local farmers and residents of the Calakmul Biosphere Reserve did not learn about the creation of the reserve until 1 year after the decree was passed. This lack of communication created negative attitudes among local stakeholders. To deal with local opposition, the federal government used sustainable development projects to quiet local protests against the creation of the NPA (Haenn 1999b).

Table 1.1. Biosphere Reserves in Mexico recognized by the Man and the Biosphere Programme – UNESCO as of July 2002.

Name of Biosphere Reserve	Year of Establishment	Location (state)	Plan Availability[a]
Mapimi BR	1977	Durango	No
La Michilia BR	1977	Durango	No
Montes Azules BR	1979	Chiapas	Yes
El Cielo BR	1986	Tamaulipas	No
Sian Ka'an BR	1986	Quintana Roo	Yes
Sierra de Manantlán BR	1988	Jalisco/Colima	Yes
Alto Golfo de California BR	1993	Sonora/Baja California	Yes
Calakmul BR	1993	Yucatán	Yes
El Triunfo BR	1993	Chiapas	Yes
El Vizcaino BR	1993	Baja California Sur	Yes
Islas del Golfo de California BR	1995		Yes
Sierra Gorda BR	2001	Querétaro	Yes

Source: UNESCO-MAB (2002)
[a] Written management plans available and used for analysis in this project

Table 1.2. Current Natural Protected Areas in Mexico, listed by type, as of July 2002.

Type of Natural Protected Area	Number	Plan Availability[a]
Biosphere Reserves (MAB Programme – UNESCO)	12	9
Biosphere Reserves (INE – Mexico)	19	6
National Parks	66	7
Natural Monuments	4	0
Natural Resource Protection Areas	1	0
Flora and Fauna Protection Areas	23	4
Other categories	4	2
TOTAL	129	28

Source: CONANP (2001)
[a] Written management plans available and used for analysis in this project

Young (1999) reported that local involvement in the El Vizcaino Biosphere Reserve proved to be critical, but also became problematic. Even though local people were expected to take the lead in protecting natural resources, the conservation process itself was too complicated for them to become active conservation advocates (Young 1999).

Stakeholder involvement is only one of many challenges natural resource conservation planners face in Mexico. Land privatization (Thompson and Wilson 1994, Brown 1997, Yetman and Burkez 1998), free trade agreements (Taylor 2000, Johnson 2001), intrarural migration (Haenn 1999a), and adequate management of common property systems (e.g., forests) (Thoms and Betters 1998) present challenges to conservation in Mexico. If natural resource conservation planning is to be successful not only within NPAs, but also in modified rural landscapes (MDRLs) where greater biodiversity may exist (Little 1994), Mexico needs to adopt a new, more comprehensive planning protocol. This new protocol must acknowledge different stakeholders, create dynamic participatory processes, and allow effective evaluation of plan implementation. Development of adequate and shared performance measures not only will allow necessary monitoring of progress in plan implementation, but, more importantly, allow goals and objectives to be modified as needed using adaptive approaches (Agrawal 2000).

This dissertation is organized in 5 chapters, including this general introduction. Chapter 2 reviews the literature of natural resource conservation planning, stakeholder theory and analysis, community-based conservation, common property systems, and performance measures and evaluation. Chapter 3 addresses how natural resource conservation planning currently is conducted in Mexico, with particular emphasis on what components are present in and/or missing from the planning processes. For this assessment, I developed and used a comprehensive evaluation matrix using case studies from both NPAs and MDRLs. I also conducted face-to-face interviews with project planning team members and thoroughly evaluated written management plans. Chapter 4 concentrates on developing and testing a methodology for stakeholder analysis. I examine how stakeholders are identified, what selection criteria can be used, and the similarities and differences among stakeholders across different scales (i.e., local, state, and federal levels). I rely heavily upon face-to-face interviews with stakeholders associated with the Laguna de Babicora Conservation Planning Project (LBCPP) in Chihuahua, Mexico, and several other planning teams and coalitions in Mexico. Chapter 5, a detailed examination of the Laguna de Babicora case study, culminates in development of recommended performance measures used to monitor and evaluate successful plan implementation.

1.1 Study Objectives

The specific objectives of this project were to:

1. To characterize conservation planning practices in Mexico and their validity under current economic and social characteristics by:
   a) Characterizing conservation planning (1994 – 2003) as it occurs in NPAs and MDRLs in Mexico,
   b) Assessing validity of the existing conservation planning protocol for natural protected areas in regards to neo-liberal economic reforms (e.g., devolution of use rights, land tenure changes),
   c) Analyze the potential contribution of participatory processes in conservation planning in Mexico.
2. Use the Laguna de Babicora planning process and the principles of the stakeholder theory and common property resources model to:

a) Develop classification criteria and analysis tools to identify stakeholder groups at Laguna de Babicora Watershed,

b) Characterize stakeholders' behavior toward identified conservation threats at Laguna de Babicora watershed, and to assess the feasibility for collaborative implementation of Laguna de Babicora Watershed management plan,

c) Analyze potential threats and obstacles associated with conservation and management of common lands due to changes in land tenure at Laguna de Babicora Watershed, Chihuahua, Mexico.

3. Based on information generated from the review of Laguna de Babicora planning process and other management plans in Mexico, my objectives are:

a) Establish a descriptive protocol for collaborative conservation planning that incorporates major requirements, limiting factors, and opportunities for successful design and implementation of conservation plans in Mexico;

b) Evaluate the planning process at Laguna de Babicora to assess effectiveness of that planning approach, identify missing components of effective planning, and identify and describe potential limitations to future implementation; and

c) Develop process-related as well as output, outcome and input-related performance measures to monitor and evaluate the planning process for either modified rural landscapes or natural protected areas' planning processes in Mexico.

Chapter 2. Literature Review

2.1 Mexico and its resources

Mexico covers 5,114,295 km^2 that politically have been divided into 31 states and 1 Federal District, and supports a human population of nearly 100 million people (INEGI 2001). Climate varies greatly across the country; 56% of Mexico is classified as being arid or semiarid (i.e., north-central Mexico), 37% as sub-humid (i.e., temperate forests along the Pacific and Atlantic coasts), and 7% as humid (i.e., south-east Mexico) (De Alba and Reyes 1998). Precipitation ranges from 100-200 mm/year in north-central Mexico, to as much as 2,000 – 4,000 mm/year in south-east Mexico (De Alba and Reyes 1998). Average annual temperature over 75% of the country equals or exceeds 18^{o}C.

2.1.1. Biological Diversity in Mexico

The high climatic and biological diversity in Mexico is a consequence of several factors, including (1) sharp contrasts in landscape attributed to change in latitude and altitude (e.g., approximately 50% of Mexico is >1000 meters above sea level), (2) convergence of coastal areas with mountainous systems, which influences rain and temperatures patterns, (3) convergence of the Neoartic and Neotropical biogeographic regions, and (4) a complex geological history. A significant number of plants and animals endemic to Mexico today evolved since the late Pleistocene glacial period (Neyra-González and Durand-Smith 1998).

Mexico is the most biodiverse country in Latin America, and one of the most biodiverse countries in the world. Mexico contains 5 natural regions, 9 of 11 habitat types, and 51 of 191 eco-regions. Fourteen eco-regions in Mexico are considered a world priority for conservation purposes (Neyra-González and Durand-Smith 1998). Mexico has particularly high gamma (i.e., diversity of species at the regional level) and beta diversities (i.e., species exchange at the landscape level). Gamma diversity contributed to Mexico's ranking as one of the 12 mega diverse countries in the world (SEMARNAP 1997). For example, Mexico has the world's highest reptilian (709 species), the second highest mammalian (439 species), the fourth highest amphibian (282 species), and the fourth highest angiosperm plant diversities (26,000 species) respectively (Neyra-González and Durand-Smith 1998). Despite efforts of the Mexican government to increase the number of natural protected areas (NPAs) over the last 15 years, some researchers believe that existing NPAs are insufficient to adequately protect Mexico's biodiversity at the landscape level (beta diversity) (Sarukán et al. 1996).

Endemic species are particularly numerous. For example, among phanerogam plants such as cacti, 79% of 900 species are endemic, and among agaves, 67% of 217 species are endemic. Nearly 1,000 species of vertebrates are endemic, including 174 of 290 species of amphibians (Neyra-González and Durand-Smith 1998).

Mexico protects 2,421 species, of which 14% (336 species) are classified as endangered and 33% (801 species) are threatened (Peña-Jimenez and Neyra-Gonzalez 1998). Plant families with the highest numbers of threatened and endangered species (T&E) include Cactaceae (257 species), Orchidaceae (180 species), Palmae (64 species), and Agavaceae (48 species). Furthermore, 1,420 species of vertebrates have some degree of special protection, including 143 endangered mammals, 272 endangered birds, 218 endangered reptiles and amphibians, and 126 endangered freshwater fish (Peña-Jimenez and Neyra-Gonzalez 1998).

In Mexico, 15 plant species and 32 vertebrate species became extinct in recent history (i.e., 5.2% of all extinctions worldwide). This estimate does not include the extinction of nearly

300 invertebrate species. Causes for extinction include habitat destruction, overexploitation, and introduction of competing exotic species (Peña-Jimenez and Neyra-Gonzalez 1998).

According to the National Commission for the Study and Protection of Biodiversity, the greatest proportion of ecosystems and species that comprise Mexico's biodiversity is found outside the NPA system (CONABIO 2000). These modified rural landscapes (MDRLs) (see Appendix G for list of acronyms) often suffer from highly destructive management regimes (Little 1994). To reverse this situation, Mexico has increased the number of conservation initiatives on MDRLs to protect biodiversity (i.e., terrestrial, aquatic or insular) that occurs outside NPAs, and to link fragmented habitats that sustain isolated fauna and flora populations (CONABIO 2000).

2.1.2. Threats to biodiversity in Mexico

Clearing of forests and grasslands for agriculture and cattle raising constitute the greatest threats to conservation of terrestrial ecosystems in Mexico (Garcia-Barrios et. al. 1998, Peña-Jimenez and Neyra-Gonzalez 1998, Zabin 1998). According to the Food and Agriculture Organization of the United Nations (FAO), between 1990 to 2000 Mexico converted 631,000 ha of forested land to agricultural uses annually (i.e., 1.8% annual deforestation rate), one of the highest rates in North and Central America (FAO 2000). About 95% of the original tropical forests, 50% of temperate forests, and a significant, but unquantified percentage of grasslands and shrub lands have been destroyed or altered (Peña-Jimenez and Neyra-Gonzalez 1998). Although official estimates of the acreage of arable land arable land in Mexico have remained stable over the last 20 years (i.e., 20 million hectares), Peña-Jimenez and Neyra-Gonzalez (1998) suggested that these estimates do not acknowledge abandoned or newly cleared areas for agriculture.

Despite old perceptions, environmental degradation is not associated exclusively with indigent farmers. Modern irrigation practices can lead to salinization, desertification, and pollution of soils and waters, whereas traditional rain-fed farming can cause considerable soil erosion. Approximately 78% of Mexico's land area (154 million hectares) is subject to erosion attributed to agriculture or grazing (SEDESOL 1994, as cited in Peña-Jimenez and Neyra-Gonzalez 1998). Natural grasslands in northern Mexico have been overgrazed. In central and southern Mexico, lands have been cleared to create artificial prairies (Peña-Jimenez and Neyra-Gonzalez 1998). From 1950 to 1990, the amount of area dedicated to cattle raising increased by 260%, from 50 million ha to 130 million ha by 1990.

Illegal trade of wildlife (individuals of and by-products from wild species) is a growing threat in Mexico, particularly for birds, reptiles, and ornamental plants (e.g., cacti, wild orchids, parrots, macaws). Estimates of economic profits from illegal trade of wild species are exceeded only by drug and arms dealing in Mexico (Peña-Jimenez and Neyra-Gonzalez 1998).

2.1.3. Public policy, environmental degradation, and poverty

Mexico's failure to adequately preserve biodiversity has arisen mostly due to a lack of integration of national development and conservation policies. National debt, land tenure reform, and economic instability problems typically have been addressed with short-term policy shifts that have had disastrous consequences for the environment. This lack of integration also has generated negative public attitudes toward enforcement of environmental laws. Mexico's large debt burden has prevented the government from investing in natural resource management. In 1997, the budget for conservation in NPAs nationwide was 23.4 million pesos (US $ 2,127, 272), or, 2.4 pesos/ha (Peña-Jimenez and Neyra-Gonzalez 1998).

Areas that display high biological diversity also are home to some of the poorest people in Mexico (e.g., states of Oaxaca, Chiapas and Guerrero in southern Mexico). De Alba and Reyes (1998) estimated that 14 million people in Mexico (15.4% of the population) are unable to fulfill their basic needs. Living conditions for the poor have continued to worsen over the last 10 years because benefits and costs of conservation are not shared equally, and the number and quality of jobs have not increased (Peña-Jimenez and Neyra-Gonzalez 1998).

The contribution of agriculture and forestry products to the GNP has changed over time. In the 1940s, such activities comprised 23% of the GNP, whereas in the 1990s, that contribution was 7.8%. By 1995, nearly 23% (5.3 million people) of Mexico's population depended on agriculture for income (e.g., crop farming, cattle raising) (INEGI 1995). Nowadays, manufacturing and service industries represent major income sources in Mexico, collectively comprising 92% of the GNP (Peña-Jimenez and Neyra-Gonzalez 1998).

Nevertheless, productivity within the primary sector is low mostly because of obsolete technology and changes in product demands (e.g., higher demands for fruits, vegetables, meat, and wheat with lower demands for traditional food like rice and beans). De Alba and Reyes (1998) identified 3 additional limiting factors for agriculture in Mexico: (1) ambiguous property rights over key resources (e.g., lands, water), (2) undercapitalization due to the lack of loans and economic incentives, and (3) lack of private investments due to insecure land ownership rights.

2.1.4. Legal framework for natural resources

Galindo-Jaramillo and Loa-Loza (1998) identified 3 environmental conservation eras in Mexico. The first era occurred during the 1970s, during which the Secretary of Health and Assistance (SSA) addressed issues mainly related to pollution and health of the human environment. During this era, the Mexican government restricted biodiversity conservation to regulation of forest and wildlife uses and protection of charismatic species (Galindo-Jaramillo and Loa-Loza 1998).

The second era occurred during the 1980s, when protection of the environment was institutionalized and linked with national development policies. Several events characterized this decade: (1) creation in 1982 of the Secretary of Urban Development and Ecology (SEDUE) with the purpose of linking biological richness with environmental pollution, (2) passage of the first environmental law in 1988 – The General Law of Ecological Equilibrium and Protection of the Environment (LGEEPA) (SEMARNAT 2001a), and (3) creation in 1989 of the National Commission of Water (CONAGUA).

The third era, which started in the early 1990s, included 4 key elements responsible for the current status of the environmental policy in Mexico: (1) creation of the Secretary of Social Development (SEDESOL), the National Institute of Ecology (INE), and the Federal Prosecutor Office of the Protection of the Environment (PROFEPA) (in 1992), (2) establishment in 1994 of the Secretariat of Environment, Natural Resources, and Fisheries (SEMARNAP), a large organization that encompassed multiple natural resource agencies and mandates (e.g., water administration, law enforcement, normative procedures, forestry, grassland, and wildlife management), (3) the update in 1996, and subsequent revision in 2001, of the LGEEPA, and (4) the issuing of the Official Mexican Norms (NOMs) starting in 1997, to regulate water and air-related issues (e.g., management, pollution) (Galindo-Jaramillo and Loa-Loza 1998, McBride 2000).

In addition, the involvement of Mexico in international forums over the last 25 years also contributed to increased awareness of environmental and biodiversity conservation in Mexico. Currently, Mexico has signed several conservation treaties including: (1) the Man and the

Biosphere Program from the United Nations Educational, Scientific, and Cultural Organization (MAB-UNESCO) (1977), (2) the Convention on Wetlands located at the Iranian city of RAMSAR (aka RAMSAR Convention) (1986), (3) the Convention for the International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1991), (4) Convention on Biological Diversity (CBD) (1992), and (5) Cooperation committees among Canada, US, and Mexico for conservation of wetlands and migratory waterfowl (1994), and wildlife and ecosystems (1996).

This new environmental awareness in Mexico has contributed to the increase in numbers and appreciation of the National Protected Areas (NPAs). Mexican NPAs are receiving through current regulations additional support to conduct sound conservation planning and law enforcement. Before 1994, most NPAs lacked sound and comprehensive management plans. Between 1994 and 2000, management plans were developed for approximately 30% of existing and newly created NPAs (Table 2.1). Yet some resource managers believe that the operation of NPAs is challenging because the legal model of many NPAs either lacks enough detailed information for their operation or is obsolete. In addition, the discretional nature of the decree allows for multiple interpretations of the purpose of many NPAs. This situation hinders the ability of the environmental agencies to monitor the progress in achieving their conservation goals (Galindo-Jaramillo and Loa-Loza 1998).

Table 2.1. List of Federal Natural Protected Areas in Mexico with management plans created after 1994.

Management Plan	Date of Plan	State(s)
Biosphere Reserves (MAB-UNESCO)		
1. Management Program for the BR Sian Ka'an	01/1996	Quintana Roo
2. Management Program for the BR Alto Golfo de California y Delta del Rio Colorado	12/1996	Sonora and Baja California
3. Management Program for the BR El Triunfo	04/1999	Chiapas
4. Management Program for the BR Sierra Gorda	09/1999	Quintana Roo
5. Management Program for the BR Calakmul	11/1999	Campeche
6. Management Program for the BR Manantlan	01/2000	Jalisco-Colima
7. Management Program for the BR El Vizcaino	05/2000	Baja California Sur
8. Management Program for the BR Montes Azules	05/2000	Chiapas
9. Management Program for BR Islas del Golfo de California	11/2000	Baja California, Baja California Sur, Sonora, Sinaloa
Biosphere Reserves (Mexico)		
1. Management Program for the BR El Pinacate y Gran Desierto del Altar	12/1995	Sonora
2. Management Program for the BR La Sepultura	10/1999	Chiapas
3. Management Program for the BR La Encrucijada	10/1999	Chiapas
4. Management Program for the BR Ria Lagartos	11/1999	Yucatán – Quintana Roo
5. Management Program for the BR Pantanos de Centla	02/2000	Tabasco
6. Management Program for the BR Banco Chinchorro	05/2000	Quintana Roo
National Parks		
1. Management Program for the Parque Nacional Isla Contoy	05/1997	Quintana Roo
2. Management Program for the Parque Marino Nacional Arrecifes de Cozumel	05/1998	Quintana Roo
3. Management Program for the Parque Marino Nacional Costa Occidental de Isla Mujeres, Punta Cancun y Punta Nizuc	05/1998	Quintana Roo
4. Management Program for the Parque Nacional Cumbres de Majalca	05/1999 (revision)	Chihuahua
5. Management Program for the Parque Marino Nacional Arrecife de Puerto Morelos	10/1999	Quintana Roo
6. Management Program for the Parque Nacional Bahía de Loreto	11/2000	Baja California Sur
Flora and Fauna Protection Areas		
1. Management Program for the APFF Maderas de Carmen	05/1997	Coahuila
2. Management Program for the APFF Cañon de Santa Elena	07/1997	Chihuahua
3. Management Program for the APFF Laguna de Términos	08/1999	Campeche
4. Management Program for the APFF Cuatrocienegas	11/1999	Coahuila

2.1.5. Biodiversity Conservation in Rural Landscapes

Since the 1970s, the number of NPAs worldwide has increased steadily, playing a key role in the conservation of biodiversity. However, as the numbers of protected areas increase, particularly in countries with extensive poverty, the number and intensity of conflicts between conservationists and local people also have increased exponentially (Brandon and Wells 1992, Olomola 1998, O'Neill and Walsh 2000, Stræde and Helles 2000). Conflicts over resource use ownership and consumption rates are constant threats for many conservation areas. According to Brandon and Wells (1992), natural resource agencies in developing countries have limited capabilities for dealing with park-people conflicts.

Some researchers believe that the wealth of the world's biodiversity is found outside of NPAs. Little (1994) suggested that a substantial percentage of the world's biological diversity exists outside the legal boundaries of protected areas (i.e., MDRLs). According to Western et al. (1994), conservation efforts in MDRLs started to develop early in the 1980s, and it is in these areas where future conservation efforts must concentrate. Although some efforts are taking place, the concepts and criteria for this new model are still vague. Conservation in MDRLs faces the challenge of goal incompatibility between conservationists and local communities. While communities look to regain control over resources as a means to improve their economic status, conservationists tend to develop ecologistic attitudes about resources (Western et al. 1994). Although conflicts may be most conspicuous regarding forest resources (Little 1994), the conservation-development dilemma applies to a more diverse range of resources. Wildlife conservation deserves special attention because it deals with wildlife populations and habitats simultaneously.

2.2 Wildlife conservation and development

Depletion of wildlife populations occurs for many reasons. Negative attitudes and indifference toward wildlife (Dalal-Clayton 1991), conflicting values among different users (Cohn 1988), disregard for the economic value of wildlife, and inequitable distribution of conservation costs and benefits (Dalal-Clayton 1991) are some factors that account for this situation. As suggested by Child (1996a), the introduction of agriculture-related activities contributed to the reduction of wildlife populations due to higher immediate profitability of agriculture and other land uses, as well as high opportunity costs for local people. In particular, high opportunity costs represent a major limitation for wildlife conservation because a high percentage of the world's biodiversity is found in highly productive rural areas (Salafsky 1994). Brandon and Wells (1992) and Haenn (1999b) suggested that local farmers bear most of the costs for environmental conservation particularly when conservation projects are established without local consent. The restrictions that come as a result of these projects create high opportunity costs and low benefits for local communities. Brandon and Wells (1992) believed that these restrictions are likely to create negative attitudes toward wildlife among local communities. Thus, wildlife conservation will only take place if fair and democratic economic development is promoted as an incentive to stop land degradation (Brown 1986, Brechin and West 1990). In addition to case-specific conditions, Western et al. (1994) suggested that problems such as growth of human population, commercial pressures, corruption, lack of awareness, and nepotism also contribute to inhibit conservation efforts in general. According to Salafsky (1994), the real challenge for conservationists is the promotion of wildlife conservation in those areas with real possibilities of conflicting interests and values among different stakeholders. Examples of this situation are documented in the literature for countries such as

Zimbabwe (Child 1996b), Indonesia (Brown 1986), Nepal (Sanjay and Weber 1995), and Kenya (Ayieko 1986).

2.3 Natural Resources Planning and Public Involvement

2.3.1. Natural Resources Planning

Zazueta (1995) defined sustainable development as the protection of the integrity of the Earth's system to maintain its ability to meet current and future needs for present and future generations. In light of such concepts, it has been recognized that economic development and environmental protection can no longer be approached separately (Slocombe 1993, Zazueta 1995). Proclamations at the World Conservation Strategy (IUCN 1980) and Rio de Janeiro Earth Summit (Hammond et al. 1995, Walls et. al. 1999) identified conservation and economic development as complementary activities that should be linked to efforts aimed at the eradication of poverty and environmental degradation (Brown 1986, Brandon and Wells 1992). This integration of conservation and economic development will require sound environmental management, broad-based economic development, equitable distribution of goods and services, control of population growth and resource use rates, and equitable distribution of conservation rights and duties (Salafsky 1994, Bromley 1994, Hammond et al. 1995, Zazueta (1995).

The complex nature of social and environmental problems makes it challenging to manage them based on single, dominant variables. Both types of problems are result of the interaction of a large number of variables (Briassoulis 1989), most of which are difficult to manage unambiguously (Cartwright 1973). Although environmental impacts from large scale resource development plans are recognized widely throughout the world, these problems only recently were described adequately using planning concepts (Hudson 1979). Thus, if society is to be sustainable in the future, resource planners and managers must meet current and future needs by following interdisciplinary approaches where urban planners, biologists, sociologists, and economists collaborate to solve complex social and environmental problems (Grumbine 1994). In particular, mainstream planning needs to acknowledge the existence of social and ecological regional elements (Slocombe 1993, Zazueta 1995).

Slocombe (1993) suggested that urban and environmental planning can complement each other in solving environmental problems. Environmental planning may benefit from the procedural, systematic experience of urban planning, whereas urban planning may re-adopt a more ecosystem-oriented, systemic approach. Integration of different bodies of knowledge is not limited to resource planning. Toledo et al. (2002) suggested that the integration of different bodies of knowledge (e.g., social sciences, ecology, anthropology), also known as the "conceptual revolution" (Naredo 1992) already has yielded new revolutionary research avenues (e.g., environmental sociology, human ecology, political ecology). These disciplines that bridge both development and environment follow a geocentric approach where the human experience and the environment are referenced to each other within their historical context.

The increase of public involvement in environmental issues during the late 1960s and early 1970s contributed to the shift from a science-based, centralized management paradigm toward a still-developing collaborative, more integrative, ecosystem-based paradigm (Hudson 1979, Briassoulis 1989, Slocombe 1993). This new conservation planning paradigm is based on the experience gained from comprehensive resource development and other planning approaches (e.g., incremental, adaptive, contingency planning) (Briassoulis 1989). One critical characteristic of this "*approach in the becoming*" (Briassoulis 1989), or "*hybrid*" (Toledo et al. 2002), is the presence of a strong component of social participation (Briassoulis 1989, Slocombe 1993, Zazueta 1995, Child 1996a). The role of managers should not be to provide a definition for sustainable resource systems. Instead, resource managers should be able to facilitate the development of processes aimed at identifying and incorporating different stakes and understandings of what a sustainable resource system should be (Diemer and Alvarez 1995). The need for deeper public involvement also is supported by emerging methodologies such as Ecosystem Management (EM) (Slocombe 1993, Grumbine 1994), Integrated Conservation and Development Projects (ICDPs) (Ack 1991, Brown and Wyckoff-Braid 1992), and Community-Based Conservation (CBC) (Child 1996a).

2.4 Ecosystem Management

The idea of EM originally was suggested in the late 1940s (Leopold 1949), but it was not embraced fully by resource managers until recent years (Slocombe 1993; Grumbine 1994). Unlike sustained yield, which emphasizes products and outputs, EM emphasizes maintenance of fully functioning ecosystems with human use accommodated subject to ecological constraints through the implementation of collaborative processes (Cortner and Moote 1994, Grumbine 1994).

EM requires agreement among resource planners and managers on concept definitions (e.g., sustainable use, biodiversity, ecosystem management, collaborative management, management system units) (Darling and Dasmann 1969, Slocombe 1993). It also requires information and data for large-scale, ecosystem-based studies, and development of more friendly policy and institutional frameworks for public involvement. In addition, EM requires techniques and methods for better integration of different social values and perspectives (Cortner and Moote 1994) and definition of ecological boundaries (Grumbine 1994). The Great Lakes Ecosystem

Project (MacKenzie 1997), the Human Ecosystem Model (HEM) (Luzadis et al. 2002), and specific case studies involving renewable resources (Olson and Folke 2001) show the potential benefits of this approach.

2.5 Public and Community Involvement: Use of Participatory Processes

The core premise of participatory processes is that the public is able to make relevant contributions to decision making and implementation in any planning process (Diemer and Alvarez 1995). Since the 1970s, participatory processes have been instrumental for the success of programs in a variety of fields including rural development (Little 1994), agriculture research (Little 1994, Zazueta 1995), civil rights, education, and health (Little 1994, Thrupp et al. 1994), and conservation of natural resources (Cernea 1992, Little 1994, Zazueta 1995, Child 1996a). Participatory processes have been used in management and conservation planning on a wide range of resources such wildlife (Metcalfe 1990, Chitere and Mutiso 1991), marine fisheries (Rousseau 1990), and forestry (Diemer and Alvarez 1995) in countries such as Zimbabwe (Child 1996a) and Thailand (Leelapatra et al.1992, Tan 1992). The popularity of participatory processes results from a combination of several factors, namely: (1) the recognition by resource managers that, to reduce public antagonism toward conservation projects, participatory decision making was required (Western et al. 1994), (2) the limited capacity of natural resource agencies to deal with high rates of environmental degradation and biodiversity losses (Brechin and West 1990), and (3) the increasing demands for democratic processes in natural resource management (Zazueta 1995). This demand has been particularly important at the regional or local level where local involvement has been absent and the potential for conservation programs is highly promising (Western et al. 1994).

Compared to non-democratic projects, use of participatory processes could yield additional advantages, including: (1) assisting in developing more suitable technologies for local needs, (2) assessment of a local "say" (e.g., local needs, concerns, limitations), (3) facilitation of the process for empowering local people, (4) an increase in project flexibility and adaptability at specific times and places, (5) support for involvement of marginalized stakeholders (Thrupp et al. 1994), (6) facilitating the implementation processes, (7) higher economic benefits in compensation for high opportunity costs, and (8) easy dissemination of results (Zazueta 1995). Zazueta (1995) suggested that all these potential benefits will hold true only if local stakeholders are included from the outset of the project, otherwise opposition from the intended beneficiaries is likely (Haenn 1999b).

The use of participatory processes in natural resource management does not guarantee successful involvement of local stakeholders. Poor understanding or misuse of participatory processes may have adverse effects, namely: (1) participatory processes consume time and money, thus, inadequate budgeting will constrain the use of participatory processes to small scales with limited results, (2) if poorly implemented, participatory processes will disregard the natural heterogeneity of local stakeholders by focusing on specific interest groups, (3) the lack of acknowledgement of government policies while using participatory processes can reduce the possibilities of local initiatives for successful development, and (4) there is a trend among resource managers to restrict participation to either early (e.g., inventory) or final planning stages (e.g., evaluation, implementation) (Thrupp et al. 1994).

Several participatory methodologies are used in both rural development and conservation projects. Search conferences and participative design workshops (Diemer and Alvarez 1995) have proven effective in eliciting local participation. However, in recent years new participatory processes have been proposed to improve local participation. The central element for all these new approaches is "learning by doing," where non-traditional stakeholders (e.g., communities) are encouraged to develop basic planning skills (e.g., data collection and analysis, leadership, effective negotiation) (Thrupp et al. 1994). These innovations in participatory processes incorporate several new dimensions. First, they scale up and evolve into planning, where participation is conceptualized as a process that fits local schedules and needs. Participation in these new approaches is flexible, adaptive, and not as time-constrained as older approaches. Second, they encourage methodological innovation and flexibility, where people create new, more sound participatory processes through the adaptation of old theories and methodologies (Thurp et al. 1994). Examples from Ecuador showed that, through the combination of vernacular and mainstream planning concepts, it was possible to develop alternative processes that acknowledged local perceptions of nature and time, and responded more adequately to local needs. Third, these new participatory processes foster open involvement and partnerships with local organizations and promote appropriate pacing for planning and decision-making processes. Fourth, they ensure adequate representation of all key stakeholders throughout all planning stages (Thrupp et al. 1994). Despite their potential benefits, participatory processes still are an evolving concept. Each case should be analyzed individually to assess if participatory processes could improve local conservation (Little 1994).

2.6 Stakeholders in Natural Resource Conservation

2.6.1. Stakeholder Theory

The conceptualization and study of the term "stakeholder" started within the management field as a way to understand corporations and their interactions with different interest groups

(Freeman 1984). The term "stakeholder" was developed in the mid-1980s in the business field to facilitate identification of numerous interest groups (e.g., consumers, suppliers, regulators, communities, employees). Starik (1994) suggested that any definition of stakeholder shares 2 main elements: the presence of the stakeholder itself and the entity from which the stake is developed. Freeman (1984) first defined stakeholders as any individual or group who can be affected or can affect the performance of an organization through markets and laws (Goodpaster 1991). Carroll (as cited in Starik 1994) defined stakeholders as groups or individuals who interact with the company and have a vested interest on the organization. Finally, Wartick (1994) added time to the definition of stakeholder by considering them as individuals or groups who claim or have ownership or interests in a company and its performance in the past, present, and future. Donaldson and Preston (1997) suggested that stakes can be developed based on effort (e.g., employees supporting the firm for a period of time), or in fulfillment of expectations (e.g., the right and need for clean air and water). These same principles that support property rights give various groups a moral interest and represent the foundation for the stakeholder theory (ST) (Donaldson and Preston 1997).

The ST was crafted as a way to manage and balance shareholders with stakeholders' interests and demands, in contrast with the previous management approaches of improving shareholders benefits at the expense of other interest groups (Brooks 1994). In this context, ST represents a unifying effort that blends previous firm-oriented theories into a single, pluralistic approach where firms are recognized to have diverse obligations toward their multiple range of stakeholders (e.g., customers, managers, employees) (Cochran 1994). The ST is in essence descriptive, instrumental, and normative (Donaldson and Preston 1997). First, the ST is descriptive because it recognizes the corporation as an heterogeneous arrangement of competitive and cooperative interests that interact among each other. Second, the ST is instrumental because allows the manager to examine connections between the management of different stakeholders and the level of success in achieving the corporation goals. Finally, the ST fundamentally is normative because it justifies for the manager the fact that stakeholders possess legitimate, intrinsic interests in the corporation despite the corporation response (Donaldson and Preston 1997). That is, that all parties with legitimate stakes participate in the venture to receive benefits with no special considerations for any particular party (Donaldson and Preston 1997).

The development of ST relied heavily on the property rights theory. Property, defined as a well-established, limited set of rights over a specific resource or good, will be influenced or restricted by certain individuals or activities. Thus, property rights are not considered unlimited because unlimited rights do not require enforcement to support them (Coase 1960). Pejovich (cited in Donaldson and Preston 1997) suggested that property rights imply restrictions against harmful uses where human and property rights are considered jointly. This allows managers to incorporate non-owners as a new stakeholder group.

2.6.2. Stakeholder Identification and Management

Stakeholder management recognizes stakeholders as dynamic entities that respond and change due to external factors (e.g., presence of other stakeholders). Wartick (1994) suggested that as stakeholders evolve, so do their interests and goals. Because interests and goals are socially constructed, these features tend to be subjective (Wartick 1994, Mitchell et al. 1997). The ST addresses this by characterizing the development of current events (inductive) and by predicting the evolution of stakeholders and their relationships (deductive) (Wood 1994). Thus, appropriate stakeholder management requires understanding of 3 main elements: stakeholder normative cores, situational factors, and power relationships (Wartick 1994).

Classification of stakeholders is one of the most challenging tasks in stakeholder management (Starik 1994). Decker et al. (1996) suggested that the challenge centers around which stakes and stakeholders to consider in a particular situation. If the stakeholder concept is interpreted too broadly, the concept will become synonymous with citizen, and therefore, useless or redundant. On the other hand, if the concept is interpreted too narrowly, it might be perceived as an attempt to empower particular interest groups (Decker et al. 1996). Although generalized criteria exist for stakeholder classification, hierarchical stakeholder classification is a common practice in human resources management (Donaldson and Preston 1997, Mitchell et al. 1997).

Criteria for stakeholder classification include strategic utility (Starik 1994), cooperativeness and competitiveness (Freeman 1984), geographic and temporal proximity (Starik 1994), probability of impact (Starik 1994), power and legitimacy (Carroll, as cited in Starik 1994; Mitchell et al. 1997), and economic status, gender, and ownership rights (Little 1994). Mitchell et al.'s (1997) stakeholder classification model is based on power, legitimacy, and urgency. The model identifies 7 stakeholder categories, including dormant stakeholders, dangerous stakeholders, and demanding stakeholders among others. The use of multiple criteria for classification allows identification of small, but important, differences among stakeholders that are likely to rank high in some criteria, but low in others (Starik 1994). Carroll (1993) suggested that, in some instances, stakeholders with higher power or legitimacy are classified as more important and receive more managerial attention. However, decisions based on a single criterion are discouraged. Discounting a stakeholder because of perceived low power or legitimacy can be dangerous because that stakeholder may rank high in probability of impact (Starik 1994).

Some common problems of stakeholder classification include (1) difficulty in visualizing potential avenues for achieving balance given the stakeholders' diverse nature and often competing interests, (2) being stakeholders themselves, managers often have difficulty in facilitating the process and meeting their own needs, and (3) some stakeholders play multiple roles simultaneously or interchangeably (Preston and Sapienza 1990). Because stakeholders tend to be issue and site-specific, the selection criteria for stakeholder classification should be determined only by the user. However, the principles of mutuality or relationship (e.g., whether they either benefit or affect the other) (Starik 1994), or influence (or being influenced) always should be considered (Donaldson and Preston 1997). The possibility of influencing or being influenced allows identification of stakeholders who gravitate to the firm, without necessarily having a stake in it (e.g., media, competitors).

2.6.3. Stakeholder Concept in Participatory Conservation Ventures

The stakeholder concept is key for several conservation approaches, including community-based conservation (CBC) (Little 1994, Child 1996a), ecosystem management (EM) (Grumbine 1994, MacKenzie 1997), sustainable conservation (Brechin and West 1990), and integrated conservation and development projects (ICDPs) (Brandon and Wells 1992). Traditional stakeholders in conservation include natural resource agencies, law enforcement institutions, local and federal governments, NGOs, and local communities. The recognition and involvement of different stakeholders with often conflicting interests and values represents a challenge for conservation in many developing nations throughout the world. Resources such as wildlife (Little 1994, Child 1996b), forestry (Kencairn 1995), marine fisheries (White and Savina 1987, White 1989, Siar et al. 1992, Christie et al. 1994, Nikijuluw and Naamin 1994), freshwater fisheries (Chimbuya and Ersdal 1994), water (Sakthivadivel et al. 1992), and coral reefs (Alix

1989) have been managed using participatory conservation approaches. In spite of widespread use of the stakeholder concept, stakeholder analysis is a relatively new topic to conservation (Grimble and Chan 1995). Traditionally, attention has been directed toward more vocal or powerful stakeholders at the expense of less favored groups (e.g., women, landless people) (Wicks et al. 1994). This has important implications in conservation because ignored parties nevertheless possess interests or have impacts on the resource system. Exclusion of these less favored groups represents a decisive factor that may contribute to the failure of conservation projects (Zazueta 1995).

Participatory conservation requires local involvement in conservation projects in rural landscapes to be successful (Little 1994, Western et al. 1994, MacKenzie 1997). Community involvement usually has been considered a passive exercise, with communities regarded as static, homogeneous entities (Cohn 1988). However, the principle of heterogeneity applies to local communities and villages (Little 1994). Zazueta (1995) believed that successful participatory conservation must gather and acknowledge the ideas, views, and values of all interested parties if common understanding is to be attained.

2.7 Common Property Resource Model

Ostrom (1996) defined common property resource systems (CPRs) as human-made or natural resource systems that are large enough to make them costly (but not impossible) to exclude unauthorized users from obtaining benefits from such systems. Unlike human-made CPR structures (e.g., bridges, highways), where crowding will only result in high use rates, biological resource systems face a different problem. Short-term crowding in natural resource systems can destroy the resource base, or negatively affects its potential to continue producing resources (Ostrom 1996).

Research on CPR management resurged in the 1980s, with focus on water, rangelands, forests (Berkes and Kislalioglu 1991), marine fisheries (Ostrom 1996), and wildlife resources (Bromley 1994, Child 1996b). CPRs are defined using criteria such as property rights (Berkes and Kislalioglu 1991), number of co-owners (Ciriacy-Wantrup and Bishop 1975) or control-access frameworks (Christy 1982). Although examples of successful CPRs exist around the world, these systems still are largely misunderstood. This misunderstanding originated with the publication of Garret Hardin's essay *The Tragedy of the Commons* (Hardin 1968), where he described resource users as selfish appropriators with no intentions or abilities to collaborate in maintaining and wisely using the resources they shared with others.

Berkes and Kislalioglu (1991) suggested that Hardin's description is inadequate because open-access and common property regimes are not the same. Hardin (1968) believed resource users were self-seeking, unconnected individuals. However, more recent findings suggested that resource users interact with each other and are capable of reaching agreements regarding their resource base (Berkes and Kislalioglu 1991). Furthermore, government control necessarily is not required to regulate use of common resources (Berkes and Kislalioglu 1991). Under this context, 2 distinctive characteristics of CPRs include (1) subtractability – the capacity of each user to subtract from the welfare of other users, and (2) difficulty of exclusion (Berkes and Kislalioglu 1991). Bromley (1994) suggested that exclusion of non-owners applies to all property systems where reduced or non-existent enforcement accelerates the return to open-access regimes. Ostrom (1996) identified principles for long-lasting community pool resource institutions, namely: (1) identified physical boundaries, (2) congruence between appropriation, provision rules, and local institutions, (3) graduated sanctions for violations, (4) collective choice arrangements regarding resource use and management, and (5) monitoring of collective-resolutions and mechanisms.

Berkes and Kislalioglu (1991) suggested that CPR systems currently are shifting from resource management to people management, and from large to small scale. Replacement of traditional, small-scale, common property schemes by large-scale enterprises has proven to be ecologically unsustainable and economically inefficient for many fishery enterprises (Berkes and Kislalioglu 1991). Although CPRs may be difficult to manage, evidence found around the world shows that CPRs can lead to sustainable resource use. Case studies in Brazil (Cordell and McKean 1986), Indonesia (Bailey et al. 1987), Ghana (Pauly 1987), and Mexico (McGoodwin 1987) documented sustainable CPR systems. These experiences showed that CPRs contribute to increasing the sense of ownership and self-regulation, crucial characteristics for successful management of CPRs (Berkes and Kislalioglu 1991).

The biggest challenge for CPR users and managers has been the transition from individual-oriented to collective structured systems (Ostrom 1996), where costs and benefits for the maintenance of the system are expected to be distributed equally. Costs incurred in most CPRs are high and not always distributed equally, whereas benefits generally are shared by all users, regardless of their sharing of transformation costs (Ostrom 1996). The solution to this problem is not to create new systems, but to transform existing structures. The focus should be on how to obtain sustained joint goods when there are temptations to evade, free-ride or act opportunistically (Ostrom 1996). For rural landscapes with communal land tenure, CPR approaches such as Community-Based Conservation (CBC) often are used (Little 1994). As suggested by Berkes and Kislalioglu (1991), CPRs are comprehensive and can exist even in the absence of territories, as in territorial use rights for fisheries (TURFs). Brechin et al. (2002) grouped all of these different approaches (e.g., community-based conservation, integrated conservation and development projects) as 'people-oriented' conservation approaches.

2.8 People-oriented Management Approaches

2.8.1. Community-based Conservation

CBC emerged in developing nations in response to open access to natural resources, environmental degradation, and economic issues (Christie et al. 1994, Wainwright and Wehrmeyer 1998). Unlike traditional, unilateral, centralized conservation projects, CBC is defined as conservation of biodiversity or natural resources by local communities where the community is both the beginning and ending points (Bromley 1994, Wainwright and Wehrmeyer 1998). As suggested by Little (1994), CBC introduced natural resource managers to concepts such as people-centered, participatory, decentralized, and village-based management. This approach involves local management practices where at least one outcome is preservation of species, maintenance of habitats, or conservation of some critical resources, while economic and/or social welfare is improved (Little 1994, Western et al. 1994, Haynes et al. 1996). Restricting user access to key areas or providing economic compensation in return for curtailed consumptive activities are not goals of CBC. Little (1994) believed that CBC focuses on active, local participation in management decisions involving current community resource use schemes (Little 1994). Thus, CBC aims to promote reconciliation between local communities and nature (Salafsky 1994, Western and Wright 1994), and between resource users and conservationists (Bromley 1994). Bromley (1994) suggested that resolutions of these dilemmas must acknowledge use and property rights, and a comprehensive suite of restrictions and incentives.

CBC projects first appeared in the 1970s in response to high biodiversity losses in non-protected landscapes (Little 1994), increasing environmental problems due to careless technology, consumerism, and population explosion (1950-1980), and emergence of grassroots development and human rights movements (Western et al. 1994). However, the principles and *modus operandi* for CBC are not new. Communities historically and successfully have managed resources by limiting off-take levels, restricting access to key resources and distributing benefits (Western et al. 1994). Nevertheless, CBC still is new and may not be ready to address other social issues such as human population control and management (e.g., family planning, migration) (Salafsky 1994).

Most experiences with CBC programs come from developing countries in Asia, Latin America, and Africa. These programs involve resources such as wildlife (Little 1994, Child 1996b, Belsky 1999, Hackel 1999), tropical and temperate forests (Kencairn 1995, Klooster 2000), non-timber forest products (Anderson 2001), fisheries (Berkes and Kislalioglu 1991, Jentoft 2000), and coral reefs (White 1988, Luttinger 1997). In these case studies, the targeted resource was either the driving factor among resource users (Siar et al. 1992, Kencairn 1995) or had considerable economic potential (Little 1994, Child 1996b). Zimbabwe's Communal Areas Management Program for Indigenous Resources (CAMPFIRE) provides a good example (Child 1996b).

According to Child (1996b), CAMPFIRE arose in 1980 in response to conservation needs of endemic wildlife populations and related management issues (e.g., wildlife crop damage, negative wildlife conservation attitudes, high opportunity costs for locals, centralized, top-down institutional infrastructure). CAMPFIRE used an adaptive/incremental planning approach to address granting of use rights, establishment of democratic processes for decision-making, and program implementation. The apparent success of CAMPFIRE lies in its development of processes that allowed community empowerment and equitable benefit distribution, and more importantly, to changes in government institutions that favor CBC projects (Child 1996a). Factors playing a decisive role in the success of CAMPFIRE, include: (1) granting of use and management rights, (2) use of holistic approaches (e.g., concurrent management of wildlife, water, soil, vegetation), (3) land tenure changes from state to private-communal lands, (4) development of an institutional framework supportive of CBC initiatives, (5) establishment of democratic, in-place, benefit distribution systems, (6) use of an adaptive/incremental philosophy, (7) commitment to long-term solutions, (8) promotion of self-assessment of basic needs and problems among communities, and (9) training and technical assistance for self-planning and management of natural resource. Government participation was crucial for the success of CAMPFIRE program because it recognized diversity of stakeholders while complying with national programs and policies (Child 1996b). As a result of CAMPFIRE, wildlife populations in Zimbabwe increased and local communities obtained economic benefits in return.

2.8.2. Integrated Conservation and Development Projects (ICDPs)

Integrated conservation and development projects (ICDPs) are considered revolutionary, new ways of linking development and conservation initiatives, and are promoted worldwide by institutions such as the World Bank. These projects seek to link biodiversity conservation (e.g., in national parks, biosphere reserves) with rural development through use of socio-economic tools (Brandon and Wells 1992, Brown and Wyckoff-Braid 1992). Development activities used in ICDPs are designed carefully to be environmentally-sound and avoid depletion of wild species and natural resources (Brandon and Wells 1992). ICDPs are more complicated than traditional rural development or conservation projects that concentrate exclusively on single components (e.g., water, forestry, poverty alleviation) (Brandon and Wells 1992). ICDPs rely on several strategies to accomplish their goals: (1) strengthening park management (2) developing buffer areas around NPAs, (3) creating fair substitute or compensation systems, (4) promoting economic and social development at local levels, and (5) empowering local communities (Brandon and Wells 1992). The lack of a systematic analysis of ICDPs occasionally has caused projects with unbalanced conservation and development goals to end up as exclusive development projects (Brandon and Wells 1992).

According to Brandon and Wells (1992), critical factors for successful ICDP performance include (1) baseline data collection and clear understanding of ecosystem dynamics, socioeconomic environment, and environmental threats, (2) use of participatory approaches for all project stages, (3) interagency cooperation, (4) openness toward nontraditional, exploratory management strategies, (5) sound balance among enforcement, development, and compensation components, and (6) constant technical and economic support.

The ICDP approach still faces major limitations. Brandon and Wells (1992) recognized the following 6 problems for the implementation of ICDPs:

1. Defining appropriate incentives and linkages. Threats to conservation must be identified clearly so that adequate incentive or compensation systems can be created. These systems must reinforce the links between conservation and development.

2. Promote local participation. Stakeholder involvement must be solicited at all stages (if needed).

3. Indigenous management systems. Planners must develop mechanisms to promote adoption of new rules among indigenous people.

4. Conservation or development projects? Planners must design appropriate incentive structures with clearly targeted benefits (i.e., conservation or development).
5. Scope and scale. In diverse regions, projects must be active in all important management areas (e.g., environmental management, social justice). Isolated projects are likely to fail. There is still no experience on applying ICDPs at large scales.
6. Growth poles or buffer zones? There must be some human demographic considerations when designing an ICDP. Human settlements should be established close enough to move people away from the area, but far enough away to prevent resource depletion within the area.

2.8.3. Territorial Use Rights in Fisheries

Territorial Use Rights in Fisheries (TURFs) represent an alternative method to manage and promote community-based conservation of fisheries that are owned or used commonly (Pollanc 1984, Siar et al. 1992). TURFs concentrate on use rights rather than ownership. Thus, the nature of the owner necessarily is not important. According to Christy (1982), TURFs are considered an effective way to control use rights and limit access in ponds, lakes, and sea coasts (Christy 1982). TURFs provide users with partial control over resource use and administration within a pre-identified territory by granting use rights, excluding access to nonusers, and establishing the amount and type of use within the area (Christy 1982, Pollanc 1984, Siar et al. 1992). TURFs are, by definition, site-oriented rather than resource-oriented, so, TURFs take into account migratory movements of affected populations. This is important because misuse of the resource in one area reduces the validity of TURFs in areas the species migrate to (Christy 1982).

TURFs represent an alternative to overcome open-access resource problems. TURFs are established in response to several conditions, namely: (1) management of mobile resources, (2) difficulty in excluding other resource users, (3) increasing demands for higher benefits from a restricted resource base, (4) absence of adequate state support, and (5) a shift from subsistence to cash economy (Christy 1982, Siar et al. 1992). Their flexibility also allows application of TURFs to cultured or free-ranging fisheries enterprises (e.g., fish traps, lagoon fisheries) (Christy 1982).

For TURFs to be effective it is fundamental to enforce exclusion rights, intensity of use rights, and sustainability rights (Christy 1982). These rights apply to all TURFs at any level of organization (e.g., local, regional, international). In addition, boundaries, public acceptance of TURFs, and fair wealth distribution must be encouraged and monitored for maintenance of efficient TURFs (Christy 1982).

Smaller, local TURFs tend to be more efficient than large-scale ventures. Smaller projects are monitored and enforced more easily, resources are used more efficiently, beneficial impacts are more evident, and positive attitudes toward resource use develop quicker (Christy 1982). Christy (1982) suggested that positive attitudes toward resource use promote self-regulation and compliance among TURFs members. However, wealth redistribution and exclusion of some current users may be politically or socially difficult to accomplish.

2.9 Performance Measurement

2.9.1. Background

Performance measurement systems (PMSs) provide valuable insights to multiple stakeholders (e.g., policymakers, planners, program administrators) about the value and role of evaluation and progress monitoring (Kates et al. 2001). The use of PMSs emerged primarily in the business field as companies started to move towards factual-based management (Harbour 1997). This shift from perception-based to factual-oriented management also arose in fields such as healthcare (Galvin 1998, Coutts and Rogers 2000, Grol 2001, Kates et al. 2001, Thompson and Harris 2001), public transportation (Abbott et al. 1998), library use and services (Crawford et al. 1998), computer information systems (Jiang et al. 2000), municipal services (Kelly and Swildell 2002), marketing and manufacturing (Abbott et al. 1998), and education (Vesper and Gartner 1997, Simpson and Edwards 2000).

Over the last decade, the public has demanded greater accountability in performance (Lied and Kazandjian 1999). Similarly, federal regulations (e.g., National Performance Review, and Government Performance and Review Act - GPRA) have stipulated increased efficiency in addressing social issues (e.g., healthcare), which lead to development of comprehensive performance measurement tools (Kates et al. 2001). For example, PMSs created under GPRA must now include (1) strategic comprehensive plans, (2) annual performance plans with measurable goals and objectives, and (3) annual evaluation reports based on the recorded performance and fulfillment of performance goals (Kates et al. 2001). Despite these efforts to encourage agencies to adopt the idea of measuring results, this shift in priorities will take time (Kates et al 2001).

Approaches used for performance measurement differ across different fields. Examples include total quality management (TQM), assessment, accreditation and accountability, and professional development in the healthcare field (Grol 2001), output- and outcome-based approaches in public transportation and environmental law enforcement (Abbott et al. 1998, McDonald 1998), and stakeholder evaluation in library management (Crawford et al. 1998). However, these approaches concentrate only on limited aspects of performance, which reduces their ability to assess overall operation (Grol 2001).

Contrary to old beliefs, PMSs are both field-specific (i.e., specific topical areas per field) and dynamic (i.e., presence of feedback loops in the system that allows for adaptive management) (Abbott et al. 1998). Differences in approaches usually are due to intrinsic features within the field (e.g., missions, goals, objectives, intermediate/final products, constituencies) (Abbott et al. 1998) or the original intent of the system (e.g., improving or testing existent systems, stakeholder involvement) (Crawford et al. 1998, Coutts and Rogers 2000, Jiang et al. 2000).

2.9.2. Why establish a performance measurement system ?

PMSs are used by organizations to monitor success in achieving goals (Abbott et al. 1998, Thompson and Harris 2001), and to satisfy constituencies' interests (Lied and Kazandjian 1999). Thus, performance measurement should improve overall efficiency of these organizations by (1) increasing accountability to and from stakeholders towards a collective performance (Abbott et al. 1998), (2) providing support to introduced changes (Abbott et al. 1998, Hoelzer et al. 2001), and (3) offering insight for allocating resources (Abbott et al. 1998). Past approaches for measuring performance concentrated mostly on output evaluation (i.e., objectives-related measurement). New approaches suggest that performance measurement should be a combination of process (i.e., logical map), output- and outcome-based monitoring (Harbour 1997, Abbott et al. 1998).

Harbour (1997) suggested that appropriate PMSs provide information to (1) assess a company's initial baseline (i.e., where are we?), (2) identify short and long-term goals/objectives given current performance (e.g., what can we expect?), (3) identify gaps between current performance vs. desired goals, (4) monitor progress toward desired scenarios (e.g., predictive power), (5) identify obstacles and solutions (e.g., diagnostic power), and (6) use adaptive and incremental planning approaches.

2.9.3. Performance Dimensions, Performance Measures, and Performance Indicators

The terms and concepts used in performance measurement are inconsistent across different fields and organizations (Lied and Kazandjian (1999), Kates et al. 2001). For example, the words “measure” and “indicator” are used interchangeably in the literature, yielding results that are not comparable across different disciplines and fields. Thus, it is important to create a standardized body of knowledge so that managers and stakeholders can perform both inter- or intra-disciplinary comparisons (Kates et al. 2001). There are 3 main concepts in performance measurement that are important to define: performance dimension, performance measures, and performance indicators.

Performance dimensions are major topical areas that capture a program’s structure and functions (e.g., access, utilization, unmet needs, quality, continuum of care, capacity building) and should be identified during early planning stages (Kates et al. 2001). Once these dimensions are defined, it then is possible to identify the performance indicators and subsequently develop performance measures (PMs). Given the nested nature of PMSs, it is recommended highly that stakeholders are involved in the process of developing these tools (Kates et al. 2001).

Performance indicators are the tools used to acquire information regarding specific tasks or activities. In contrast, performance measures illustrate the progress toward a desired level of performance. Overall, performance indicators must provide a significant result from the comparisons between 2 values or positions of the indicator (e.g., comparison between ratios of patient visits between 1997 and 2000) (Kates et al. 2001).

PMs describe performance dimensions (e.g., rate, quantity, duration). Often, > 1 performance measure (PM) might be required to describe a performance dimension. Conversely, a performance measure may help to describe > 1 performance dimensions. Performance measures that describe > 1 performance dimension contain more descriptive power.

2.9.4. Output-, Outcome-, and Process-related performance measures

Abbott et al. (1998) addressed the ongoing debate about the differences between outputs and outcomes. Outputs are the individual services that are delivered or produced (e.g., roads, sidewalks, traffic control, patching). Each activity (output-related performance measures) monitors only a part of the whole system. Therefore, output-related performance measures are not a measure of overall success. They provide only a piece-meal picture of the entire system.

An outcome is defined as the major pieces of the overall performance for a program, agency or plan. Outcome-related performance measures yield information on general performance, and the success in achieving mission-oriented goals. Outcomes can be considered as the sum of many outputs. Both output- and outcome-related performance measures are equally important and mutually dependent (Abbott et al. 1998).

In addition to outcome- and output-related performance measures, Harbour (1997) recommended use of measures to evaluate and monitor the planning process. Process-related performance measures target specific actions (e.g., involvement of stakeholders in decision-making) within specific stages of the planning process (e.g., inventory, identification of issues, identification and selection of stakeholders, plan implementation).

2.9.5. Example of Performance Measurement in Environmental Planning

Development and use of PMSs in environmental planning have been limited. McDonald (1998), in a comprehensive study of performance measurement in environmental planning, examined the system developed to assess the success of the U.S. Environmental Protection Agency (EPA) in enforcing environmental regulations. This performance measurement protocol was designed with input from public meetings with stakeholders and a review of published literature. It included 3 types of performance measures: (1) environmental indicators (i.e., measure of progress over time toward achieving EPA's environmental objectives), (2) outcome-based measures (i.e., tracking changes in behavior of regulated entities in response to EPA's enforcement efforts), and (3) output-based measures (i.e., tracking EPA compliance assurance and enforcement activities) (McDonald 1998).

Haufler et al. (2002) integrated ecological performance measures as a foundation for ecological sustainability. Ecosystem management is an environmental approach focused on maintaining ecosystem integrity and biodiversity conservation while accommodating socio-economic needs (Grumbine 1994). Haufler et al. (2002) identified 4 major performance domains: genetic diversity, species richness and diversity, existing ecosystems, and landscape ecology. Their study examines output- (i.e., individual elements specific to ecosystem management, for example, species composition for a particular ecosystem) and outcome-related performance measures (i.e., ecosystem management goals) relevant for the promotion of ecosystem management. Haufler et al. (2002) recognized that successful ecosystem management needs to incorporate several basic assumptions, namely: (1) output- and outcome-related performance measures for ecosystem management should be sensitive to differences in spatial scales (e.g., regional, local), (2) successful performance measures require the establishment of thresholds for comparison purposes (i.e., current, existing conditions vs. desired goals and objectives), and (3) development of successful PMSs in ecosystem management require a clear understanding of historical and current ecological and social conditions.

2.9.6. Criteria for development of PMSs

PMSs must be linked directly to program or plan goals, objectives, strategies, and legal mandates (Hoelzer et al. 2001). Once the performance dimensions have been defined, the next step is to define the criteria for selecting adequate performance measures. Criteria found in the literature include: (1) select only those performance measures crucial for the system; eliminate trivial or highly correlated performance measures (i.e., duplicity), (2) check the capacity for data collection, data availability, and data needs (Harbour 1997), (3) if applicable, identify benchmarks (i.e., potential thresholds of performance given the current conditions) (Crawford et al. 1998), (4) reliability and validity of performance measures, (5) detect those areas for which there is a need for evaluation and there is no available performance measure (i.e., information gaps) (Hoelzer et al. 2001), (6) choose performance measures that represent > 1 aspect of the process (e.g., timeliness, quality), (7) select performance measures reported as important for the field, and (8) use or build a shared body of knowledge (e.g., concepts, definitions) that is understandable to all stakeholders (Jiang et al. 2000).

Most PMSs are dynamic and evolve over time (Abbott et al. 1998). As a plan or program is implemented, the performance measurement system (PMS) evolves, and so does the need for new performance measures. In this regard, PMSs should be flexible enough to address new monitoring and evaluation needs (Coutts and Rogers 2000) or compare different systems or programs (Crawford et al. 1998).

2.9.7. How to elaborate a PMS?

Kates et al. (2001) believed a definitive blueprint for developing PMSs does not exist. Outcome measures and report cards are relatively new and poorly developed concepts within the public sector. Different approaches or protocols have been used to develop performance measurement tools, including stakeholder involvement (Crawford et al. 1998, McDonald 1998, Jiang et al. 2000), legal mandates (Kates et al. 2001), or information gaps (Coutts and Rogers 2000). Regardless of the discipline or field being assessed, PMSs must address 2 major areas. First, a PMS must arise directly from mission, goals, and objectives of a management plan or program (Abbott et al. 1998). Second, performance measurement in most fields (e.g., healthcare, education) is designed to develop a code of national and international standards of performance (Hoelzer et al. 2001). For this to happen, a body of common knowledge (e.g., concepts, principles, definitions) must exist, which will help to identify the main performance dimensions relevant for the field in question. The acquisition of this shared knowledge allows for meaningful comparisons among different case studies (e.g., benchmarking, expected outcomes, performance domains) (Crawford et al. 1998).

Data for a particular PMS may be available already, or will become available during implementation of the plan. Data already available are valuable because they facilitate monitoring of trends. According to Abbott et al. (1998), quantitative measures involving quota-like standards may not be best suited for use with non-profit programs or plans because they often evoke negative responses, and lead to increased measurement and micromanagement instead of long-term improvement (Abbott 1998). However, Crawford et al. (1998) suggested that quantitative values should be collected and built into a database so that comparisons among different programs can be performed.

Kates et al. (2001) suggested that comprehensive and participatory PMSs must do 5 things. First, they must involve all key stakeholders (e.g., program staff, grantees, clients) who represent all program levels and functions. Stakeholder involvement makes the system more operational, flexible, and creates greater stakeholder engagement. Stakeholder participation also helps identify expected or desired values for program indicators (e.g., number of expected ambulatory medical care visits). Second, they must articulate program purposes, goals, and objectives as well as relationships among them. Program goals and objectives guide development of a performance management system by specifying the relationships developed among different organizational components. Third, these systems must develop a program's logic, that is, the interactions and relationships among a program's objectives and stages of activities or performance (e.g., flow of inputs, activities, outputs and outcomes required to achieve objectives). Next, a program's logic model(s) should identify the type of accountability and performance throughout all levels of the program (e.g., federal, state) (Kates et al. 2001). Finally, it is important to include data availability for the selection of specific performance measures (e.g., How much explanatory power does the performance measure have?, Are different measures appropriate at different program levels?, How much of a burden is presented by this measure?) (Kates et al. 2001).

Once the layout for the PMS is completed, the next step is to analyze the suggested performance measures based on the nature of the data. Three main aspects need to be considered: capacity for collection of data, data needs, and data gaps. The task at this point is to identify performance measures relevant to the system, and ones supported by the data gathering system.

Finally, once a PMS is completed, it must be tested. A comprehensive test will: (1) test the system at all levels, (2) confirm that available data support the system and that no additional performance measures are needed, and (3) see how much and what kind of explanatory power is conveyed by the system as a whole (i.e., theoretical vs. practical). Although PMSs can provide theoretical power, these tools primarily should deliver practical knowledge (Kates et al. 2001).

2.9.8. Challenges in developing and using a PMS

Despite the attention placed on PMSs, very few published papers show that PMSs actually improve performance (Lied and Kazandjian 1999). This information is fragmented and may not provide an adequate picture of PMSs (Lied and Kazandjian 1999). Performance measures today frequently are isolated and used to answer questions from managers and administrators, with little consideration for other constituency groups (e.g., users) (Galvin 1998, Hoelzer et al. 2001).

One major challenge in developing meaningful PMSs is determining the appropriate level of detail (Abbott et al. 1998) and scale (Kates et al. 2001) of the program or plan. Kates et al. (2001) suggested that measuring performance and outcomes in large federal programs (e.g., the Ryan White Comprehensive AIDS Resources Emergency Program) is challenging because these programs are autonomous, have variation at local levels, and methodologically are complex.

Another limitation of PMSs is that agencies often use performance measurement tools without clear understanding of the concepts or the meaning and use of collected information (Abbott et al. 1998). Different interpretations of commonly used terms by different stakeholders make it difficult to understand the results of monitoring programs (Galvin 1998) and represent serious handicaps when comparing different studies or sharing information. Galvin (1998) suggested that, until a workable definition is introduced and acknowledged by all interested parties (e.g., what is health care?), that measurement system will fail to provide reliable evaluation data. Lied and Kazandjian (1999) suggested that PMSs must provide adequate feedback, data need to be standardized, and performance components need to be weighed and combined to yield valid composite performance measures.

Finally, if these systems are to be successful, there must be agreement among stakeholders about the goals of the program or plan. Goal congruency should be a top concern because incongruence among stakeholders often creates job dissatisfaction and poor performance (Jiang et al. 2000). If these differences in perceptions are not resolved, they can impact the development of a PMS, particularly the identification of performance indicators and their weight in the system (Jiang et al. 2000).

Chapter 3. Conservation Planning in Mexico

3.1 Introduction

Environmental problems (e.g., deforestation, pollution, global warming) have increased over the last 4 decades at an alarming rate (Colby 1991), particularly in developing countries (UNESCO-MAB 2002). Mexico experienced rapid environmental degradation within the last 20 years. Centralized industrialization, unequal distribution of benefits, increasing poverty, and lack of rural development programs have contributed to Mexico's environmental crisis (SEMARNAT 2002b).

During the 1950s and 1960s, the parasitic nature of human-biosphere relationships were not perceived as detrimental. However, with increasing human population, the effects of demands for natural resources and services on the environment became more apparent (Colby 1991). Systematic study of environmental problems began in the late 1960s and early 1970s as a way to identify alternative strategies and efficiently allocate resources (Briassoulis 1989). Mainstream media, increased environmental legislation, and the introduction of environment-related agencies served as catalysts for the revision of existing resource administration paradigms (Colby 1991). Colby (1991) described 5 predominant resource administration paradigms: frontier economics, deep ecology, environmental protection, resource management, and eco-development.

Frontier economics and deep ecology first were framed in the late 1800s and early 1900s in response to conservation and development conflicts (Nelson 1995). These 2 paradigms fundamentally oppose each other (Nelson 1995). Frontier economics describes nature as an endless supply of environmental goods and services (e.g., water, soil, air) that is resilient enough to accommodate all byproducts from human activities. Deep ecology encourages the return to pre-industrial conditions, re-establishing harmony with nature and promoting ecological values (e.g., equality of all species, reduction of human populations, promotion of multiculturalism and biodiversity values, bioregional autonomy) (Colby 1991). Philosophically, frontier economics had a clear mission (i.e., nature can be manipulated to satisfy human needs). On the other hand, deep ecology remains undefined for many scholars. According to Colby (1991), deep ecology serves as a source of inspiration for philosophical discussions.

The decline of frontier economics and an increasing awareness of environmental problems during the late 1960s (Briassoulis 1989), gave rise to the environmental protection paradigm (Colby 1991). Environmental protection seeks to control damaging activities, rather than improving them. Tools to assess costs and benefits of development activities were designed and implemented. However, adding such assessments as after-thoughts to development projects, spawned a perception that all environmental concerns opposed development (Colby 1991). Principal characteristics of the environmental protection paradigm include: (1) the economy is still considered a closed system, however, the environment is regarded now as an economic externality, (2) definition of optimal levels of pollution, (3) natural resource agencies emerged, but they have little control over development activities, and (4) private tenure is preferred over common property. Some considered this paradigm to be a reformed version of frontier economics, where biodiversity conservation is considered a form of ecological colonialism (Colby 1991).

The resource management paradigm appeared in the late 1970s and early 1980s, in part due to publications such as World Conservation Strategy (IUCN 1980) and Our Common Future (WCE 1987). Although economic development remained a priority, this new paradigm integrated capital and resources in development assessments (e.g., human, biophysical, infrastructural and economic) (Colby 1991). Resource management recognized links between ecological services and the state of the environment (e.g., watershed protection and water quality). Global environmental problems were now described (e.g., global warming, biodiversity crisis), but comprehensive problem identification tools still were rudimentary. The concept of sustainable development was introduced first in the resource administration paradigm, but for some, this idea created unbalanced interests for environmental conservation between developed and developing countries (Colby 1991).

The eco-development paradigm materialized in the early 1990s to address the need for redesigning human activities to act in synergy with environmental processes. Concepts introduced with this paradigm included: (1) the economy now is perceived as a biophysical system (i.e., goods and services flow to the economy, whereas by-products flow back to the environment), (2) there is a shift from polluter-paying to preventer-saving (e.g., *in situ* water treatment, agro-forestry), (3) ecological uncertainty is linked to development planning, (4) environmental enforcement must incorporate ecological and social principles (e.g., social justice, ecological integrity), (5) planning must be framed within the context of the systems being planned for, including all affected parties, and (6) functional common property systems should be maintained (Colby 1991). For some, this paradigm suggests a shift from an economized ecology to ecologization of economic and social systems.

These paradigms represent pieces of a continuum in the relationship between humans and the biosphere, with a continuous exchange among all of them (Colby 1991). As societies adopt new paradigms, societal characteristics evolve (e.g., changing attitudes toward nature and natural resources, tenure systems, environmental technologies, administration responsibilities) (Colby 1991). Concurrent with these evolving paradigms is a change in environmental planning methodologies (Briassoulis 1989).

3.2 Approaches to Environmental Planning

Common environmental planning approaches in the US include comprehensive, incremental, adaptive, and participatory planning (Briassoulis 1989). Comprehensive planning is an extension of the model for land use and regional development from the 1960s (Nelson 1995). Its comprehensiveness was considered appropriate given the perceived interconnection of things in nature. This model was introduced at the peak of the environmental movement (i.e., late 1960s, early 1970s) and sought to identify long-term solutions to environmental problems (Briassoulis 1989). Typical comprehensive environmental planning included (1) a thorough analysis of social and ecological conditions of an area following a systems approach, and (2) the development of multiple potential scientifically-based solutions for identified problems. Comprehensive planning was perceived as being environmentally sound, but it rarely accounted for uncertainty and risks. The planner is merely a technician, and power and decision-making is centralized.

Incremental planning provides planners with a reactive framework to deal with environmental problems (Briassoulis 1989). Because environmental problems often are not addressed until a crisis emerges, incremental planning uses a disarticulated approach similar to crisis management. Environmental management is today incremental in nature (e.g., separate programs to deal with separate resource systems), and so incremental planning is not as environmentally sound as comprehensive planning (Briassoulis 1989). In fact, incremental planning is more pragmatic, leaving many questions unanswered (e.g., level of acceptable risk, uncertainty) (Briassoulis 1989).

Adaptive planning is based on the premise that human activities continuously adapt to changing social and environmental conditions (Briassoulis 1989). It starts with development of a plan or policy, moves into implementation, and continues through monitoring and evaluation. Systems analysis provides the foundation for adaptive planning because it acknowledges changing conditions in the ecosystem, and can incorporate uncertainty associated with human impacts on the environment. Because adaptive planning also incorporates previous experiences, social responsibility can be tracked (Briassoulis 1989). Adaptive planning is adequate for implementation of broad-level policies in heterogeneous landscapes, but often it is questioned because of implied costs (i.e., eagerness to secure the future at present expenses) and required attitude changes (i.e., adaptive learning/experimentation) (Briassoulis 1989).

Participatory or consensual planning is a recent approach. Solutions to environmental problems are discussed in groups and decision making is through consensus. This approach relies heavily on negotiation and resolution and invites a diversity of stakeholders via voluntary participation (Briassoulis 1989, Zabin 1998).

Participatory planning seeks to develop common ground for (1) joint solutions to environmental problems, (2) recognition of differences of opinions, and (3) equal distribution of costs and benefits among stakeholders. Participatory planning is better suited to small scale projects because there is a greater chance of reaching consensus. Participatory planning in large-scaled problems remains uncertain because reaching consensus is rare (Briassoulis 1989). Politically, the success of this approach continues to be uncertain due to multiple factors (e.g., competing values-interests, unequally distributed power).

3.3 Environmental Conservation in Mexico

The environmental legal framework in Mexico is relatively new (see Section 2.1.4). In 2001, with the election of a new federal government fisheries administration was removed from SEMARNAP and transferred to the newly created Secretariat of Food, Agriculture, Animal Husbandry, Rural Development, and Fisheries (SAGARPA). SEMARNAP also was renamed, becoming Secretariat of the Environment and Natural Resources (SEMARNAT).

3.3.1. Biodiversity Conservation in Mexico

In 1995, the federal government developed multiple national programs to help implement its public policies (e.g., economic and social development, education, tourism, health, environmental management). The National Program for the Environment and Natural Resources (2001-2006), and its predecessor (i.e., National Program for the Environment 1995-2000) outlined the political landscape for the current administration and management of natural resources in Mexico (SEMARNAT 2002b). The 2001-2006 national environmental program includes 17 topics or sub-programs of the environmental agenda in Mexico (Table 3.1) (SEMARNAT 2002b). Biodiversity conservation is one of the challenges in integrating the new environmental policies in Mexico (Galindo-Jaramillo and Loa-Loza 1998).

Biodiversity conservation attempts to balance different coinciding elements, including economic neo-liberal reforms (see Section 3.4), rural poverty (CONANP 2001, Kelly 2001), sustainable use of natural resources (Galindo-Jaramillo and Loa-Loza 1998, CONANP 2001, SEMARNAP 200b), and protection of natural capital (Galindo-Jaramillo and Loa-Loza 1998). Historically, the Mexican government has relied on the model of NPAs (e.g., biosphere reserves, national parks) to promote natural resource conservation in the country (CONANP 2001, SEMARNAT 2002b). The participation of Mexico in both the Earth Summit and the Convention on Biological Diversity (CBD) in 1992 prompted an analysis of the status and achievements of NPAs (CONANP 2001).

As a result, administration of NPAs underwent profound transformations, including the creation of an institutional framework for the understanding, use and protection of biodiversity. This framework included the creation in 1992, of the National Commission for the Knowledge and Use of Biodiversity [CONABIO] development of the country study (CONABIO 1998), the national strategy (CONABIO 2000), and implementation plan (in process) for biodiversity conservation.

Table 3.1. Working areas for the National Program for the Environment and Natural Resources 2001-2006 from the Secretariat of the Environment and Natural Resources (SEMARNAT), Mexico.

1. National Forestry Program 2001-2006
2. National Hydraulic Program 2001-2006
3. Program for Environmental Justice 2001-2006
4. Program for the National Protected Areas Commission 2001-2006
5. National Crusade for Water and Forests
6. Crusade for Clean Mexico
7. National Program for Control and Prevention of Water, Soil, and Air Pollution 2001-2006
8. Program to Stop and Reverse the Loss of the Natural Capital
9. Program for the Conservation of Ecosystems and Biodiversity
10. Program for the Promotion of Sustainable Development
11. Strategic Program for the Northern Frontier
12. Strategic Program for the Southern Frontier
13. Program for the Cortez Sea
14. Mesoamerican Biological Corridor
15. Program for the Indigenous Nations
16. Program for Gender Equality, the Environment, and Sustainability 2001-2006
17. The Youth and The Environment Program

Source: SEMARNAT 2002b

Securing funding for the operation of NPAs was another transformation that began in 1997 (SEMARNAT 2002b). In addition, all federal NPAs were integrated into an institutionalized body (i.e., National Commission of Natural Protected Areas [CONANP] (CONANP 2001). CONANP is a decentralized institution within SEMARNAT and is responsible for both administration of federal NPAs and implementation of Regional Programs for Sustainable Development (PRODERS). PRODERS were introduced first in 2001 to reduce poverty in rural communities and to link regional development needs with conservation guidelines from existing NPAs (CONANP 2001).

3.3.2. Natural Protected Areas in Mexico

NPAs are federally designated areas in which ecosystems have not been altered significantly by human activities and that require preservation or restoration (SEMARNAT 2001b). NPAs must do several things: (1) preserve natural areas that represent biogeographic, ecological regions and fragile ecosystems necessary to ensure the continuity of evolutionary and ecological processes, (2) protect genetic diversity of threatened, endangered, endemic or rare species, and ensure sustainable use of biodiversity, (3) allow for scientific research, (4) understand and preserve traditional knowledge about natural ecosystems and uses of biodiversity, and (5) ensure the continuous flow of environmental services (e.g., water) (SEMARNAT 2001b).

Mexico’s General Law of Ecological Balance and Environmental Protection (LGEEPA) recognizes 8 different NPA types and establishes land use and management guidelines for each specific category (e.g., spill of toxic waste, altering of critical habitats, allowed or prohibited activities) (SEMARNAT 2001b). The legal framework for the administration of NPAs is based in laws (e.g., National Water Law), the NPA's decree, and Mexican Official Norms. Mexico currently has 148 NPAs which protect an estimated 17.1 million ha (8.5% of Mexico's territory) (CONANP 2004). Seventy-six percent of this area represents terrestrial habitats, and 24% marine ecosystems (CONANP 2001). The 3 most common types of NPAs include National Parks (n = 65), Biosphere Reserves (n = 34), and Flora and Fauna Protection Areas (n = 26) (CONANP 2004).

Prior to the establishment of a specific NPA, LGEEPA requires planning teams to perform exhaustive justification studies for the designation of the area (e.g., ecological importance, uniqueness) and to hold public meetings with interested parties (e.g., local governments, federal and state agencies, NGOs, landowners) for evaluation and feedback. These meetings also are expected to promote conservation of the area in conjunction with integrated social development (SEMARNAT 2001b).

Designation of an NPA must include (1) the location of the NPA (e.g., boundaries, size, zoning), (2) type of suggested NPA category, including regulations regarding resource uses and banned activities, (3) an assessment for expropriating lands (if needed), (4) a suggested administrational structure (e.g., committees, fiduciary trust, development of a management plan), (5) guidelines for the restoration, preservation, and sustainable use of resources within the NPA (e.g., administration, law enforcement), and (7) ecological ordering promoted by SEMARNAT. Once the NPA is established officially, a management plan for the NPA should be issued within the first year of operation. Stakeholder involvement is mandatory for development of the management plan (SEMARNAT 2001b).

3.3.3. Management Plans for NPAs in Mexico

The development of management plans for NPAs follows a protocol known as "terms of reference." This protocol was adopted from an FAO framework for National Parks Planning in Latin America (Moseley et al. 1976). It is a comprehensive planning tool centered on 3 major topics: (1) description of the resource base (e.g., geology, hydrology, forests, wildlife), (2) background information on the area (e.g., current land uses, socio-demographic information, climate, land tenure), and (3) anticipated management efforts (e.g., boundaries, zoning, management programs, NPA administration) (Moseley et al. 1976) (Figure 3.1).

In 1994, the National Institute of Ecology (INE) began updating or developing and publishing comprehensive management plans for NPAs in Mexico (e.g., El Pinacate Biosphere Reserve). The protocol used was primarily based on the 1976 protocol, with some additions, including (1) goals and objectives for the NPA, (2) problem identification, (3) identification of data and information needs, (4) public involvement in conservation planning, (5) monitoring and evaluation for the planning process and within the NPA, and (6) operational planning (i.e., annual plan of activities) (Figure 3.2).

The management plan must include first a description of the characteristics of the area (e.g., physical, biological, social, cultural, land tenure). Second, it describes short, medium, and long term actions that match the NPA's mission to applicable state and national programs. Third, it includes specific objectives of the NPA and recommended actions.

1. Introduction
2. The Resource
2.1 Natural Resources
2.1.1 Geology
2.1.2 Water
2.1.3 Flora
2.1.4 Fauna
2.1.5 Specific genetic and ecological features
2.2 Cultural Resources
2.2.1 Archeology
2.2.2 History
2.2.3 Contemporary Culture
3. Background Information
3.1 Location
3.2 Regional Analysis
3.3 Land Use and Economy
3.4 Regional Transportation System
3.5 Population Characteristics
3.6 Tourism Services and Recreation
3.7 Park Legal Status
3.8 Existing Land Use
3.9 Visitor Use of Resources
3.10 Visitor Analysis
3.11 Climate
3.12 Special Conditions
3.13 Fire History
3.14 Terrain and Soils
4. Management and Development
4.1 Park Objectives
4.2 Boundaries
4.3 Zoning
4.4 Management Programs
4.4.1 Resource Management and Protection
4.4.2 Public Use
4.4.3 Administration and Maintenance
4.4.4 Physical Development

Figure 3.1. Conservation planning protocol for management of national parks in Latin America, as suggested by FAO in 1976 (Modified from Moseley et al. 1976).

i. Presentation	*
ii. Objective of the National Protected Area	*
iii. Specific Objectives	*
iv. Content of the Management Plan	*
1 Introduction	✔
1.1 Background	✔
1.2 Justification	✔
2. Description of the area within a national, regional, and local context	✔
2.1 Geography	✔
2.2 Physical Characteristics	✔
2.3 Biological Characteristics	✔
2.4 Archeological, Historical, Cultural, and Aesthetic Context	✔
2.5 Population, Economic and Social Characteristics	✔
2.6 Land Use	✔
2.7 Legal and Administrative Context	✔
2.8 Studies and Research	*
3. Diagnosis and Problem Identification	*
3.1 Environmental	*
3.1.1 Renewable Resources	*
3.1.2 Nonrenewable Resources	*
3.2 Social and Economic Diagnosis	✔
3.2.1 Demography	✔
3.2.2 Economic	✔
3.2.3 Social	✔
4. Objectives of the Management Plan	✔
5. Zoning	✔
6. Administrative Guidelines	✔
7. Components of the Management Plan	✔
7.1 Conservation and Management	✔
7.2 Research and Monitoring	*
7.3 Sustainable Resource Use and Public Use	✔
7.4 Participation and Social Harmony	*
7.5 Environmental Education, Training, and Dissemination	*
7.6 Administration	✔
7.6.1 Director and Coordination	*
7.6.2 Administration	*
7.6.3 Finances	*
7.6.4 Legal	*
8. Evaluation of the Process for the development of the management plan	*
8.1 Meetings for participatory planning	*
8.2 Control and Evaluation	*
9. Bibliography	*
10. Expected Outcomes	*
10.1 Progress Reports	*
10.2 Maps and Aerial Photos	*
10.3 Appendix	*
11. Program of Activities	*

Figure 3.2. “Terms of Reference” used by the National Institute of Ecology in Mexico for conservation planning in Natural Protected Areas. (Modified from Esquivel-Solís 1999).

KEY: ✔ indicates components found in FAO and INE protocols; * indicates new components

Recommended actions are described within specific performance domains (see Section 2.9.3) identified in the LGEEPA, such as (1) protection and conservation of natural resources, (2) public and sustainable use of natural resources, (3) recreation, (4) research and environmental education, (5) law enforcement, (6) environmental contingencies, (7) administration and funding, and (8) any other actions that apply to the NPA due to its specific characteristics. Fourth, mechanisms for continuous stakeholder involvement and NPA administration should be identified (e.g., development of partnerships, organizational flow chart). Fifth, the plan should cross-reference all applicable laws and official norms. Sixth, information and data needs should be defined clearly. Finally, a map of the NPA should be produced. Once the plan is issued, SEMARNAT establishes collaborative agreements with parties affected by the decree (SEMARNAT 2001b). Operational plans are established annually and are the responsibility of the Director of the NPA.

3.4 Changing Conditions in Rural Mexico.

In 1994, Mexico began to implement a new, neo-liberal economic approach to integrate the country into the global economy (Diego-Quintana et al. 1998). This changed the *status quo* of most sectors in the economy, particularly the rural sector (García-Barrios et al. 1998). The purpose of these modifications was to create more competitive production means and services by increasing private investments and reducing governmental intervention in primary activities (e.g., agriculture, silviculture, fisheries) (García-Barrios et al. 1998, Jones and Ward 1998, Guerrero et al. 2000). The modifications in rural Mexico primarily targeted the administration and management of natural resources (e.g., land, water, fisheries, forests, grasslands) (Cornelius and Myhre 1998, García-Barrios et al. 1998). They included amendments to Constitutional Article 27 (1992), aimed at changing existing land tenure types, and decentralizing resource-based rights (e.g., use, administration) of some natural resources. In addition, new laws were promulgated (e.g., Forestry Law of 1992, Agrarian Law of 1992, revision of the LEGEEPA in 1996 and 2001, re-issuing of Official Mexican Norms starting in 1994) in preparation for implementing the North America Free Trade Agreement (NAFTA) in January 1994 (Cornelius and Myhre 1998, Whiteford et al. 1998, Zabin 1998).

Social, economic, and environmental benefits and impacts from the transformation of natural resource administration, have not been documented well. Evidence suggests that some sectors (e.g., agriculture, fisheries, forestry) are likely to undergo deep transformations (García-Barrios et al. 1998, De Walt 1998, Whiteford et al. 1998, Guerrero et al. 2000). Cornelius and Myhre (1998) and García-Barrios et al. (1998) suggested that, in particular, small-scaled, commonly-owned resource systems (i.e., subsistence agriculture, water and irrigated agriculture, fisheries, and forests) are in jeopardy due to the decomposition of social systems of cooperation and authority.

3.4.1. Modifications of the Land Tenure System.

As a result of the Mexican Revolution (1910-1917), 3 major land tenure types were created (i.e., public, private, common lands). Two commonly-owned land types were designed, ejidos in North Mexico, and communal land in South Mexico (Jones and Ward 1998, Guerrero et al. 2000). Jones and Ward (1998) suggested that the establishment of commonly-owned land (e.g., ejidos) placed these institutionally created communities as strategic element for perpetuating the corrupt political system up until the year 2000. For a more detailed description of the functioning and historical evolution of ejidos, see Thoms and Betters (1998).

Article 27's reforms allowed, among other things, the privatization of previously inalienable, commonly-owned lands (Jones and Ward 1998, Cornelius and Myhre 1998) and of irrigation systems (Whiteford et al. 1998). In addition, the World Bank encouraged the liberalization of agricultural produce markets, privatization of state enterprises (Whiteford et al. 1998), and reduction of subsidies (García-Barrios et al. 1998) as necessary steps to strengthen Mexico's position in the evolving global economy (Whiteford et al. 1998). Whiteford et al. (1998) described these reforms as part of the "devolution revolution" where the principles of privatization and decentralization are globalized. Efforts to decentralize are both fiscal (i.e., shifting monetary control from federal to local governments or stakeholders) and managerial (i.e., allocation of administrative power to participating constituencies) (Whiteford et al. 1998).

Modifications in land tenure caused by the new Agrarian Law led to (1) the end of land redistribution and expropriation in favor of private citizens (e.g., peasants) to ensure private property rights, (2) establishment of decentralized and autonomous agrarian tribunals to resolve land rights disputes, and (3) optional land ownership titling for commonly-owned land (i.e., Program for the Certification of Ejido Land Rights and the Titling of Urban House Plots – PROCEDE). Once titled, the new law allowed for some *ejidal* lands (e.g., agricultural lands) to become economic assets available to the landowners or *ejidatarios* (e.g., sharecropping, renting, selling, mortgaging, collaterals). Other common lands, such as grasslands and forests, can be sold as a unit with the approval of ejidos' assembly (Cornelius and Myhre 1998, Guerrero et al. 2000).

3.4.2. Agricultural Land and Water Rights.

Fifty-eight percent of irrigated agricultural land in Mexico is ejidal land, benefiting an estimated 514,000 ejidatarios. In 1992-1993, in response to the World Bank's neo-liberal restructuring of irrigation systems, water laws in Mexico were modified to transfer management rights (e.g., operation, maintenance) to water users as means to create self-sufficient and administratively independent systems (Whiteford et al. 1998).

CONAGUA implemented these changes but retained responsibilities for operating, controlling, and maintaining large canal networks, and for engineering both drainage and irrigation systems. Water users gained responsibility for water distribution, operation of irrigation systems, and maintenance of medium or small-scaled irrigation systems (Whiteford et al. 1998). Effective in late 1994, the first modifications were implemented (i.e., maintenance and operation of main canals), just after implementation of NAFTA and Article 27 reforms.

Whiteford et al. (1998) studied 2 ejidal areas (Mexicali Valley, Panuco River Irrigation Project) and found that, despite continuing support from the federal government (i.e., credits, technical assistance), social disorganization remained constant, showing symptoms of structural disintegration and reconstitution. This included erosion of local authorities, absenteeism, and massive land selling. Ejidatario attitude remained unchanged, a belief that government-created irrigation system should be operated by federal agencies. Land tenure reforms were appreciated only because they legally allowed *ejidatarios* to either rent or sell their lands, thus defeating the purpose of creating efficient systems (Whiteford et al. 1998). The new tenure reforms reactivated profiteering and compulsive land exploitation, which resulted in loss of control in resource management among rural people. As a result, land disputes are likely to arise due to overlapping use rights (García-Barrios et al. 1998).

3.4.3. Aquaculture in Mexico: The Blue Revolution

The Mexican aquaculture industry ranked 14th worldwide in 1994, and is expected to become a primary component of the economy, due mostly to farming of valuable species such as shrimp, oysters, and abalone (De Walt 1998). This so called "Blue Revolution" is due to changes in fisheries policy designed to address the underdevelopment of fisheries and aquaculture industries in Mexico (e.g., Fisheries and National Waters Laws). An analysis of existing conditions until 1992 showed that: (1) fisheries-based rights (e.g., capture, culture, and process of desirable species) were granted mostly to the social sector (e.g., cooperatives), (2) use rights, not property rights, had been transferred to users, and (3) stocks of marine and freshwater species were declining due to poor government support, inefficient markets, and increasing human populations (De Walt 1998).

Amendments to Article 27 modified the use and status of coastal and lacustrine systems by (1) eliminating exclusive fisheries use rights to the social sector, (2) extending aquaculture concessions from 25 to 50 years to grant security to private investors, (3) developing economic, biological, and productivity guidelines for granting aquaculture concessions, (4) encouraging joint investments (i.e., private-ejidal) where companies either can lease or buy the land, (5) identifying potential areas for aquaculture, and (6) promoting credits for the expansion of aquaculture (De Walt 1998). Modifications to the 1992 National Water Law introduced new fiscal incentives that reinforced these policy changes. These incentives redirected the government's previous role (e.g., credits, purchasing, marketing) toward delivering public goods (e.g., technical support for aquaculture, provide use regulation frameworks, environmental monitoring) (DeWalt 1998).

Despite the perceived benefits potential problems for aquaculture in Mexico include an unbalanced sharing of costs and benefits across different stakeholder groups (e.g., unequal resource access, exclusion of non-users) and changes in water quality (e.g., increasing salinity, water pollution). In particular, land and water use rights conflicts likely will emerge (e.g., access to mangrove or wetland areas), particularly among co-existing land tenure types (e.g., ejidal, private, communal, public lands). This is likely to create great uncertainty about development of joint partnerships between peasants and private investors (DeWalt 1998).

3.4.4. Community-based vs. Private Forestry Management in Mexico

Forest lands in Mexico are 80% common property, 15% private, and 5% public lands (mostly in NPAs) (Guerrero et al. 2000). Commonly-owned forests in Mexico are home to some of the poorest peasants and indigenous groups in the country, but also some of the most biodiverse areas in the country (Zabin 1998).

Guerrero et al. (2000) suggested that the legal framework for forestry in Mexico (i.e., laws, policies, practices) has followed a paper production, import-substitution, industrialization approach (ISI) (Zabin 1998). Guerrero et al. (2000) identified several post-revolutionary (1917-2003) recognizable stages of forestry management in Mexico. Between 1917 and 1948, large private holdings were expropriated. Resource access changed from private to public concessions, with restrictive resource use rights. New harvesting technologies then evolved from clearcuts (1948-1977) to selective harvesting (1977-1986) to alternative silvicultural methods (1994). In 1948, the federal government began to establish forested ejidos which prevented private forestry concessions and established state-based forestry companies (1977-1986). Finally, in 1987 environmental impact statements revealed a need to re-establish regulatory measures (e.g., monitoring of transported timber, monitoring of potential harvesting volume or use rates). This not only facilitated transition to a neo-liberal economic approach (i.e., NAFTA), but also eliminated state-owned companies.

To support the transition toward a neo-liberal economic system, the Forestry Law was modified (1986, 1992, 1997), and rural communities regained control (on paper) over commonly-owned forests (Guerrero et al. 2000). This new political scenario sparked development of community-based forestry projects (e.g., logging, transformation of raw materials, marketing, leasing use rights) (Zabin 1998). However, as suggested by Zabin (1998), Guerrero et al. (2000), and Taylor (2000) reforms to the ejido tenure system may pose a threat to community-based forestry projects.

Analyses of the Union of Forestry and Agrarian Ejidos and Communities "General Emiliano Zapata" in Durango, Mexico (Taylor 2000), and of indigenous common-owned forests in Copper Canyon, Chihuahua, Mexico (Guerrero et al. 2000), showed that neo-liberal reforms favored individuals rather than communal systems (e.g., common ownership rights, community organization). Hence, the social institutions that sustain community forestry likely will erode. Despite proven leadership among peasant organizations, the need to create larger and more diverse organizations to compete in a free-trade environment has created interest conflicts. As bureaucracy increases, peasants withdraw from organizations because it becomes less clear how the organization benefits them (Taylor 2000). Guerrero et al. (2000) suggested that most indigenous groups lack the knowledge to operate, and administer commonly-owned forests. Government support then is required to avoid mismanagement (e.g., overexploitation, corruption).

3.5 Goal and Objectives

To characterize conservation planning practices in Mexico and their validity under current economic and social characteristics by:

3.5.1 Characterizing conservation planning (1994 – 2003) as it ocurrs in NPAs and MDRLs in Mexico.

3.5.2 Assessing validity of the existing conservation planning protocol for natural protected areas regarding neo-liberal economic reforms (e.g., devolution of use rights, land tenure changes).

3.5.3 Analyze the potential contribution of participatory processes in conservation planning in Mexico.

3.6 Methods

3.6.1. Selection and Evaluation of NPA and MDRL management plans.

Twenty-seven NPA and 6 MDRL management plans were selected for evaluation. Management plans for NPAs were published between 1994 and 2000 (SEMARNAT 2001b, INE 2002). Fifteen plans were from biosphere reserves, 6 from national parks, 4 from flora and fauna protection areas, and 2 from NPAs in other categories (Table 3.2). The 27 NPAs were located in 13 states and represented a wide array of terrestrial and marine ecosystems (Figure 3.3).

Management plans for MDRL projects all fell outside the Natural Protected Areas System. These cases were selected based on (1) the absence of legal protected status for the areas, (2) high biological and ecological importance, and (3) strong orientation from planning teams toward both conservation and rural development activities. MDRL case studies represented local conservation projects in 5 states and involved multiple ecosystems (e.g., mangrove areas, intermountain semi-arid wetlands, marine ecosystems) (Table 3.3). All MDRL projects started between 1996 and 2001. My evaluation of management plans was both quantitative and qualitative. Quantitative data were collected to characterize planning approaches and the soundness of plans.

Table 3.2. Management plans from Natural Protected Areas used to characterize conservation planning in Mexico.

Biosphere Reserves (UNESCO-MAB)	**Publication Date**	**State(s)**
1. Sian Ka'an Biosphere Reserve	01/1996	Quintana Roo
2. Alto Golfo de California y Delta del Rio Colorado Biosphere Reserve	12/1995	Sonora, Baja California
3. El Triunfo Biosphere Reserve	08/1998	Chiapas
4. Sierra Gorda Biosphere Reserve	09/1999	Quintana Roo
5. Calakmul Biosphere Reserve	01/2000	Campeche
6. Sierra de Manantlán Biosphere Reserve	01/2000	Jalisco, Colima
7. El Vizcaino Biosphere Reserve	05/2000	Baja California Sur
8. Montes Azules Biosphere Reserve	05/2000	Chiapas
9. Islas del Golfo de California Biosphere Reserve	10/2000	B. California, Baja California Sur, Sonora, Sinaloa
Special Biosphere Reserves (Mexico)		
1. El Pinacate y Gran Desierto del Altar Biosphere Reserve	08/1994	Sonora
2. La Sepultura Biosphere Reserve	10/1999	Chiapas
3. La Encrucijada Biosphere Reserve	10/1999	Chiapas
4. Ria Lagartos Biosphere Reserve	11/1999	Yucatán, Quintana Roo
5. Pantanos de Centla Biosphere Reserve	02/2000	Tabasco
6. Banco Chinchorro Biosphere Reserve	05/2000	Quintana Roo
National Parks		
1. Isla Contoy National Park	05/1997	Quintana Roo
2. Arrecifes de Cozumel National Park	05/1998	Quintana Roo
3. C. Occidental de Isla Mujeres, Punta Cancun y Punta Nizuc National Park	05/1998	Quintana Roo
4. Cumbres de Majalca National Park*	05/1999	Chihuahua
5. Arrecife de Puerto Morelos National Park	05/2000	Quintana Roo
6. Bahía de Loreto National Park	11/2000	Baja California Sur
Flora and Fauna Protection Areas		
1. Maderas de Carmen Flora and Fauna Protection Area	05/1997	Coahuila
2. Cañon de Santa Elena Flora and Fauna Protection Area	07/1997	Chihuahua
3. Laguna de Términos Flora and Fauna Protection Area	05/1997	Campeche
4. Cuatrocienegas Flora and Fauna Protection Area	02/2000	Coahuila
Other		
1. X'Cacel y X'cacelito ecological area for marine turtle conservation	05/1997	Quintana Roo
2. Bosque de Aldama Forest Protection Area	08/1999[a]	Chihuahua

* Version of this management plan is an update, from 1999, of previous plans.

Figure 3.3. Location of Natural Protected Areas (NPAs) and Modified Rural Landscape Projects (MDRLs) in Mexico for which management plans were published between 1994 and 2000 and were evaluated in this research.

Table 3.3. Location, facilitating institutions, and project leaders of 6 modified rural landscape conservation projects evaluated for this research.

Project ID	**Type of Facilitating Institution**	**Name of Institution**	**Field interviews with team members**
1. Wetland Conservation at La Mancha-El Llano, Veracruz, Mexico	Research Center	National Institute of Ecology (Jalapa, Veracruz, Mexico)	Yes
2. Conservation of Manialtepec's Watershed, Oaxaca, Mexico	Regional NGO	Institute of Society and Nature of Oaxaca, (Oaxaca, Oaxaca, Mexico)	Yes
3. Soyate Palm Management Plan, Topiltepec, Guerrero, Mexico	Regional NGO	Group of Environmental Studies (Mexico City)	No
4. Conservation and Management Plan for Santa Maria Bay Sinaloa, Mexico	International NGO	Conservation International (Guaymas, Sonora, Mexico)	Yes
5. Integrated Management Plan for Babicora's Watershed, Chihuahua, Mexico	Public University	Autonomous University of Chihuahua (Chihuahua, Chihuhaua, Mexico)	Yes
6. Chihuahua's State Forestry Plan, Chihuahua, Mexico	Federal Agency	Secretary of the Environment and Natural Resources (Chihuahua, Chihuahua, Mexico)	No

Qualitative data were collected either to fine-tune unclear issues found in the management plans (e.g., decision making, identification and involvement of stakeholders) or to explore reactions of conservation planners to neo-liberal reforms in Mexico. Quantitative data were generated by using an evaluation matrix, whereas qualitative data were gathered through structured interviews.

3.6.2. Quantitative Data: Conservation Planning Evaluation Matrix

I development an evaluation matrix to identify and contrast components of models relevant to natural resource management world-wide, such as common property resource systems (Berkes 1989, Ostrom 1990), stakeholder theory (Freeman 1984, Wartick 1994), territorial fisheries use rights (Catilla 2000), integrated conservation and development projects (ICDPs) (Ack 1991, Brown and Wyckoff-Braid 1992, Sanjayan et al. 1997), environmental planning (Briassoulis 1989), participatory processes (Thrupp et al. 1994, Zazueta 1995), community-based conservation (Berkes and Kislalioglu 1991, Child 1996a, Brosius et al. 1998, Vasseur and Hart 2002), and ecosystem management (Slocombe 1993, Grumbine 1994). Variables from these models were selected based on their (1) ability to increase the diagnostic power of planning processes at different stages (e.g., identification of problems, classification and involvement of stakeholders), (2) relevance in understanding and integrating into a planning process the changing conditions in natural resource administration in Mexico, (3) potential for increasing the likelihood for successful plan implementation, (4) potential in providing measures to assess overall plan completeness (i.e., identified issues, mission, goals, objectives, recommended actions, and PMS), (5) potential to develop comprehensive PMSs (i.e., outcome- and output-related performance measures), and (6) potential to balance social and economic justice with environmental conservation.

My evaluation matrix was not intended to evaluate the justification criteria used to designate selected NPAs or MDRLs (e.g., umbrella species, biodiversity values and distribution, evolutionary processes and genetic diversity, hot spots, fragile or unique ecosystems) (Woodroffe 1998, Prendergast 1999, Balmford 2000, Slotow and Hamer 2000, Jepson and Canney 2001, Nachuha and Pomeroy 2001, Rubinoff 2001, Moritz 2002). Also, my matrix was not designed to assess the effectiveness of already established NPAs or MDRLs in adding protection for biodiversity when analyzed at higher landscape levels (Abbitt et al. 2000).

Evaluation variables used in the matrix are nested, as shown in Table 3.4. There are 4 major performance domains (i.e., inventory, strategic planning, operational planning, and monitoring and evaluation) (Crowe 1983), 10 subdivisions, and 107 variables (Appendix B). Inventory includes 5 sections: description of the area, resource base tenure system, participatory processes, scoping for evaluative factors for stakeholder analysis, and definition and effects upon common property resource systems. Strategic planning integrates 3 sections: problem identification, stakeholder normative cores, and goals and objectives. Operational planning and monitoring and evaluation included 1 section each.

Table 3.4. Structure of the planning evaluation matrix used to evaluate 27 natural protected areas and 6 modified rural landscapes management plans in Mexico.

A. SCOPING AND EVALUATIVE FACTORS – INVENTORY
1. Description of the Area
2. Resource Base Tenure System
3. Participatory Processes
4. Scoping for Evaluative Factors for Stakeholder Analysis
5. Definition and Effects upon Common Property Resource Systems (CPRs)
B. STRATEGIC PLANNING
6. Problem Identification
7. Stakeholder Normative Cores
8. Goals and Objectives
C. OPERATIONAL PLANNING
9. Planning Framework
D. MONITORING AND EVALUATION
10. Monitoring and Evaluation

3.6.2.1. Description of the grading system.

I developed individual scales for each planning matrix element (n = 107). Individual scales contained $\geq$ 1 parameters for evaluation purposes. Elements in the matrix were ranked using 4 possible ratings: (1) described, (2) vague, (3) absent, and (4) irrelevant.

Described: A value of 1 was assigned to elements in a management plan that were described fully and provided evidence that this descriptive information was analyzed and incorporated in the plan. Variables with multiple parameters (i.e., > 3) were assigned a 1 if $\geq$ 3 parameters were described, regardless of the type of parameter (e.g., description of land tenure types – communal, private and public lands, proportion for each type) (Table 3.5).

Vague: A value of 2 was assigned to variables for which information presented in the plan did not allow (1) assessment of the depth or degree of use of such information in the planning process, (2) assessment of the relative importance of such information for the development of the management plan, or (3) presence of $\leq$ 2 parameters for variables having > 3 parameters. A value of 2 does not mean the planning team failed to incorporate this information; it means the information presented in the plan was scarce, scattered, or its use was unclear.

Absent: A value of 3 was assigned to variables that were not present or discussed in the management plan. A value of 3 does not mean the planning team failed to incorporate this information; it means these variables were not referenced directly in the plan.

Table 3.5. Example of variables and parameters used to evaluate 27 natural protected areas and 6 modified rural landscapes management plans from Mexico from 1994-2003.

Variable Name	Planning Stage	Parameter(s)	#Parameters
1f. *Concise **statement** of the conservation mission for this plan	Inventory	A) Mission statement	1
2a. **Description** of existing land tenure system **types** (e.g., private, communal)	Inventory	**A) Description** a) presence b) amount c) location **B) Type** a) private b) common c) public	3 3
6c. **Description** of issues and problems	Strategic Planning	**A) Description** a) scale b) location c) affected resource d) causative agents e) performance indicators f) time-bounded g) uncertainty	7
9e. Identification of **responsibilities** for plan implementation	Operational Planning	**A) Responsibilities** a) roles b) duties c) time frameworks d) mechanisms for accountability e) funding	5

*the ID reference number indicates its position within the evaluation matrix (Appendix B).

Irrelevant: A value of 4 was assigned to those matrix criteria that, given the nature of the NPA or MDRL, were irrelevant either for development, or implementation of the plan and subsequent management of the area. For example, many NPAs have no indigenous groups present within their boundaries. Therefore, an assessment of indigenous commonly-owned resource systems (i.e., variable 5c, see Appendix B) is irrelevant. However, exceptions may apply such as when the absence of a higher level element (e.g., commonly-owned resource systems) does not lead automatically to absence of lower level elements. For example, even in the absence of communal lands in marine parks (i.e., variable 2a in the matrix), other resources (i.e., coastal lines, reefs, marine fisheries) may be affected by typical CPR problems (e.g., 5d. in the matrix – inability to control access). If these impacts were not addressed in the management plan, a value of 3 (i.e., absent) was assigned to that particular element.

3.6.3. Qualitative Data: Questionnaires and Interviews.

A questionnaire consisting of 14 closed-ended questions was developed and used when interviewing selected planning team members. Planning team members from 4 NPAs and 4 MDRLs were contacted and interviewed (based on availability and willingness to participate). I conducted 38 interviews between June and July 1999 and October through December 2000 (Table 3.6). Questions explored issues related to inventory, strategic planning, and operational planning. Inventory-related issues included description of the planning protocol used, beliefs about transferring resource-based rights, and changes in land tenure in Mexico. Questions related to strategic planning included characteristics of problem definition, stakeholder analysis, and stakeholder involvement in conservation planning.

Table 3.6. Interviews with planning team members from natural protected areas and modified rural landscape projects conducted in Mexico between October and December 2000.

Category	State	# Interviews
1. NPAs		
a) Maderas del Carmen Flora and Fauna Protection Area	Coahuila	3
b) Cañon de Santa Elena Flora and Fauna Protection Area	Chihuahua	4
c) Cumbres de Majalca National Park	Chihuahua	3
d) Bosque de Aldama Forest Protection Area	Chihuahua	4
2. MDRLs		
a) Conservation of Manialtepec's Watershed	Oaxaca	3
b) Community-based Wetland Conservation La Mancha-El Llano	Veracruz	5
c) Integrated Management Plan for Babicora's Watershed	Chihuahua	12
d) Management Plan for the Conservation and Development of Santa Maria Bay	Sinaloa	4
	Total	38

Finally, questions on operational planning focused on composition of planning teams and monitoring and evaluation of conservation planning (Appendix A). Quantitative data from the evaluation matrix were analyzed using descriptive statistics (i.e., frequencies). Analysis was performed using Statistical Package for Social Sciences for Windows (SPSS 2001). Data from interviews were analyzed through content analysis using QSR N4 classic (QSR 1998).

3.7 Results

3.7.1. Management plans for Natural Protected Areas (NPAs)

Most NPA plans I evaluated seemed to have a good understanding of the area's characteristics, as well as the prevalent issues. In addition, most plans showed that planning teams clearly were aware of the need for collaboration. However, these plans often were unclear on how this collaboration could be operationalized (i.e., Participatory Processes - Section 3 - average), who should be involved in early stages (i.e., Evaluative Factors for Stakeholder Analysis Section 4 - average), and what the specific, quantifiable objectives of the plan were (Goals and Objectives - Section 8). Although specific management recommendations were comprehensive, mechanisms for plan implementation remained vague (Operational Planning - Section 9). Most plans failed to acknowledge potential threats due to recent changes in law regarding resource-based rights and tenure (Resource-Based Tenure System - Section 2; Common Property Resource Systems - Section 5). In particular, many plans failed to link conservation and development issues (Stakeholder Analysis – Section 7) and lacked sound PMSs (Monitoring and Evaluation – Section 10). Overall, conservation planning, as described in these management plans, focused on the inventory stage, expended less effort on strategic planning, and average effort in developing operational components, and neglected development of sound PMSs.

3.7.2. Management plans for Modified Rural Landscapes (MDRLs)

Despite shared procedural characteristics, all MDRLs methodologically were unique regarding their goals, expected outcomes, and timing. All MDRL plans demonstrated good understanding of the surrounding landscape, its resources, and its social characteristics (Section 1 – Description of the characteristics of the area). Topics such as existing tenure system, implications for resource management, participatory frameworks, and operational planning were addressed clearly in at least half of the case studies (Sections 2, 3, and 9). Most MDRL plans had clear goals, but problem identification (Section 6) and objectives (Section 8) were not detailed enough to allow measurement of achievements and their timeliness. At least 3 MDRL projects had a strong, ongoing participatory components designed to promote stakeholder involvement, but there was lingering doubt as to whether planners truly understood stakeholders' normative cores (i.e., values, interests, power analysis) (Sections 4, and 7). Although most MDRL projects showed a working understanding of common property systems, most failed to describe them as such. All MDRL plans simultaneously outlined inventory (i.e., description of the area), strategic planning (e.g., description of the problems), and operational planning activities (e.g., nurseries, women groups), but they either lacked performance measurement tools, or they were poorly developed (Section 10).

3.7.3. NPAs vs. MDLRs quantitative data

I. Description of the Area.

Most NPA (n=24) and MDRL management plans (n=4) provided vague descriptions of historic characteristics of the area in question. Only 3 NPA management plans (Maderas del Carmen FFPA, Costa Occidental de Isla Mujeres, Punta Cancún y Punta Nizuc NP, X'Cacel-X'Cacelito PA) described past conditions of these areas including processes that affected them, and likely scenarios for conservation (Table 3.7). NPA plans typically described historical characteristics only vaguely, focused attention on describing social-cultural characteristics (e.g., pre- post-colonial era), and failed to describe original ecosystems, historical distributions of species, or ecological processes. MDRL management plans briefly described either existing indigenous groups, or relevant colonial or post-revolutionary conditions, but information on historical physical or biological characteristics of the areas was largely missing.

Although most NPAs and MDRLs described current characteristics of the area (i.e., physical, biological, and social characteristics), NPA plans were more comprehensive than most MDRLs. Most NPA plans adequately described their physical (n=27), biological (n=25), and social characteristics (n=22). All NPA plans provided information regarding the status and location of physical characteristics (e.g., geology, hydrology, soils, geophormology), and 25 of 27 plans described the type and location of biological resources (e.g., forests, fauna, fisheries) and the human settlements in the areas (e.g., demographics, economic activities, age distributions).

Table 3.7. Frequency values from the qualitative evaluation for "Section 1 – Description of the Area" for 27 natural protected areas and 6 modified rural landscape management plans in Mexico (1994-2000).

A. SCOPING AND EVALUATIVE FACTORS	**FREQUENCY**							
1. Description of the Area	**Described**		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
1a. Past background of the area	3	0	19	4	5	2	0	0
1b. Description of physical characteristics	27	3	0	2	0	1	0	0
1b. Description of biological characteristics	25	3	2	3	0	0	0	0
1b. Description of social characteristics	22	4	5	1	0	1	0	0
1c. Physical Characteristics: Scale	25	4	2	1	0	1	0	0
1c. Physical Characteristics: Geographic Location	23	2	4	3	0	1	0	0
1c. Physical Characteristics: Aerial Coverage	17	1	10	4	0	1	0	0
1c. Biological Characteristics: Scale	22	4	5	2	0	0	0	0
1c. Biological Characteristics: Geographic Location	17	4	10	2	0	0	0	0
1c. Biological Characteristics: Aerial Coverage	1	2	25	4	1	0	0	0
1c. Social Characteristics: Scale	22	4	5	2	0	0	0	0
1c. Social Characteristics: Geographic Location	19	3	8	3	0	0	0	0
1c. Social Characteristics: Aerial Coverage	8	2	19	4	0	0	0	0
1d. Trends	3	1	23	5	1	0	0	0
1e. Past, current or anticipated efforts	19	4	6	1	2	1	0	0
1f. Conservation Mission	24	4	2	2	1	0	0	0

Overall, MDRL plans provided a description of the physical (n=3), biological (n=3) and social characteristics (n=4) of the management areas.

I evaluated each plan for the presence of indicators of scale for the area characteristics (i.e., landscape scale, boundaries, local vs. regional vs. international), geographic location (i.e., North, South, West, Central, critical habitat types), and aerial coverage (i.e., quantitative information of proportions, wildlife population trends, historical threshold indicators, abundance).

Descriptions of physical characteristics in most NPA plans included or used $\geq$ 2 indicators of scale (n=25), geographic location (n=23), and aerial coverage (n=17). Biological characteristics in most NPA plans were described in terms of both scale (n=22) and geographic location (n=17), but indicators of aerial coverage were provided only in 1 plan (i.e., El Vizcaíno BR). This management plan provided quantitative information related to some wildlife species (e.g., population status, trends, abundance, location and habitat availability). Social characteristics described in NPA management plans had indicators of scale (n=22) and geographic location (n=19) but only a few plans used indicators related to aerial coverage (n=8). I observed that NPA plans published after 1999 that used indicators of aerial coverage for social characteristics, also incorporated indicators of scale and geographic location (Biosphere Reserves of Sierra Gorda, La Sepultura, Ría Lagartos, El Vizcaino, Islas del Golfo de California, and Calakmul).

Four MDRL plans provided indicators of scale for the description of the physical characteristics, but, few introduced indicators of geographic location (n=2) and aerial coverage (n=1). Similarly, 4 of MDRL plans adequately used indicators of scale and geographic location (n=4) for describing biological characteristics, whereas only 2 used indicators of aerial coverage (State Plan for Forestry Development in Chihuahua, and Soyate Palm Management Plan). The description of social characteristics included indicators of scale (n=4) and geographic location (n=3) in at least half of the plans. However, only 2 plans used indicators of aerial coverage (Conservation of Manialtepec's Watershed, Wetland Conservation at La Mancha-El Llano).

Most NPA plans (n=23) vaguely documented anticipated trends given current physical, biological, and social conditions (e.g., intra-community migration, declining populations of T&E species, changes in resource-based property-rights). Only 3 NPA plans (Ria Lagartos BR, Montes Azules BR, and Sierra de Manantlán BR) attempted to elaborate on likely scenarios (e.g., disappearance of T&E species, depletion of forests). Although located in different states, all 3 plans were released officially between 1999 and 2000.

The Soyate Palm Management Plan was the only MDRL plan that specifically discussed anticipated trends in conservation, given current characteristics. The rest of the projects described these topics (n=5) only vaguely. Nineteen NPA and 4 MDRL plans accounted for the presence of past, current or anticipated efforts in the areas (e.g., management, conservation, research and monitoring, community involvement). Similarly, most NPA (n=24) and MDRL (n=4) plans had $\geq$ 1 or more conservation mission statements.

In conclusion, most plans from both categories failed to provide a historical framework and context for the conservation of natural areas. Despite providing detailed data on some aspects of the physical, biological, and social characteristics of the areas, most plans failed to include indicators for geographic location and aerial coverage, particularly for biological and social characteristics. Most plans restricted their inventory only to a listing of major resources, with no interpretation and/or analysis of that information.

II. Resource Base Tenure System

Eighteen NPA and 4 MDRL plans discussed current land tenure system, including such items as land tenure types (e.g., communal, private), geographic location, and proportions of different land tenure types (Table 3.8). Many NPA plans (n=15) failed to identify and describe the either type of project or type of resource-based rights and responsibilities (e.g., use, management, administration, enforcement, protection) involved in the project. Half of MDRL plans described projects associated with resource-based rights. Eleven and 10 NPA plans, respectively, vaguely described projects involving resource-based rights and the type of right involved (Table 3.8). Only the El Vizcaino BR management plan explicitly outlined projects that described shared responsibilities and rights with wildlife users (e.g., sustainable use of desert bighorn sheep (*Ovis canadensis*), and gray whale (*Eschrichtius robustus*)). Similarly, the type of right(s) being shared was described only in 2 MDRL projects (e.g., Soyate Palm Management Plan). Although 11 NPA plans vaguely mentioned potential threats, and 6 mentioned opportunities for conservation of highly priced resources, the majority of plans (n=16 and 21 respectively) disregarded these topics. Those describing this information more often identified "threats" rather than "opportunities."

Table 3.8. Frequency values from the qualitative evaluation for "Section 2 - Resource Base Tenure System" for 27 natural protected areas and 6 modified rural landscape management plans in Mexico (1994-2000).

A. SCOPING AND EVALUATIVE FACTORS 2. Resource Base Tenure System	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
2a. Description of land tenure system	18	4	6	2	0	0	3	0
2b. Type of resource-based projects	1	3	11	2	15	1	0	0
2b. Type of resource-based right	1	2	10	3	16	1	0	0
2c. Threats for resource-based projects	0	2	11	2	16	2	0	0
2c. Opportunities for resource-based projects	0	1	6	3	21	2	0	0
2d. Land tenure changes: Impacts on people	0	0	8	2	16	4	3	0
2e. Land tenure changes: Natural resource impacts	0	0	6	1	19	5	2	0

Two MDRL plans (Chihuahua's Forestry State Plan, Conservation and Management Plan for Santa Maria Bay) described some threats for conservation through resource-based right projects, whereas only one plan mentioned opportunities for conservation (Conservation of Manialtepec's Watershed). All remaining plans described these topics vaguely or failed to discuss them completely.

Finally, all NPA and MDRL plans acknowledged the existence of a diverse land tenure system in the conservation areas. However, most NPA plans failed to explore potential impacts of land tenure reforms on local communities (n=16) or natural resources in general (n=19). Only 8 and 6 NPA plans, respectively, most of which were issued in 2000 (Table 3.2), described potential consequences of these reforms (e.g., Sian Ka'an BR, Pantanos de Centla BR, Puerto Morelos NP, Montes Azules BR). A similar pattern was found among MDRL plans, where only Conservation of Manialtepec's Watershed and Chihuahua's State Forestry Plans vaguely described the impacts on rural people, whereas Conservation and Management Plan for Santa Maria Bay vaguely described the impacts on some of the natural resources.

<u>III Participatory Processes</u>

Only 9 NPA plans clearly defined the public involvement tools used in the development of the plans (e.g., El Pinacate BR, Laguna de Términos BR, La Sepultura BR, Sierra de Manantlán BR). For the remaining NPA, plans this information was either described vaguely (n=15) or absent (n=3) (Table 3.9). In contrast, 5 MDRL plans described the participatory framework used to develop the projects. This information was not found only in the Chihuahua's State Forestry Plan.

Table 3.9. Frequency values from the qualitative evaluation for “Section 3 – Participatory Processes” for 27 natural protected areas and 6 modified rural landscape management plans in Mexico (1994-2000)

A. SCOPING AND EVALUATIVE FACTORS **3. Participatory Processes**	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
3a. Description of required participatory framework	9	5	15	0	3	1	0	0
3b. Limitations for using participatory processes	0	2	5	2	22	2	0	0
3b. Opportunities for using participatory processes	0	1	5	2	22	3	0	0
3c. Planning stage where participation is expected	4	2	18	3	5	1	0	0
3c. Initial identification of stakeholders	1	3	21	3	5	0	0	0

Public participation for development of NPA plans was mostly consultative (McMullin 1996), through workshops and open houses. MDRL projects used a more diverse approach to promote stakeholder participation, including surveys, interviews, development of coalitions and/or governance bodies, search conferences, workshops, and open houses.

Most NPA (n=22) and MDRL (n=4) management plans failed to explain limitations and opportunities for the use of participatory processes. Any discussions of opportunities (n=5) and limitations (n=3) I found were addressed only vaguely (e.g., Laguna de Términos BR, El Vizcaíno BR). Similarly, only 2 MDRL projects (Wetland Conservation at La Mancha-El Llano, Conservation of Manialtepec's Watershed) identified limitations for the use of participatory processes, and the latter was the only plan to also describe opportunities. Eighteen NPA plans vaguely described it, whereas 5 NPA plans failed to identify planning stages where collaboration was required (Table 3.9). Only 4 NPA plans, all issued in 1997 or later (Table 3.2), described collaborative processes (Laguna de Términos BR, Puerto Morelos NP, El Vizcaíno BR, Sierra de Manantlán BR).

Similarly, 5 MDRL plans vaguely identified the planning stage where stakeholder participation was expected. Such information was described clearly only in the Manialtepec Watershed management plan. Finally, most NPA plans either vaguely described (n=21) or failed to pre-identify (n=5) potential stakeholders. These plans identified stakeholders based on general categories (e.g., local communities, resource users, universities, federal agencies). Only the Sierra de Manantlán BR management plan, published in 2000, provided detailed information about the pre-identification of potential stakeholders. In contrast, 3 MDRL plans described the process for pre-identification of stakeholders (Manialtepec Watershed, La Mancha-El Llano, Soyate Palm Management Plan).

IV. Scoping for Evaluative Factors for Stakeholder Analysis.

Although most NPA plans (n=25) recognized the need for interagency cooperation, the majority of these plans (n=20) addressed it vaguely (Table 3.10). Only 5 plans (El Pinacate BR, El Triunfo BR, Sierra Gorda BR, El Vizcaíno BR, and Cuatrociénegas FFPA) clearly stated what type of cooperation was required, and at what planning stages (e.g., strategic planning, implementation, funding, training). Among MDRL management plans, interagency cooperation was described only in Conservation of Manialtepec's Watershed plan. This information was vaguely addressed in most MDRL cases (n=4).

Most NPA plans failed to identify threats (n=23) and opportunities (n=24) for collaborative work. Only the plan for Bahía de Loreto National Park, the latest plan issued by INE (November 2000), discussed threats and opportunities for collaboration. Among MDRLs, threats and opportunities for collaboration among stakeholders were described only in Conservation of Manialtepec's Watershed plan. Four MDRL plans described threats vaguely, whereas opportunities for collaboration were described vaguely only in 1 project (i.e., Wetland Conservation at La Mancha-El Llano).

Table 3.10. Frequency values from the qualitative evaluation for "Section 4 – Scoping for Evaluative Factors: Stakeholder Analysis" for 27 natural protected areas and 6 modified rural landscape management plans in Mexico (1994-2000).

A. SCOPING AND EVALUATIVE FACTORS 4. Scoping for Evaluative Factors: STK Analysis	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
4a. Assessment for interagency cooperation	5	1	20	4	2	1	0	0
4b. Description of threats to collaboration	1	1	3	4	23	1	0	0
4b. Description of opportunities for collaboration	0	1	4	2	23	3	0	0
4c. Description of criteria for STK identification	0	1	24	5	3	0	0	0
4d. Preliminary identification of stakeholders	2	4	23	1	2	1	0	0
4e. Assessment of willingness to participate	0	2	3	1	24	3	0	0

All NPA plans recognized the importance of stakeholder identification. However, no plans clearly defined criteria for stakeholder identification. Twenty-five NPA plans addressed this information vaguely. Criteria used to identify stakeholders included resource use, ownership, legal mandates (i.e., agencies), and expressed interests (i.e., NGOs). Most plans (n=23) identified stakeholders at a very general level (e.g., federal agencies, research centers, farmer organizations). Only Laguna de Términos BR, and El Vizcaíno BR plans showed evidence of a more detail stakeholder identification. Criteria for stakeholder identification were described clearly only in the Wetland Conservation at La Mancha-El Llano MDRL plan. This information remained vaguely addressed in 5 MDRL plans. Stakeholders were pre-identified in 5 MDRL projects, but not in the Chihuahua's Forestry State Plan.

Finally, most NPA plans lacked assessments of stakeholders' willingness to participate (n=24). This topic was explored vaguely in 3 plans (e.g., El Pinacate and Montes Azules BR, and Cuatrociénegas FFPA). The last two plans were among the last cohort of plans issued in 2000. Similarly, only one MDRL plan provided evidence of an assessment of willingness to participate (Conservation of Manialtepec's Watershed); the remaining plans described it vaguely (n=2) or failed to incorporate it (n=3).

V. Definition and Effects upon Common Property Resource Systems

Common property resource systems were described in all NPA plans as resources found in commonly-owned lands, rather than resource systems on their own. Still, 11 management plans made vague, indirect references to commonly owned resources (e.g., forests, fisheries, grasslands), including type of CPR systems (i.e., indigenous vs. institutionally created). In the rest of NPA plans, this information was either absent (n=14) or was irrelevant (n=2) (Table 3.11). All MDRL plans dealt with CPRs, but only 2 described them as resource systems on their own (i.e., Soyate Palm Management Plan, Conservation of Manialtepec's Watershed). The remaining cases had only vague descriptions of CPRs.

Eleven NPA plans described vaguely the boundaries of common property systems. Most plans failed to provide information about management guidelines (n=21), exclusion of nonusers (n=24), enforcement of collective agreements (n=26), resource access or distribution (n=24), decision-making (n=25), and internal accountability (n=26). Overall, only the MDRL of Manialtepec Watershed specifically described CPR characteristics such as boundaries, management guidelines, exclusion of non-users, resource access, distribution systems, and internal accountability. The remaining MDRL plans (n=5) provided vague information about CPR characteristics.

Although most NPA plans did not frame CPRs as such, some still described problems affecting indigenous (n=3) and institutionally-created CPRs (n= 7). These plans belong to NPAs located in South Mexico where there are large populations of indigenous people (e.g., Sian Ka'an BR, Montes Azules BR) and where problems involved freshwater and marine fisheries (e.g., unclear boundaries and use rights).

Threats for indigenous CPR systems were described specifically only in the Manialtepec Watershed plan. Of the remaining MDRL plans, this information was irrelevant because they had no indigenous CPRs (n=3) or vaguely described (n=2) (Chihuahua's Forestry State Plan, Soyate Palm Management Plan).

Table 3.11. Frequency values from the qualitative evaluation for "Section 5 – Definition of Common Property Resource Systems (CPRS)" from 27 natural protected areas and 6 modified rural landscapes management plans in Mexico (1994-2000)

A. SCOPING AND EVALUATIVE FACTORS **5. Definition of Common Property Resource Systems**	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
5a. Description of the type of CPRs	0	2	11	2	14	2	2	0
5b. CPR characteristics: Definition of boundaries	1	2	11	3	14	1	1	0
5b. CPR characteristics: Management guidelines	0	1	2	3	21	2	1	0
5b. CPR characteristics: Exclusion of non-users	0	1	2	2	24	3	1	0
5b. CPR characteristics: Enforcement of agreements	0	0	0	4	26	2	1	0
5b. CPR characteristics: Resource access/distribution	0	1	2	2	24	3	1	0
5b. CPR characteristics: Decision-making	0	1	1	1	25	4	1	0
5b. CPR characteristics: Internal accountability	0	1	0	1	26	4	1	0
5c. Threats for indigenous CPRs	0	1	3	2	10	0	14	3
5d. Threats for institutionally created CPRs	0	0	7	2	19	4	1	0

Threats to institutionally created CPRs (i.e., ejidos, colonias) were described vaguely in 2 MDRL plans (Chihuahua's Forestry State Plan, Soyate Palm Management Plan) (Table 3.11). Remaining MDRL plans (n=4) lacked this information.

VI. Strategic Planning

In most NPA cases (n=24), management plan development was facilitated by $\geq$ 1 clearly identified institutions (Table 3.12). These institutions were either non-governmental organizations (NGOs), research centers, or universities. Similarly, institutions facilitating the planning processes were described in 5 MDRL plans. Non-governmental organizations lead the planning processes in the Manialtepec Watershed, Soyate Palm and Santa Maria Bay plans, whereas academic institutions lead processes for Babicora Watershed and La Mancha-El Llano plans. SEMARNAT lead the planning process for the Chihuahua's Forestry State Plan.

Problems were introduced in NPA plans within a section titled "Identification of Problems." Problems usually were linked to the physical (n=24), biological (n=27), or social characteristics (n=27) of the NPAs. The identified problems section represented a transition between inventory-related activities and strategic planning. Three MDRL plans described problems associated with the physical characteristics of the area. This information was missing from Chihuahua's Forestry State Plan, and Soyate Palm Management Plan.

Table 3.12. Frequency values from the qualitative evaluation for "Section 6 – Problem Identification" from 27 natural protected areas and 6 modified rural landscapes management plans in Mexico (1994-2001).

B. STRATEGIC PLANNING **6. Problem Identification**	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
6a. Identification of facilitating institutions	16	5	8	0	3	1	0	0
6b. Problems: Physical characteristics	27	3	0	1	0	2	0	0
6b. Problems: Biological characteristics	27	5	0	1	0	0	0	0
6b. Problems: Social characteristics	24	1	0	4	3	1	0	0
6c. Problem characteristics: Scale	12	4	11	2	4	0	0	0
6c. Problem characteristics: Location	13	4	12	2	2	0	0	0
6c. Problem characteristics: Affected resource	18	5	9	1	0	0	0	0
6c. Problem characteristics: Causative agents	4	1	22	5	1	0	0	0
6c. Problem characteristics: Indicators of performance	0	1	6	3	21	2	0	0
6c. Problem characteristics: Time-bounded	0	1	4	1	23	4	0	0
6d. Hierarchical analysis of issues	2	1	11	4	14	1	0	0
6e. Decision-making in identification of issues	4	3	14	2	9	1	0	0
6f. Identification of information needs	2	2	23	2	2	2	0	0

Problems related to biological resources were described in 5 MDRL plans, whereas social problems were described in detail only in the Babicora Watershed plan. This information was missing in 4 MDRL plans (Table 3.12).

Identified problems were evaluated for the presence of indicators of (1) scale (local, regional, state, national), (2) geographic location, (3) affected resource(s) or parties, (4) causative agents, (5) indicators of performance (i.e., elements aimed at measuring progress toward a desired end), and (6) time-bounded characteristics. Fifteen NPA plans had either vague or no indicators of scale. However, 12 NPA plans framed the problems within an appropriate scale context (e.g., local, regional, national). In contrast, most MDRL plans (n=4) provided detailed indicators of scale.

Whereas only 13 NPA plans clearly used indicators of geographic location, 4 of the 6 MDRL plans used them clearly. Eighteen NPA plans showed a clear link between the problems and affected resources or parties; the rest of the plans presented a vague description. Only 4 NPA plans (Biosphere Reserves Sierra Gorda, La Sepultura, Ria Lagartos, and El Vizcaíno) linked the problems to specific causative agents; the majority of plans vaguely described of such indicators (i.e., lack of detail). Most MDRL plans showed clear use of indicators linked to affected resources (n=5). However, indicators related to causative agents, indicators of performance, and time-bounded characteristics were vague in most projects. Only the Soyate Palm Management Plan provided clear indicators related to these 3 indicators. All NPA plans failed to introduce indicators of performance (n=21) and time-bounded characteristics (n=23). A similar pattern was found among MDRL plans.

Fourteen NPA plans failed to perform any kind of hierarchical analysis on identified problems. Twelve NPA plans performed hierarchical analysis of identified problems, but based it only on time needs for implementation (i.e., short, medium and long-term needs). The analysis was performed onto sets of recommendations within specific management areas. Only the La Sepultura BR and Montes Azules BR made a comprehensive hierarchical analysis of identified issues, both of which were published after 1999. In contrast, hierarchical analysis was either absent (n=1) or vaguely described (n=4) in most MDRL plans. Only the La Mancha-El Llano management plan addressed this need specifically, based mostly on expressed needs from local and regional stakeholders (Table 3.12).

The wording used in NPA plans to describe decision-making in problem identification suggested stakeholder involvement. However, in most cases, these plans failed to convey specific information about the role of stakeholders. Only 4 NPA plans clearly described it (Biosphere Reserves Sierra Gorda, La Sepultura, Montes Azules, and Islas del Golfo de California). For the rest of NPA plans, this information was either presented vaguely (n=14) or absent (n=9). Three MDRL plans clearly described their decision-making in problem identification. For the remaining plans, this information was either described vaguely (n=2) or absent (n=1). In MDRL La Mancha-El Llano and Manialtepec Watershed, stakeholders other than planning team members (e.g., local communities, county authorities) were involved specifically in problem identification.

Finally, even though most NPA plans (n=23) acknowledged information gaps different areas (e.g., inventories, species distributions, habitat availability), data needs usually were described only vaguely. This was true particularly for data needs on biological or social issues. Only the plans of El Vizcaíno BR and Cuatrociénegas FFPA clearly described their information needs. Both management plans were published in 2000. Data needs were defined clearly in only 2 MDRL plans (Soyate Palm Management Plan, Conservation of Manialtepec's Watershed). This information was vague or absent in remaining plans (Table 3.12).

VII. Stakeholder Normative Cores

Because stakeholders were identified vaguely in most NPA plans (n=20), there is little evidence to suggest that a formal stakeholder analysis was performed (Table 3.13). Stakeholders were listed based on criteria such as resource use, ownership (e.g., local communities, resource users), legal mandates (i.e., federal, state, local agencies) or expressed interest (NGOs, universities, research centers). None of the NPA plans I evaluated classified stakeholders based on their importance regarding the successful development or implementation of the plan. Stakeholders specifically were classified in the MDRL plans of Soyate Palm and La Mancha-El Llano. For the remaining MDRL plans this information was described vaguely (Manialtepec Watershed, Santa Maria Bay), or it was absent (Chihuahua's Forestry State Plan, Babicora's Watershed). Most NPA plans (n=25) vaguely addressed the expected role of stakeholders. In contrast, only the Manialtepec Watershed and Soyate Palm plans clearly outlined both expected stakeholder roles and the planning stage where participation was expected. The remaining 4 MDRL plans only vaguely described both issues.

Table 3.13. Frequency values from the qualitative evaluation for "Section 7 – Stakeholder Normative Cores" from 27 natural protected areas and 6 modified rural landscapes management plans in Mexico (1994-2001).

B. STRATEGIC PLANNING 7. Stakeholder Normative Cores	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
7a. Classification of stakeholders	0	2	20	2	7	2	0	0
7a. Expected role of stakeholders	0	2	25	4	2	0	0	0
7b. Planning stage where participation is expected	3	2	20	3	4	1	0	0
7c. Stakeholder normative cores: Goals/objectives	0	0	3	3	24	3	0	0
7c. Stakeholder normative cores: Interests	0	1	2	3	25	2	0	0
7c. Stakeholder normative cores: Values	0	0	0	1	27	5	0	0
7c. Stakeholder normative cores: Organizational Structure	0	3	5	0	22	3	0	0
7d. Power analysis: Power sources	0	1	1	1	26	4	0	0
7d. Power analysis: Personal agenda	0	1	0	0	27	5	0	0
7e. Reasons for collaboration	0	0	6	3	21	3	0	0
7e. Reasons for no collaboration	0	0	2	1	25	5	0	0
7f. Interdependence	0	0	10	1	17	5	0	0

Information found in most NPA plans suggested that stakeholders were expected to participate in early stages of the planning process (i.e., consultative) or during plan implementation (i.e., active participation). By "early stages", these NPA plans meant that stakeholders should participate either in inventory activities (e.g., description of the area, current resource use, resource use rates, management guidelines, potential threats for the NPA) or in strategic planning (e.g., problem definition, establishment of goals and objectives) (Biosphere Reserves Ría Lagartos, Montes Azules, and Sierra de Manantlán). Three MDRL plans advocated similar stakeholder involvement, whereas 3 other MDRL plans anticipated and promoted stakeholder participation throughout the entire planning process, including implementation of suggested strategies (Conservation of Manialtepec Watershed, Wetland Conservation at La Mancha-El Llano, Soyate Palm Management Plan). None of the NPA management plans suggested that stakeholders should help develop operational plans or monitor and evaluate outcomes via a PMS.

Most NPA plans failed to analyze stakeholders' goals and objectives (n=24), interests (n=25), values (n=27), and organizational structure (n=22) (Table 3.13). Only few plans (n=3) indirectly, but vaguely, addressed stakeholder goals and objectives (Cañon de Santa Elena FFPA, Bosque de Aldama FPA, El Vizcaíno BR), interests (n=2) (Isla Contoy NP, El Vizcaíno BR), and organizational structure (n=5)(Isla Contoy NP, Arrecife de Cozumel NP, Puerto Morelos NP, El Vizcaino BR, Banco Chinchorro NP). No NPA plan analyzed stakeholders' values. No MDRL plans analyzed goals and objectives from participating stakeholders. Even though no MDRL plan specifically described stakeholders' interests, at least 3 plans showed vague understanding about this matter. Only the Soyate Palm Management Plan described potential stakeholders' interests. This information was addressed vaguely in half of the cases, and absent in 2 plans (Table 3.13). Stakeholders' values and attitudes for some stakeholders (e.g., local peasants) were described only in Babicora Watershed plan. All remaining plans failed to provide information on stakeholders' values. However, 50% described stakeholders' organizational structure.

Only the Montes Azules BR plan vaguely addressed issues related to power struggles (Montes Azules BR); the other 26 plans failed to provide evidence suggesting that these problems were analyzed. Similarly, only Conservation of Manialtepec's Watershed plan specifically described power struggles and their consequences on plan implementation. Of the remaining 5 MDRL plans most failed to examine these issues (n=4 and 5 respectively) or vaguely addressed them (n=1).

Most NPA plans failed to include data related to reasons for stakeholder collaboration (n=21) or no collaboration (n=25). Three NPA plans were more proactive in identifying possibilities for collaborative work (e.g., Biosphere Reserves Alto Golfo de California y Delta del Rio Colorado, El Vizcaíno). No MDRL plan clearly addressed reasons or limitations for collaboration among stakeholders; this was addressed only vaguely in 3 MDRL management plans.

Although the format and language used in NPA plans suggested that collaboration with different stakeholders was necessary, most plans (n=17) provided no information indicating an assessment of interdependence (i.e., successful implementation depends on the collaboration with other stakeholders). This was addressed vaguely in 10 NPA plans (e.g., areas where collaboration is essential, type of collaboration, time-span of these partnerships). Among MDRL plans all acknowledged the magnitude of proposed goals and the required collaboration of multiple stakeholders to accomplish them, but none provided clear evidence of having assessed interdependence (i.e., areas of cooperation, times, required support, expectations, degree of interdependence). This information was introduced only vaguely in one plan (Conservation of Manialtepec's Watershed).

VIII. Goals and Objectives

The type of decision-making used to develop goals and objectives was described specifically only in 2 NPA plans (Arrecife Puerto Morelos NP, Sierra de Manantlán BR). The rest of the plans either described it vaguely (n=18) or failed to describe it (n=7). Among MDRL plans, this information was described specifically only in the Conservation of Manialtepec's Watershed plan (Table 3.14).

Most NPA plans suggested that decision-making was consultative, that is, goals and objectives were defined, and feedback was collected afterwards, and incorporated (if appropriate). A large number of NPA plans (n=12) clearly identified performance domains (e.g., conservation, sustainable use, law enforcement, environmental education, environmental restoration) either on their mission, or through the description of current or past efforts within the areas. However, most NPA plans (n=15) described performance domains only vaguely.

All NPA plans contained objectives related to physical (n=27), biological (n=27), or social (n=n=26) characteristics of the area (Table 3.14). Similarly, most MDRL plans described objectives linked physical and biological characteristics of the area (n=5 and 6 respectively).

Table 3.14. Frequency values from the qualitative evaluation for "Section 8 – Goals and Objectives" from 27 natural protected areas and 6 modified rural landscape management plans in Mexico (1994-2001).

B. STRATEGIC PLANNING **8. Goals and Objectives**	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
8a. Decision-making in definition of goals/objectives	2	1	18	3	7	2	0	0
8b. Identification of performance domains (areas)	12	6	15	0	0	0	0	0
8c. Objectives: Physical characteristics	27	5	0	0	0	1	0	0
8c. Objectives: Biological characteristics	27	6	0	0	0	0	0	0
8c. Objectives: Social characteristics	26	3	0	0	1	3	0	0
8d. Objective characteristics: Scale	8	1	19	5	0	0	0	0
8d. Objective characteristics: Geographic location	6	3	20	3	1	0	0	0
8d. Objective characteristics: Affected resource	19	6	8	0	0	0	0	0
8d. Objective characteristics: Causative agents	2	0	22	6	3	0	0	0
8d. Objective characteristics: Performance indicators	0	0	1	1	26	5	0	0
8d. Objective characteristics: Time-bounded	0	0	4	2	23	4	0	0
8e. Assessment of objectives' feasibility	0	0	0	2	27	4	0	0

However, only 3 MDRL plans described objectives specifically related to social issues (Soyate Palm Management Plan, Wetland Conservation at La Mancha-El Llano, Conservation and Management Plan for Santa Maria Bay) (Table 3.14).

I evaluated objectives for the presence of defining indicators (i.e., scale, geographic location, affected resource, causative agents, indicators of performance, and time-bound characteristics). Clear indicators of scale were used only in 8 NPA management plans (Biosphere Reserves of Ría Lagartos, Pantános de Centla, Montes Azules and Sierra de Manantlán). Six of these plans were published either in 1999 or 2000. The remaining 19 NPA plans used indicators of scale vaguely. Only one MDRL plan used specific indicators of scale (Soyate Palm Management Plan). The remaining 5 plans incorporated these indicators vaguely.

Indicators of geographic location were incorporated clearly in 6 NPA plans and vaguely used in 20 plans. Among those NPA plans using indicators of scale, 5 also included indicators of geographic location (Biosphere Reserves Ría Lagartos, Pantános de Centla, Montes Azules, La Encrucijada, and Sierra de Manantlán). All of these plans were published after 1999. Only half (n=3) of the MDRL plans used indicators of geographic location (e.g., Conservation and Management Plan for Santa Maria Bay, Soyate Palm Management Plan).

Indicators of affected resources were used adequately in the majority of NPA and all MDRL plans (n=19 and n=6, respectively). In contrast, indicators of causative agents were described vaguely in most NPA (n=22) and all MDRL (n=6) plans. These indicators were described clearly in 2 NPA management plans (El Triunfo BR, La Sepultura BR), both in the state of Chiapas. Indicators of performance were absent in the majority of NPA and MDRL plans (n=26 and n=5, respectively). Similarly, goals and objectives from most NPA and MDRL plans lacked appropriate time references (n=23 and n=4, respectively). Only 4 NPA plans properly framed their goals and objectives using time indicators (El Triunfo BR, La Sepultura BR, El Vizcaíno BR, Banco Chinchorro NP). Two of these NPAs are located in the state of Chiapas. Finally, no NPA or MDRL plan clearly described the feasibility of recommended goals and objectives. This information was vaguely introduced only in 2 MDRL cases (Conservation of Manialtepec Watershed, Soyate Palm Management Plan) (Table 3.14).

IX. Operational Planning

Information related to operational planning was introduced in NPA management plans based on pre-management sections and sub-sections found in INE's terms of reference (Figure 3.2). Information for a typical NPA plan section included section goals and objectives, an average of 1-4 objectives, operational strategies (optional), and lists of recommended activities. Most MDRL plans (n=4) followed a similar approach. However, management sections in MDRLs arose from local conditions (e.g., Soyate Palm Management Plan, Conservation and Management Plan for Santa Maria Bay), or the planning model used (e.g., Integrated Management Plan for Babicora's Watershed, Wetland Conservation at La Mancha-El Llano). The remaining MDRL case studies lacked specific operational planning information due to the nature of the plan (i.e., strategic plan) or slow progress in the planning process (Table 3.15).

Table 3.15. Frequency values from the qualitative evaluation for "Section 9 – Planning Framework" from 27 natural protected areas and 6 modified rural landscape management plans in Mexico (1994-2001).

C. OPERATIONAL PLANNING **4. Planning Framework**	**FREQUENCY**							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
9a. Description of the planning team	8	3	17	2	2	1	0	0
9b. Decision-making in operational planning	1	0	15	5	11	1	0	0
9c. Hierarchical analysis of recommended actions	1	1	19	5	7	0	0	0
9d. Responsibilities for plan implementation	0	2	20	4	7	0	0	0
9e. Identification of potential partners	4	2	18	4	5	0	0	0

Eight NPA and 3 MDRL plans provided information concerning the composition of the planning teams by discipline. This information was described vaguely in most NPA (n=17) and MDRL (n=3) cases. Planning teams from both categories appeared to be multidisciplinary. However, planning teams often were described by stakeholder type (e.g., local communities, research centers, NGOs, planners) rather than by disciplines. This was true particularly for MDRL projects.

Based on the wording of NPA plans, decision making in operational planning mostly was consultative (n=15). Evidence suggested that truly participatory decision-making processes were lacking at this stage. Only the plan from Sierra de Manantlán BR explicitly stated this information (Table 3.15). Five MDRL plans vaguely described the type of decision-making used to select operational components. This information was missing only in one MDRL case (Chihuahua's Forestry State Plan). Evidence found in 2 of the MDRL plans suggested that participatory processes were conducted in Conservation of Manialtepec Watershed and Wetland Conservation in La Mancha-El Llano.

Only one NPA plan (Sierra de Manantlán BR) prioritized operational components. Most NPA management plans vaguely prioritized operational components by time for implementation (i.e., short, medium, long term) and duration (n=19). Only the Manialtepec Watershed MDRL plan provided information about hierarchical analysis of actions, responsibilities for implementation, and identification of potential partners. The Soyate Palm Management Plan presented specific information on responsibility for implementation, and identification of potential partners; the remaining MDRL plans described vaguely this information. Only 4 NPA plans (Arrecifes de Cozumel NP, La

Sepultura BR, El Vizcaíno BR, and Sierra de Manatlán BR) and 2 MDRL plans (e.g., Wetland Conservation at La Mancha-El Llano) had specific information about potential partners for plan implementation. This information was either described vaguely or missing in most NPA and MDRL plans (n=23 and n=4, respectively).

X. Monitoring and Evaluation.

Overall, information related to monitoring and evaluation of plan implementation was missing largely from all NPA and MDRL cases (Table 3.16). Information indicating the type of decision making for development of PMSs was missing from all NPA and MDRL plans (n=27 and n=6, respectively). Only 2 NPA plans (La Sepultura BR, Montes Azules BR) described outcome-related performance measures for goals evaluation. This information was described vaguely in 7 NPAs (e.g., Isla Contoy NP, Banco Chinchorro BR, Calakmul BR) and 1 MDRLs (i.e., Conservation and Management Plan for Santa Maria Bay).

Six NPA plans introduced examples of potential output-related performance measures. Similarly, this information was vague in all MDRLs. There was no evidence in any of the 33 plans of hierarchical analysis for the selection of performance measures. Process-related performance measures for the monitoring of planning processes were missing in all NPAs, and in 5 MDRL case studies. Only the Conservation of Manialtepec's Watershed case study introduced some notions related to monitoring and evaluation of inventory and strategic planning activities. No case study described process-related performance measures for the development of operational strategies and for monitoring and evaluation of plan implementation.

Table 3.16. Frequency values from the qualitative evaluation for "Section 10 – Monitoring and Evaluation" from 27 natural protected areas and 6 modified rural landscapes management plans in Mexico (1994-2001).

	FREQUENCY							
	Described		**Vague**		**Absent**		**Irrelevant**	
	NPA	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**	**NPA**	**MDRL**
10a. Decision-making in performance measurement	0	0	0	0	27	6	0	0
10b. Process-oriented performance measures: Inventory	0	0	0	1	27	5	0	0
10b. Process-oriented performance measures: Strategic planning	0	0	0	1	27	5	0	0
10b. Process-oriented performance measures: Operational planning	0	0	0	0	27	6	0	0
10b. Process-oriented performance measures: Monitoring and evaluation	0	0	0	0	27	6	0	0
10c. Outcome-oriented performance measures: Goal-oriented PMs	2	0	7	1	18	5	0	0
10d. Output-oriented performance measures: Objective-oriented PMs	0	0	6	6	21	0	0	0
10e. Hierarchical analysis of performance measures	0	0	0	0	27	6	0	0
10f. Responsibility for monitoring and evaluation	0	2	15	1	12	3	0	0

Finally, only the Soyate Palm and Manialtepec Watershed MDRL plans clearly identified responsibilities for monitoring and evaluation of the management plans. NPA plans either described it vaguely or was absent (n=15 and n=12, respectively). At least 3 MDRL plans lacked this information (e.g., Wetland Conservation at La Mancha-El Llano, and Integrated Management Plan for Babicora's Watershed).

3.7.4. Qualitative Data: Interviews with planning teams from NPAs

Question 1: Methodology used to develop management plans.

The planning methodology, as described by respondents from NPAs, encompassed 2 major elements: a specific planning protocol, and the planning process. Most respondents (n=9) used "terms of reference" (Figure 3.2) as a planning protocol to develop their management plan. Only 6 of 13 respondents were familiar with the content and purpose of these terms of reference. Respondents indicated that time for the submission of a final draft ranged between 8 and 10 months after initial contact from INE.

Management plans from Maderas del Carmen and Cañon de Santa Elena were requested originally by INE. Two plans arouse from local conflicts (Bosque de Aldama Forest Protection Area) or state government initiative (Cumbres de Majalca NP). Both of these plans were not yet officially approved at the time of my interviews (August-October 2000).

Planning processes were led by an NGO (PROFAUNA - Maderas del Carmen FFPA), an academic institution (Autonomous University of Chihuahua - Cañon de Santa Elena), natural resource agency (SEMARNAT – Bosque de Aldama), or a state government office (Cumbres de Majalca). All planning teams followed a similar process. First, planning teams were created by including specialists from various disciplines needed to address characteristics of the area. This team had several functions, including (1) identify information needs and integrate existing data, (2) identify required field data (e.g., update inventories, outreach with local communities), and (3) integrate new information and develop the management plan. In Maderas del Carmen and Cañon de Santa Elena FFPAs, planning teams worked as a unit, retaining control of the planning process. New information (e.g., local attitudes, conflicts, weather data) was fed to the planning teams by field technicians or planning team members and later integrated by the entire planning team. In the other 2 cases, tasks were identified, divided, and completed. Data integration and development of the management plan was performed either by a single individual (Bosque de Aldama FPA, Cumbres de Majalca NP) or by a group of planning team members (Maderas del Carmen Flora and Cañon de Santa Elena FFPAs). In all 4 cases, public meetings were held throughout the planning processes, particularly toward the end, to gauge public reaction to the management plans.

Question 2: Description of inventory-related activities

Most respondents from each NPA case were familiar with the type of diagnostic activities performed during the inventory. Diagnostic activities involved an update of existing information (Maderas del Carmen FFPA, Cumbres de Majalca NP), or conducting extensive physical, biological, and social inventories (Cañon de Santa Elena FFPA, Bosque de Aldama FPA). In addition, public meetings with local and regional stakeholders were held in all but 1 case study (Cumbres de Majalca NP), primarily to comply with official requirements from INE or to understand public attitudes toward the NPAs. Two planning teams had field technicians already working in the area for at least 6 years before beginning the planning processes (i.e., Maderas del Carmen FFPA, Cumbres de Majalca NP). Field technicians in these areas pursued different goals. In Maderas del Carmen FFPA, the presence of PROFAUNA led to the area being officially recognized as an NPA in 1994. In contrast, presence of field personnel for Cumbres de Majalca National Park arose from expressed interest to implement a management plan for the area.

<u>Question 2a: How were planning team members identified ?</u>

Experience in interdisciplinarity (i.e., ability to unify knowledge from various disciplines) (Klein 1990) was a prerequisite in only the Maderas del Carmen FFPA case. All 4 case study teams performed multidisciplinary work (i.e., collaborative work that adds information from different disciplines) through established planning teams. Identification criteria for team members in all cases included relevance of the discipline to the planning process (e.g., data analysis, identification of issues and problems, existing needs) and jurisdiction over natural resources (e.g., management, control, enforcement). Additionally, planning team members were identified based on expressed interests (e.g., conservation of the area, economic interests), resource ownership or use (e.g., ejidatarios), and capacity to provide resources for developing management plans (e.g., expertise, time, equipment). Planning teams from Cañon de Santa Elena and Maderas del Carmen worked independently from other agencies while serving as a link between local and regional stakeholders. The other cases (n=2) included federal or state agencies and specialists as part of the planning teams.

<u>Question 2b: Was there a specific assessment of social conditions relevant to the NPA?</u>

Regardless of the quality and type of diagnostic tools used, respondents in 3 of 4 cases all understood the methodology used to gather social information relevant to the area. In the case of Cañon de Santa Elena this information was clear to only 1 respondent.

Only 1 of the 4 cases (Maderas del Carmen) included a specific component to assess social conditions relevant to the plan. Information came from open houses, as required by INE, and from field personnel living in the area throughout the entire planning process. In the remaining 3 cases, even though social data was collected and used in the planning process, diagnostic tools were developed poorly. This was due to a lack of resources and expertise (Cumbres de Majalca NP, Bosque de Aldama FPA), or because of the use of required open houses by INE (Cañon de Santa Elena FFPA). In general, respondents from all 4 cases noted that local stakeholders (e.g., landowners, resource users) initially strongly opposed establishment of the NPA. Opposition was strong particularly in newly designated NPAs where no previous record of conservation or environmental management existed (Cañon de Santa Elena), or in NPAs in which the decree had not been enforced for a long time (Bosque de Aldama). Animosity emerged from a perceived loss (e.g., loss of property or use rights) or the inability of local stakeholders to understand the NPA concept.

Question 2c: What information was available to you when you started the planning process?

All respondents from all NPA cases knew what information was available. In 2 cases, Maderas del Carmen and Cumbres de Majalca, planning teams had both existing information and knowledge on the designated areas. Available information included previous management plans, "basic study" as requested by INE, and inventories and reports. These teams conducted only verification field trips rather than additional inventories. The other 2 cases had only scarce existing information about the region, so they conducted extensive inventories on forestry, soils, hydrology, wildlife resources, and public involvement. Respondents indicated that absence of information complicated the planning process, given the short deadline allowed for development of a plan by INE.

Question 2d: Was there any operational component at the time you started the project?

Operational components in this context are projects or activities implemented during development of a management plan (e.g., environmental education activities, training workshops). Two NPAs (Maderas del Carmen and Bosque de Aldama) established operational components as outlets to provide supplementary information and build trust among local communities. Environmental education for children was a common tool. Others included reforestation, garbage collection, and organized field trips. Operational components were not reported by NPA planning team members as fundamental, rather circumstantial due to local conditions.

Question 3: Were all required disciplines represented on the planning team?

All respondents from all 4 NPA cases were familiar with the composition of the planning teams. Planning team members were selected primarily based on requirements established by INE's terms of reference (Figure 3.2). With the exception of the Cumbres de Majalca planning team, who lacked funding to hire experts, most respondents believed that required disciplines were represented properly on planning teams, with the exception of social sciences. Most respondents indicated that traditional planning teams often were over represented with natural resource specialists (e.g., ecologists, natural resource managers, conservation biologists, hydrologists, geologists), while social scientists (e.g., anthropologists, environmental economists, geographers, historians) were under-represented. Respondents expressed a need for social science specialists capable of performing inventory-related social assessments within the context of conservation principles.

Question 4: When would you consider that a "problem" has been adequately identified?

Although answers from most respondents were vague, most respondents from all cases indicated that identification of causative agents is key to problem definition. Causative agents should be framed within the historical context of what resources were there, what happened to them, and why. Identification of causative agents should include both ecological and socio-political characteristics. Respondents considered a problem adequately defined when (1) it was scaled properly (e.g., how meaningful are these problems to different areas), (2) the likelihood of impact was described (i.e., how likely is this problem to keep us from achieving our conservation goals), (3) problems were linked to management or performance areas (e.g., what management or planning area address this problem?), and (4) problems were quantified. Even though all respondents acknowledged that problems should be defined through participatory processes, they recognized the constraints that restrictive deadlines place on conducting such processes.

<u>Question 5: How realistic are the plan goals and objectives?</u>

All respondents from 3 cases considered the objectives and goals in the management plans to be realistic. Only 2 respondents from Cañon de Santa Elena deemed their goals and objectives achievable. Objectives and goals for NPAs were perceived as realistic because strategies and actions to achieve the objectives were arranged by time frame (i.e., short, medium and long term), and these plans were intended to provide administrative direction for the NPA rather than being operational. At the same time, most respondents acknowledged that the likelihood of achieving conservation goals depended on several factors. First, plans should adopt more realistic deadlines (e.g., activities labeled as short term should be evaluated $\geq$ 5 years after their implementation, not within 1-2 years as required by the terms of reference-INE). Second, management plans should be demystified; management plans are not intended to solve problems, rather they provide a tentative road map. Third, implementation of a management plan and achievement of conservation goals should accommodate uncertainty. Finally, funding availability is crucial to success. Those who considered goals and objectives unrealistic perceived them as theoretical due to poor social and biological inventories, lack of familiarity with the area, and limited time to complete the management plan.

Question 6: What do you think of the UMAs?

Management Units for Conservation of Wildlife (UMAs) are landholdings, private or communal, entitled by the federal government (SEMARNAT) to the use, management, and conservation of natural resources, particularly flora and fauna. With the exception of Maderas del Carmen Flora and Fauna Protection Area, $\geq$ 1 respondents for the remaining case studies had no knowledge or understanding about UMAs.

Opinions about UMAs varied widely among case studies, ranging from clear support (Bosque de Aldama), weak support (Cumbres de Majalca), mixed support and opposition (Cañon de Santa Elena), to clear opposition (Maderas del Carmen). Supporting arguments for UMAs as a biodiversity conservation tool in Mexico included (1) UMAs augment current environmental legislation regarding control, monitoring, and enforcement of flora and fauna use rates, (2) UMAs introduced a solid, scientific base for wildlife management (e.g., population data, harvesting quotas, sustainable use), and (3) UMAs provide biodiversity-based economic incentives for local people to promote conservation.

Tentative supporters of UMAs had concerns about (1) the potential of transferring administration of public resources (i.e., flora, fauna) to individuals as means to promote proper conservation and management, (2) desires of game ranch owners in northern states, such as Coahuila, Tamaulipas, and Sonora for higher, artificially sustained populations of game species (e.g., white-tailed deer), and (3) perceived corruption among technicians and landowners that might lead to inflated population data and, consequently, to higher harvest quotas.

Arguments against UMAs focused on their feasibility as biodiversity conservation tools, including (1) UMAs utilize artificially created boundaries (e.g., ownership, political) that fail to define fundamental ecological criteria (e.g., populations dynamics, densities, harvest quotas), (2) use of land units that promote fragmented wildlife use and disregard biodiversity at the landscape level (e.g., ecological processes, seasonal migrations and dispersal, threatened and endangered species), (3) privatization of public resources such as biodiversity that promotes management of fragmented wildlife populations and creates confusion about ownership rights, (4) natural resource agencies lack the capacity to verify population data and harvest quotas, (5) preferential management for some species (e.g., white-tailed deer) over other species (e.g., mountain lion, coyote), and (6) concerns that UMAs bordering NPAs negatively affect wildlife populations inside NPAs.

Question 7: Stakeholder identification

Question 7a: What criteria would you use to identify relevant stakeholders to the area?

In 3 of 4 case studies, responses from planning team members differed. Only respondents from Maderas del Carmen shared the same set of criteria and principles for identifying stakeholders. The number of criteria used to identify stakeholders ranged between 3 to 5 for all cases. Stakeholders were identified on the basis of conservation interests, (e.g., research centers, NGOs) as well as economic interests (e.g., tourism, farmers, foresters). Other criteria included (1) funding availability designed to alleviate current threats and problems (e.g., rural development agencies and programs, social well-fare), (2) public authorities at various levels (e.g., county officials, state governments), (3) leadership at different levels (e.g., teachers, community authorities, county officials), (4) capacity and willingness to commit to collaborative enterprises, (5) resource-based rights (e.g., ownership, use, management) and their potential impacts (e.g., population decline, water pollution), (6) pre-identified performance domains, issues, and required disciplines (e.g., wildlife management, law enforcement, deforestation), and (7) credibility and accountability in promoting conservation in the region.

Question 7b: Should stakeholders be involved in developing the management plan?

Respondents from all NPA cases supported stakeholder participation in developing a management plan. According to the terms of reference from INE, NPA management plans should be agreed upon by all interested parties. Thus, open houses and public meetings are required throughout the planning process to announce progress and gather feedback from stakeholders. Although some respondents considered this level of involvement appropriate, other considered it limited and fragmented. Team members from Maderas del Carmen compensated for limited stakeholder participation by maintaining field personnel in the area throughout the entire planning process. Reasons for supporting stakeholder involvement included (1) facilitating identification of potential threats to plan implementation (e.g., uncooperative stakeholders, changes in land tenure), (2) promoting a more integral, realistic diagnosis of the issues and needs, and (3) reducing the possibility of conflict.

Most respondents indicated that stakeholders should be involved in the early stages of planning (i.e., inventory, strategic planning). Some respondents believed stakeholder involvement should be temporary and focus on the issues and needs being addressed, whereas others advocated long-term involvement of key stakeholders. Most respondents deemed stakeholder involvement in operational planning and monitoring and evaluation either uncertain or unnecessary.

Only the Cumbres de Majalca planning team failed to involve stakeholders (due to lack of funding and required expertise). Team members from both Maderas del Carmen and Cañon de Santa Elena followed a different approach compared to other teams. Stakeholders (e.g., natural resource agencies, state and county authorities, NGOs, universities and research centers) participated in public meetings throughout the planning process, but, respondents in both cases indicated that feedback gathered at these meetings was limited. Thus, greater stakeholder involvement was suggested for implementation of these plans. Local stakeholders for each NPA case study provided social data and revised the management plan. In contrast, governmental stakeholders (e.g., agencies, institutions, research centers, universities) from Bosque de Aldama were integrated into the planning team and helped develop the management plan, whereas local stakeholders (e.g., resource users, landowners) were not involved until much later in the process, due mostly to conflicting interests and unwillingness to participate.

Question 8: What do you think of the land tenure reforms in Article 27?

Perceptions about land tenure reforms were similar within most cases. In Cumbres de Majalca and Maderas del Carmen respondents considered these reforms risky and expressed uncertainty about long term impacts. On the other hand, some respondents believed these reforms could improve economic conditions in Mexico's rural sector and would help address environmental problems (e.g., soil erosion, unproductive lands, higher efficiency in agriculture).

Perceived negative impacts from these reforms included (1) erosion of the credibility and power of community authorities both within and outside of the communities (e.g., ejido assembly), (2) the return to pre-revolutionary conditions (e.g., large states controlled by few wealthy owners), (3) potential displacement of a large number of people, (4) arrival of new landowners to local communities who are less likely to comply with negotiated land use guidelines, and (5) land privatization that would benefit private investors (e.g., tourism industry, real state developers, outfitters) rather than local people.

Perceived benefits from these reforms included (1) private ownership should reduce corruption within ejidos related to use of commonly-owned resources (e.g., grasslands, forests), (2) private ownership was considered more productive and environmentally friendly, (3) privatization provides greater security over land ownership than common ownership, and therefore, is likely to promote more control of other resources (e.g., forests, water), and (4) it would reduce dependency on the government by local people.

Most respondents were uncertain about the possible impact of these reforms on conservation in NPAs. However, some suggested that likely threats included (1) private landowners were perceived as being less likely to engage in conservation and more likely to disregard NPA land use guidelines, and (2) fragmentation of common areas in the ejidos through the transfer of use rights (e.g., forests, grasslands), with subsequent fragmentation of ecosystems and conservation efforts.

Question 9: Is it clear in the plan who is responsible for its implementation?

Respondents from most NPAs believed responsibility for implementation was described clearly in the management plans. Most respondents suggested that requirements from the terms of reference covered the needs for plan implementation (e.g., NPA organizational flow chart, job descriptions, integration of an NPA advisory technical committee) because (1) development of partnerships and stakeholder involvement is the responsibility solely of the NPA director and the advisory technical committee, (2) stakeholder involvement in practice is unpredictable, random, and often dependent on economic and social conditions (e.g., emergent aid programs, political problems), (3) printed information about plan implementation creates expectations and limits the ability to create non-traditional partnerships, and (4) the presence of primary natural resource agencies and state authorities in the advisory technical committee. Stakeholder listings in a management plan reflected knowledge of the breadth of potential interest groups, but not the potential role of these stakeholders.

Only the Maderas del Carmen planning team acknowledged that information for plan implementation was scarce. Even though additional information would be desirable (e.g., willingness to participate, areas of potential cooperation, agreed upon hierarchical analysis of operational components), they believed felt that additional information was unlikely to be included because unrealistically strict deadlines for delivery of the plan existed, and planning team members or consultants often lacked experience and knowledge of the areas.

Question 10: What do you think is the greatest achievement of the planning process?

Responses reflected specific characteristics for each NPA case study. Achievements identified by all respondents included (1) successful involvement of local communities and other stakeholders (e.g., natural resource agencies, foundations, NGOs), (2) increasing public awareness of conservation and natural resource management through the planning process, and (3) implementation of the management plan. Additional achievements included (1) officially listing the area as a federally recognized NPA, (2) developing working partnerships between NPA field staff and local stakeholders, (3) acquiring new skills among locals (e.g., negotiation, self-assessment), (4) completing the final document despite limited time and funding, and (5) understanding other stakeholders' interests and missions, which leads to new opportunities for collaboration.

Question 11: If you had to start all over again, what would you do differently?

Responses focused on 2 areas: stakeholder management and ecological ordering (e.g., zoning). Suggested changes in stakeholder management centered on creating stronger stakeholder participation in all stages of the planning process (i.e., inventory, strategic planning, operational planning, and monitoring and evaluation). A majority of respondents suggested (1) sharing of decision-making power beginning with early stages of planning (2) budgeting time and resources for training and/or hiring experts in negotiation, particularly at the beginning of the planning process, (3) facilitating the planning process to establish stronger joint commitments, and (4) performing a social viability analysis for the recommended strategies (i.e., how likely are these strategies to deliver suggested economic benefits?). Suggested changes in relation to ecological ordering included more strict definition of zoning (land use guidelines within a NPA) and management areas in the NPA to improve enforcement and monitoring of allowed resource uses. Additional changes suggested (1) stronger diagnostic tools for problem identification, (2) use of planning tools to deal with stochastic events (e.g., droughts, fire), (3) identification of aid programs that could be used simultaneously to benefit the planning process (e.g., rural development, popular culture program), and (4) ensure a lasting relationship between planning team members and NPA staff.

3.7.5. Qualitative Data: Interviews with planning teams from MDRLs

Question 1: Methodology used for developing management plans.

Most MDRL projects differed substantially from NPAs. Planning protocols and processes arouse from previous experiences, available expertise (e.g., conservation planning within NPAs) or existing local conditions (e.g., presence of indigenous groups). Two MDRL projects were led by NGOs (Manialtepec Watershed, Santa Maria Bay), whereas 2 were led by academic institutions (La Mancha-El Llano, Babicora Watershed). With the exception of respondents from the Babicora Watershed team, $\geq$ 50% of respondents for the other MDRLs were familiar with both the planning protocol and process.

All MDRL projects had a planning council, commission, or committee. In at least 3 case studies (Manialtepec Watershed, La Mancha-El Llano, and Santa Maria Bay), these planning groups had an equal number of stakeholders and specialists or were dominated mostly by stakeholders. In La Mancha-El Llano and Santa Maria Bay, an explicitly defined, parallel group of specialists provided planning expertise to help develop these management plans. The Babicora Watershed team followed an approach similar to those in NPAs, where specialists controlled the planning process. In Babicora Watershed and Santa Maria Bay, planning team members worked individually on pre-identified management areas. Final products were delivered and integrated later by the heads of the planning teams. In the remaining cases, lead institutions facilitated the entire processes.

Landscapes involved in all MDRL projects lacked formal protection status or decrees. All these projects started as a result of potential problems in the area (Babicora Watershed, La Mancha-El Llano) or from local initiatives for more adequate resource administration (Manialtepec's Watershed, Santa Maria Bay). All MDRL projects except the Babicora Watershed attempted to establish negotiated land use guidelines while developing the management plan. Management plans were a short-term goal for Babicora Watershed and Santa Maria Bay, whereas, for others, it represented a long term goal. All MDRL projects except Santa Maria Bay implemented operational activities while developing the plan. Implementing activities during the planning process increased institutional presence in the area, addressed urgent issues, or tested alternatives. In all 4 cases, these operational activities represented a significant portion of the planning effort. However, at La Mancha-El Llano these activities eventually formed the structural organization of the project.

Major differences among MDRL case studies resulted from the presence of unique qualities (e.g., presence of indigenous groups) or the priority given to specific components of the planning process (e.g., stakeholder involvement). For example, only the Manialtepec Watershed project specifically described and negotiated the principles overseeing the project. This project introduced conservation planning as a long-term, autonomous process (not led by government agencies) that required participation of all stakeholders. Participation was expected to build capacity for natural resource administration, particularly among local people. Specific tenets governing this process included (1) ecological protection and social justice have to occur simultaneously, (2) sustainable development represents a foreign concept, not applicable to local perceptions of life (e.g., concepts such as "progress," "development," "resource" and "management" are not only foreign, but inapplicable to indigenous nations), (3) use of a specific resource (i.e., water) as a unifying element among all stakeholders, (4) any social welfare or conservation project should promote autonomous processes, and (5) collaboration and public involvement would be required at any planning stage, including all interested parties (i.e., both in favor and against).

While planning protocols of all MDRL projects shared similar planning stages (e.g., inventory, strategic planning, monitoring and evaluation), the priority given to individual pieces differed among cases. For example, inventory activities (e.g., status quo of the resources, threats, needs) were restricted to the first year and to 1-scale layer (i.e., watershed) in Babicora Watershed, and Santa Maria Bay. On the other hand, Manialtepec Watershed team approached this issue with a multi-scale approach, i.e., individual "photos" (a "photo," as described in this

MDRL project, represents a diagnosis of the watershed by each stakeholder group…this photo includes a description of current problems emphasizing the links from these stakeholders with described problems) were required at the levels of watershed, county, and community. The development of these "photos" was deemed as a dynamic activity, specific for each locality (i.e., after 7 years in the area, these inventory activities are not considered "finished"). Finally, in the La Mancha-El Llano project inventory activities were incremental. As operational activities were being implemented, new insights into the area were gained and new diagnostic activities were introduced to address new, emerging issues.

Management plans and negotiated land use guidelines were pursued differently by all MDRL projects. In some cases, a management plan was considered fundamental (Babicora Watershed, Santa Maria Bay), while in other cases, management plans were perceived as mere formalities (Manialtepec Watershed, La Mancha-El Llano). Those cases that considered management planning a long-term priority also perceived development of negotiated land use guidelines a priority. For example, Manialtepec Watershed project devoted 7 years to develop negotiated land use guidelines for the watershed. In 2002, use guidelines for the watershed (INSO 2002a), and ecological ordering and participatory self-assessments for two communities (i.e., Santos Reyes Nopala, Santa Maria Temaxcaltepec, respectively) were finalized (INSO 2002b, INSO 2001). The Santa Maria Bay project developed a management plan and engaged in developing land use guidelines simultaneously.

Although all case studies acknowledged the importance of stakeholder involvement in conservation planning, degrees of involvement differed. The Babicora Watershed project involved local stakeholders such as communities and local organizations through workshops, open houses (McMullin 1996), or search conferences (Bryson and Anderson 2000). Decision making was shared only on inventory-related activities (e.g., diagnosis, interviews). The planning team retained decision making power on strategic planning (i.e., goals, objectives), operational planning, and monitoring and evaluation. The Santa Maria Bay project followed a similar approach, but shared decision making related to strategic planning (e.g., mission, vision, goals). In the La Mancha-El Llano project decision making was shared freely for inventory and operational activities, but not for strategic and operational planning. The Manialtepec Watershed project engaged in true participatory planning. Decision making for all 4 major planning stages (i.e., inventory, strategic and operational planning, and monitoring and evaluation) was shared equally among all stakeholders.

Question 2: Description of inventory-related activities

Involvement in inventory-related activities differed among the 4 projects. Some projects (Babicora Watershed) spent considerable time and effort in launching comprehensive assessments in multiple areas (e.g., natural resource inventories, socio-economic conditions of the area). Others performed these assessments incrementally. In those cases, inventory-related activities increased with the number of addressed issues (La Mancha-El Llano) or were prolonged along with the development of land-use guidelines (Maniatelepc Watershed). In Santa Maria Bay project, inventory-related activities concentrated primarily on integrating existing information or identifying information needs and potential partners. New field activities concentrated almost exclusively on corroborating existing information.

Question 2a. How were the planning team members identified ?

At least half of respondents in all cases were familiar with the process to identify planning team members. Respondents who lacked this information became involved in the process at later stages, had limited participation, or never had it clarified to them.

Exception for Babicora Watershed, MDRL planning teams were composed of both stakeholders and specialists. Stakeholder groups participated at different levels in decision making and development of negotiated land use guidelines. Selection criteria for stakeholders participating in the planning processes included interest in collaborative conservation planning, legal mandates, spatial scale, public duty, resource ownership and/or use, and likelihood of impact or benefit from conservation projects. Specialists, on the other hand, were selected based on pre-identified conservation priorities, existing capacities, or expertise in specific fields.

This combination of stakeholders and specialists resulted in 3 types of "planning teams." The first type was a team similar to the NPA model (Babicora Watershed), that is, a group of specialists with multiple pre-defined projects, including public involvement. This multidisciplinary group performed all inventory-related activities. As new information became available, the team integrated it into the plan. No negotiated land-use guidelines were developed. The second approach retained the group of specialists, but added a stakeholder group as part of the team structure (Santa Maria Bay, La Mancha-El Llano). Inventory-related activities were performed primarily by the specialists, but negotiated land use guidelines were developed simultaneously in collaboration with the stakeholder groups. The third approach consisted of a stakeholder group at the core of the planning process, with the occasional inclusion of specialists, as needed (Manialtepec Watershed). The planning process focused on developing negotiated land-use guidelines and diagnosing the area rather than developing a management plan.

<u>Question 2b. Were there specific tools for assessing social conditions relevant to area?</u>

Most respondents from the 4 MDRL projects indicated familiarity with methodology used to assess social characteristics of the areas. Surveys, workshops, search conferences, open houses, and rapid rural appraisals were the most commonly used tools. Social characteristics were analyzed using typical tasks of social assessment (e.g., socio-demographic data, joint identification of problems by specialists and stakeholders, identification of potential partners, conservation attitudes among stakeholders). In addition, assessment of relevant social characteristics often included (1) identification of potential threats and opportunities for developing negotiated land use guidelines, and (2) establishment of specific bodies for the development of such guidelines (Santa Maria Bay, La Mancha-El Llano, Manialtepec Watershed). This was particularly true in Manialtepec Watershed, where the need to introduce these alternative strategies came in response to (1) conflicting communication due to non-shared "symbols" between specialists and stakeholders (e.g., GIS maps, concepts of conservation and development), (2) ability to gather and integrate local knowledge into the planning process and complete the inventory, (3) building the platform for negotiations among interested parties, and (4) recognition of their inability to promote conservation of the watershed individually. Three MDRL projects launched activities to diagnose the area during the early stages of planning. In contrast, the Manialtepec Watershed project continued negotiation and partnership building throughout the entire planning process.

<u>Question 2c. What information was available to you when you started the planning process?</u>

The majority of respondents from each planning team knew what information was available to them at the beginning of the project. In all 4 cases, available information, although scarce, was gathered and integrated into databases. Existing information included maps, biological inventories, socio-demographic data, and land use statistics. Although data needs differed among cases, stakeholder assessments of resource use and conservation needs were missing in all MDRL projects. Data gaps were managed differently across projects. In 3 cases, inventory-related activities centered around field verification, development of stakeholder assessments, or establishment of medium- to long-term research projects. In the Babicora Watershed project, gaps were addressed early in the process. Once completed, the information was delivered to the project leader and later integrated into the plan.

Question 2d. Was there any operational component at the time you started the project?

All MDRL projects established multiple operational components. In 3 projects, activities were started at least 1.5 years after work in the region began. These activities resulted from a combination of several factors: (1) development of extensive inventory-related activities, (2) identification of expressed needs, problems and expected beneficiaries, and (3) available funding and identification of potential partners. Only in La Mancha-El Llano did operational activities coincide with the beginning of the planning process. Delayed initiation of operational activities allowed for initial brainstorming and selection of potential activities. In the La Mancha-El Llano project, members continued to identify additional activities while implementing the first operational project. Although these activities primarily targeted urgent issues, they also allowed connections to develop with local and regional stakeholders and potential pilot projects to be tested. In most cases, operational activities had finite deadlines and expected outcomes, but in some cases, they became permanent projects (La Mancha-El Llano). Operational activities in 3 cases required $\leq$ 30% of time and funding from the overall planning effort. However, at La

Mancha-El Llano, these activities required ≥ 75% of all available resources (e.g., time, personnel, funding).

Question 3: In the planning team, were all required disciplines present?

Respondents from most MDRLs believed that disciplines were represented adequately in the planning teams, with the exception of social sciences. In the Santa Maria Bay project, respondents indicated that, in addition to social sciences, other key disciplines needed to be incorporated (e.g., wildlife management, forestry). The need for social science expertise was described in 2 dimensions: (1) inclusion of experts in areas such as anthropology, economics, and social psychology to facilitate inventory-related activities, and (2) mastering of anthropological skills by the rest of the planning team members. Respondents noted this would allow team members to be more sensitive to local issues and conditions (e.g., timing, acknowledgment of communication channels), and develop more detailed stakeholder maps for the areas (e.g., who is there?, values, interests, power analysis, formal and informal relationships).

Question 4: When would you consider that a "problem" has been adequately identified?

All respondents recognized that a key element for appropriate problem identification is the acknowledgment of 2 main concepts: (1) perceived needs (i.e., issue or need explicitly described by a stakeholder), and (2) existence of a perceived problem regardless of personal beliefs or attitudes. In 3 MDRL projects, problems were identified jointly by both experts and stakeholders. For example, in the La Mancha-El Llano project, stakeholders' assessment overlapped 85% with the technical assessment. However, water pollution problems were not identified by local stakeholders. Except for the Babicora Watershed project, the remaining projects attempted to further their understanding of existing problems by developing negotiated land use guidelines. This allowed them to discuss and redefine (if needed) existing problems and identify responsibilities for addressing such problems.

Additional elements suggested for proper problem identification included: (1) identifying causative agents, (2) including performance indicators in problem definition, (3) establishing clear links between affected resources and management areas in the plan, (4) including indicators of scale and magnitude of the problems, and (5) reflecting analysis of both ecological and social constraints (i.e., what can I do given current ecological conditions). All respondents agreed that problem identification should remain a continuous, dynamic, and participatory exercise.

Question 5: How realistic are the plan goals and objectives?

MDRL projects presented both conservation and process-oriented goals and objectives. Whereas conservation goals were presented specifically in all cases, process-oriented goals were addressed clearly only in the Manialtepec Watershed project. Examples of conservation goals and objectives included improving water quality, reforestation, biodiversity conservation, environmental education, and promotion of sustainable resource use. Examples of process-oriented goals and objectives included developing negotiated land use guidelines, consolidating stakeholder groups, monitoring, and developing partnerships for plan implementation and strengthening of local capacities. Interviewees from all cases agreed that conservation goals and objectives should be realistic and achievable, but, achieving conservation goals was dependent on successful development of process-oriented goals, and acknowledging that these are long-term goals (i.e., 15-20 years). Although they thought their goals were realistic, respondents expressed some uncertainty about achieving planning process-oriented goals, mostly due to limited funding and personnel or changing political conditions. This is particularly important because facilitating institutions for all 4 MDRL projects (Table 3.3) had already ceased being involved (Babicora Watershed), or were considering stopping between 2003 and 2005 (La Mancha-El Llano, Santa Maria Bay, Manialtepec Watershed). The expectation of all facilitating institutions was that (1) the process itself (e.g., stakeholder groups, negotiated land use guidelines, agreed mechanisms for internal accountability, identification of responsible parties for implementation and monitoring) will be consolidated enough to function on its own, (2) that suggested actions and strategies will be adopted locally and used to shape local environmental public policy, and (3) they can spread the process to new places in the region.

Question 6: What do you think of the UMAs?

Respondents demonstrated knowledge of UMAs and suggested that UMAs could be used in Mexico to promote biodiversity conservation. However, they expressed skepticism particularly about administration and implementation of UMAs. Two MDRL projects already had UMAs promoting hunting of waterfowl (Santa Maria Bay) or white-tailed deer and wild turkey (Babicora Watershed). In the remaining 2 MDRL cases, interest was expressed in establishing them. Skepticism from planning team members was based on emerging problems during implementation of UMAs and negative perceptions about the ability of natural resource agencies to effectively administer UMAs, including (1) the request from SEMARNAT for population dynamics and harvest quota data in UMA management plans seemed unrealistic because of the lack of skills among local resource users, (2) granting of licenses for UMAs was perceived as uncontrolled, with no scientific support as to whether the systems could sustain recommended resource use rates, (3) the establishment of UMAs could translate into restricted access to resources traditionally used through unregulated gathering and hunting (e.g., iguanas, fish), (4) UMAs would encourage development of markets for wild species that did not exist before, (5) perceived lack of capacity from SEMARNAT to verify population data, (6) perceived lack of motivation from locals to self-control their resource uses, thus increasing the likelihood for overexploiting the resource base (e.g., coastal fisheries data), (7) UMAs will benefit the private sector more than conservation, and (8) UMAs may convey the idea that use rights represent unlimited ownership rights.

Question 7: Stakeholder identification

Question 7a: what criteria would you use to identify relevant stakeholders to the area?

In 2 cases, there was a shared understanding of the criteria used to identify stakeholders (La Mancha-El Llano, Manialtepec Watershed). In the remaining cases, responses were not only different, but they showed the lack of consistencies among respondents. Overall, stakeholder identification was reported as a continuous process for all MDRL projects, that is, as new issues or needs were identified, new stakeholder groups were added. Reported criteria for stakeholder identification included (1) targeted natural resources (e.g., water, wildlife, forests), (2) issues related to targeted resources (e.g., water quality, scarcity), (3) resource-based rights (e.g., use, ownership) and activities derived from them (e.g., agriculture, fisheries, aquaculture, outfitters), (4) groups that currently benefit or could benefit (e.g., fishermen) or may impact targeted resources (e.g., sugar cane companies), (5) agencies' legal mandates that require them to address identified issues, (6) scale and boundaries of the area (e.g., watershed, wetland), (7) local leadership (e.g., community authorities, local group representatives), (8) public authorities at different levels (e.g., county officials, state governments), (9) development of past or current relevant research in the area (e.g., wildlife inventories, environmental monitoring), (10) funding availability for operational components (e.g., federal programs), (11) active, non-conservation, local groups (e.g., women's groups, health groups), (12) expressed interests and willingness to participate in conservation projects, (13) decision-making power (e.g., ability to commit), (14) stakeholder's relative importance to the project at specific times, and (15) stakeholder relevance to predefined management areas.

Question 7b: Should stakeholders be involved in developing the management plan?

Stakeholder involvement was supported strongly by all respondents, but, they differed in perceptions of the planning stages in which stakeholders should participate. The Manialtepec Watershed and La Mancha-El Llano projects devoted significant time and effort to integrate a stakeholder body aimed at developing negotiated land use guidelines. These 2 cases considered development of a management plan to be a long-term goal for stakeholders. In addition, stakeholders were expected to participate in all planning stages. On the other hand, respondents from Santa Maria Bay and Babicora Watershed indicated that stakeholders should be involved primarily in inventory and strategic planning. Stakeholder participation in operational planning was considered unnecessary in both cases, although some respondents from Santa Maria Bay supported stakeholder involvement in monitoring and evaluation. These 2 case studies developed a management plan within a 2-3 year time frame.

Reasons given to involve stakeholders included (1) early stakeholder involvement would allow interest groups to "own" the planning process leading toward implementation of the management plan, (2) participation would enrich the planning process and allow for issues and needs to be better identified, (3) it would facilitate local capacities and skills building, and (4) it would enhance understanding of historical resource uses in the area.

Question 8: What do you think of the land tenure reforms in Article 27?

Respondents from all MDRL cases were uncertain about the impact of land tenure reforms. However, they believed they may spawn negative consequences, including (1) re-emergence of large estate holdings by private landowners, (2) ejidatarios and other common land owners are vulnerable to economic and social chaos due to neo-liberal economic reforms in the country, (3) reforms to land tenure will cloud use rights for other resources (e.g., marine species, water), (4) these reforms likely will benefit only private investors in the long term, (5) a higher number of female-led households in rural areas, (6) increasing rate of development in highly sensitive areas (e.g., coastal developments) (7) challenging traditional lifestyles and traditions for indigenous groups, (8) private landowners may refuse to engage in future conservation projects, and (9) high number of displaced (i.e., landless) people, with higher rural migration rates.

Although most respondents were uncertain of the impacts of these reforms in conservation projects, all 4 planning teams deemed it important to be proactive. They suggested following a process that (at a minimum) (1) monitors current land uses at a regional level, (2) identifies key conservation areas (e.g., critical and unique habitats, sensitive areas, areas of high biological diversity), (3) identifies potential places for development (e.g., housing, agriculture, aquaculture), and (4) clearly defines all resource-based rights (e.g., use, administration, access, enforcement).

<u>Question 9: Is it clear in the plan who is responsible for its implementation?</u>

Exception for Babicora Watershed, the MDRL cases I examined had only drafts of management plans at the time of the interviews. Respondents from all cases agreed that parties responsible for plan implementation were not identified for different reasons: (1) the planning process was still developing (La Mancha-El Llano, Santa Maria Bay), (2) this should be an output of the planning process itself (Manialtepec Watershed), and (3) it was not perceived as a responsibility of the planning team (Babicora Watershed). The management plan is designed to tell you "what to do;" the "who should do it" and "how to do it" should come from the actual implementation and the diversity of participating stakeholder groups. At least one respondent suggested that, if the planning process followed a truly participatory process, the answers for these questions would be in the plan .

The development of negotiated land use guidelines in 3 MDRL cases allowed them to (1) gain knowledge of the diversity of potential interest groups for implementation, (2) identify potential threats to plan implementation (e.g., funding restrictions, interest conflicts, differences in willingness to participate and commit, absence of organizational structure), and (3) gain familiarity with the evolution of stakeholder groups and interests (e.g., adding new members, withdrawing of key stakeholders).

Question 10: What would you think would be the greatest achievement?

Responses within each case study were consistent among case respondents. Although responses for all cases reflected specific local conditions, all answers were related primarily to different topics of stakeholder management. Perceived achievements identified by respondents included (1) establishment of a working stakeholder group (Santa Maria Bay, Manialtepec Watershed, La Mancha-El Llano), (2) development and consolidation of conservation-related pilot projects that involve local stakeholders (in 2 case studies, these projects now are permanent), (3) recognition of the stakeholder diversity that would have gone unnoticed otherwise, (e.g., local communities, landowners, resource use groups), (4) better appreciation of environmental issues and needs from local stakeholders (e.g., connection between resource use and maintenance of ecological stability), (5) establishment of new communication channels with multiple stakeholders (e.g., newsletter, public meetings), and (6) development of networks for other current or future collaborations.

Question 11: If you had to start all over again, what would you do differently?

Recommendations shared by respondents from all projects included (1) allocating more time and resources to develop more pilot projects that address sustainable resource use (e.g., aquaculture, ecotourism) or conservation (e.g., reforestation, nurseries), (2) selecting smaller scaled, more achievable endeavors, with more specific goals and objectives (e.g., concentrate on a few communities rather than the entire watershed), and (3) promote more stakeholder involvement in conservation planning, particularly among local stakeholders.

Additional recommendations suggested by respondents included (1) design pilot projects in a way that allows local stakeholders to have more significant roles and beginning earlier, (2) develop mechanisms to increase commitment from all involved parties toward collective work, (3) delay development of the management plan and consolidate stakeholder groups, (4) improve communication and involvement of political entities related to the project (e.g., state deputies, federal agencies), and (5) target potential conservation areas where project managers are likely to maintain constant presence of planning team members in the field.

3.8 Discussion

3.8.1. From Environmental Protection to Resource Management

The new environmental framework in Mexico (see Sections 3.3 and 3.4) signals a transition in environmental administration in the country. Mexico appears to be transitioning from an environmental protection paradigm toward a resource management paradigm (Colby 1991). Evidence of this natural resource administration paradigm clearly is evident in Mexico's new environmental framework, including (1) incorporation of sustainability and sustainable resource use as predominant tenets across policies, regulations, and administrative tools related to resource administration, (2) human-nature interactions have become less anthropocentric (e.g., inclusion of all types of capital and resources), (3) dominating threats shifted now toward resource degradation, poverty, and population growth, (4) adoption of a 'polluter pays' approach to environmental accountability, and (5) decentralization of responsibility for resource administration (Colby 1991).

On the other hand, domains of Mexico's environmental framework that remain unchanged include (1) a reactive legal environmental infrastructure that emphasizes in 'legitimizing ecology', (2) profound changes in tenure regimes (See Section 3.4.1), and (3) simplistic technologies and strategies for environmental administration (e.g., 'same old plus an additional sewage treatment facility' vs. 'earth protection' and 'restoration ecology') (Colby 1991). Finally, planning methodologies and analytical tools appeared to be shifting paradigms (e.g., acceptable pollution quotas vs. supervision of ecosystem and human health), which suggests increased environmental awareness among natural resource agencies and traditional conservation stakeholders (e.g., scientists, NGOs, research centers). However, this newly acquired environmental awareness was not evident among other stakeholder groups (e.g., landowners, resource users, farmers).

3.8.2. NPAs, conservation planning, and resource management paradigm

NPAs are leading institutions in the implementation of environmental policies in Mexico. NPAs must accommodate human needs while promoting environmental conservation (SEMARNAT 2001). Colby (1991) recognized that connections among poverty, human population, and the environment represent key areas of the resource administration paradigm. A growing body of literature supports the inclusion of social information and human needs into environmental management and conservation (Child 1996a, Haynes et al. 1996, Alcorn and Toledo 1998, Belsky 1999, Anderson 2001). However, emphasis on the human dimension is not always viewed favorably, particularly regarding NPAs. Brandon (1997) suggested that the combination of conservation and social goals only dilutes conservation programs. Terborgh (1999) indicated that people-oriented goals, particularly within NPAs, will decrease biodiversity worldwide, especially in developing countries. Wilshusen et al. (2002) recognized that biodiversity is declining worldwide, yet they believe the issue is not about *why* biodiversity is declining, but *how* nature can be protected in a way that is socially just, ecologically sound, and ultimately feasible. Contrary to the authoritarian conservation suggested by Terborgh (1999), successful promotion of environmental management and conservation is linked to the socio-political and historical background of each NPA (Wilshusen et al. 2002).

A revised protocol adopted for NPA planning in Mexico (Figure 3.2) recognized nontraditional topics in conservation planning (e.g., public involvement, social harmony, environmental education). However, my findings suggest that NPA plans remained comprehensive, top-down planning tools that simply extended traditional land use planning (e.g., zoning, regional-global, long-term, centralized decision-making) (Briassoulis 1989). This could be due to several reasons. First, the current legal and institutional environmental framework in Mexico is relatively new. Management plans for federally recognized NPAs were not mandatory until 1994. Thus, resource managers and planners may have resisted new approaches due to self-interests, destabilization effects, political factors, and culture compatibility (Trader-Leigh 2002). Second, resource managers and natural resource agencies in Mexico often judge nontraditional conservation stakeholders (e.g., landowners, farmers) as threats rather than collaborators. The new environmental legislation recommends stakeholder involvement. However, according to some interviewees, the current institutional infrastructure (e.g., restricted deadlines, limited funding, centralized administration) is not conducive to participatory processes. Consequently, it appeared as if planning processes behind the newest cohort of NPA plans failed to address, analyze or provide detailed information for most new components (e.g., public involvement, sharing of decision-making, environmental education) (Figure 3.2). Third, as suggested by some respondents, NPA planning teams are required to closely follow INE's existing protocol. As a result, planners are more likely to comply with the protocol (see Sections 3.3.2, 3.3.3), rather than identify and provide supportive evidence of elements that truly are relevant to the NPA. This is a common problem across formal institutions, including environmental institutions (Hukkinen 1999). If institutions impose a high price for acting in accordance with their convictions (e.g., loss of authority, professional prestige or position), individuals are unlikely to act with honesty. This could result in environmental institutions' personnel advocating long-term sustainability while concentrating on short-term solutions (Hukkinen 1999).

The following example from the Ria Lagartos Biosphere Reserve Management Plan illustrates how pre-identified management areas established in INE's planning protocol are "forced" into the structure of NPA management plans, often with little or no supportive evidence as to why these management areas are necessary (e.g., what attitudes need to change?).

4.2.3. Environmental Education Subcomponent
Goal
• To raise awareness about the environmental problems and the potential best solutions by providing sound information to people so that they will become more engaged in environmental protection and in the sustainable use of natural resources.
Objectives (selected)
• To promote the understanding of the concept of a Biosphere Reserve among local people and visitors through the use of easily understandable tools.
• To respond, through the environmental education program, for the need of a deeper understanding and skills among local people.
• To involve local education institutions, county officials, non-governmental organizations and the public in general in the environmental education program.
• To develop a process through which professionals, volunteers, and community members could learn from each other to implement and develop the environmental education program.
Strategies (selected)
• To address with the environmental education program first among local people, and secondly, among visitors and neighboring local inhabitants.
• To structure the environmental education program in a way that could reach all social constituencies relevant to the reserve, including productive and socio-cultural sectors.

Although the Ria Lagartos planners probably recognized the importance of introducing a subcomponent to promote environmental education, the evidence and wording used to construct the management plan offers no justification (e.g., attitudes to be changed, willingness to participate) as to why this subcomponent was necessary to the reserve. Introduction of unsupported management components remains a major issue among the NPA management plans used (e.g., law enforcement, public involvement, NPA administration). This could be a result of multiple factors, including (1) absence of adequate tools to analyze issues and justify new planning elements and management areas, (2) lack of implementation of participatory processes, (3) lack of understanding of new concepts and approaches, and (4) lack of expertise in identifying alternative research questions.

This act of introducing unsupported management components into NPA plans will create new problems, particularly for performance measurement, not only during development of the plan (i.e., outcome-related performance measures), but particularly during implementation (i.e., output-related performance measures). Instead of following a rigid planning protocol (Figure 3.2), an alternative approach could be to use a more process-oriented approach (e.g., clear identification of stakeholders, detailed identification of problems, development of environmental assessments, measurable goals and objectives, hierarchical analysis of problems). This could allow for the development of more environment and socially sound plans.

The shift in conservation planning in Mexico will require deep transformations for agencies dealing with natural resources. Korten and Siy (1988) documented the institutional transformation of the irrigation system in the Philippines. Although a long process, such transformations force agencies to acknowledge diversity at the local and regional levels and improve public policies and delivery of public services (Korten and Siy 1988).

3.8.3. MDRLs in Mexico: Creating a synergy with NPAs

My findings suggest that NPA plans were more comprehensive than those for MDRLs because they dealt with multiple variables simultaneously (e.g., biodiversity conservation, natural resource administration, social and economic development). Most MDRL plans were oriented toward natural resource administration and/or social welfare and failed to specifically introduce biodiversity conservation as a primary tenet. In their study of forested ejidos in Mexico, Thoms and Betters (1998) found that, despite the high biological diversity found in these commonly-owned lands, individual ejido ownerships primarily were managed for timber rather than biodiversity conservation. Most MDRL projects (that often take place at the ejido or community level) emerged as a consequence of specific problems regarding resource misuse (e.g., deforestation, drainage), resource administration (e.g., development of agreed land use guidelines), or inadequate enforcement (e.g., overexploitation of marine fisheries). For example, the popularity of ICDPs as models to balance rural development and conservation needs (see

Section 2.8.2), ICDPs often does not contribute positively to biodiversity conservation (Wilshusen et al. 2002). Resource managers who improved local economies through ICDPs also attracted many newcomers, which then increased external demands on natural resources (Wilshusen et al. 2002).

Even though planning approaches for all MDRL projects were unique and site-specific, 3 cases followed an advocacy or participatory planning approach (e.g., local or regional processes, shared decision-making power, political realism) (Briassoulis 1989). This could be due to several reasons. First, all 4 case studies occurred in areas with no 'legal conservation status.' Although laws for natural resource conservation still apply to these areas, the ability of natural resource agencies to enforce these laws often is limited (Galindo-Jaramillo and Loa-Loza 1998). Second, the lack of an organizational structure for launching MDRL projects, coupled with limited funding and timing, forced at least 3 projects to develop mechanisms for communication, interaction, and negotiation early in the planning process. The majority of MDRL interviewees regarded this task as difficult and time consuming, particularly in the absence of previous experiences. Third, the diversity of stakeholders in MDRL projects demands that stakeholders develop a shared body of knowledge (e.g., agreed upon definitions of conservation, sustainable use, use quotas). This information serves as the foundation for developing negotiated land use guidelines later.

MDRL projects potentially offer valuable experiences regarding organizational challenges to successful implementation of conservation projects in Mexico (Brechin et al 2000). Because MDRL projects often occur outside NPAs, these projects provide valuable lessons about implementation of conservation strategies (e.g., potential threats, interest conflicts, negotiation strategies, stakeholder analysis). In addition, these experiences could help establish local and regional environmental governance (Sanchez 2002, Sonnenfeld and Mol 2002a). Acknowledgment by NPAs and other natural resource agencies of MDRL projects, both at regional and local levels, could increase the protected surface surrounding specific NPAs (Brechin et al. 2002), improve environmental management, and solidify conservation networks (e.g., coalitions).

MDRL projects often are short-lived, due to limited funding, interest conflicts, or specific deadlines imposed by financial donors. Natural resource agencies and managers must be aware of this and provide adequate guidance during project development (e.g., development of strong stakeholder groups), and not to lose momentum. NPAs and agencies must find alternative means that allow MDRL and other environmental initiatives to persist. Most MDRL projects are nongovernmental initiatives; new MDRL projects should not be controlled, rather supported during development. My findings suggest that facilitating institutions often withdraw from projects due to lack of personnel, funding, or growing demands from interested parties. This jeopardizes the continuation of the processes. Natural resource agencies, including NPAs, could help integrate existing MDRLs into a larger landscape process, and then secure their continuation.

3.8.4. Inventory-related activities in conservation planning in Mexico

Items 1 and 2 from the current planning protocol for NPAs in Mexico (Figure 3.2) and the first 5 components of my evaluation matrix (Appendix B) represent inventory-related topics. Inventory-related data in both NPA and MDRL plans were descriptive (e.g., species listings, demographics, types of ecosystems) and lacked diagnostic power and historical perspective. This was true particularly for biological and social systems where plans failed to identify possible trends or scenarios given past or current characteristics of the area. Stakeholder identification and other stakeholder-related items (e.g., use of participatory processes, willingness to participate) were not described clearly, particularly in NPA management plans. In general, NPA and MDRL projects both failed to integrate into the planning process changes in resource administration in Mexico (e.g., changes in land tenure types, transferring of resource-based rights) (see Section 3.4).

3.8.4.1. *Analytical and diagnostic power of current planning approaches in Mexico*

Black et al. (1998) recommended that planners should analyze past land uses and ecological conditions within specific, sequential time and spatial scales. Such analysis promotes understanding by conservation planners of human impacts on the environment throughout time and helps identify management priorities and future research needs (Black et al. 1998).

This sequential assessment of past ecological conditions and land uses was lacking in most NPA and MDRL plans because, at least for MDRL projects they tend to be smaller-scaled projects, oriented toward resource administration. However, regardless of the type of conservation or environmental project, new analytical tools are required (Briassoulis 1989) that are sensitive to time and scale characteristics (Hukkinen 1999) and enhance proper identification of environmental issues. For example, Defeo and Pérez-Castañeda (2003) found that decrees and plans for marine protected areas in Mexico often lacked specific scientific evidence about marine resources and their use rates (e.g., larval dispersal, hydrodynamic factors, fishing quotas). This lack of information, in combination with poor enforcement and weak objectives, has contributed to the failure of NPAs to promote biodiversity conservation (Defeo and Pérez-Castañeda 2003). Additionally, despite agreement that biodiversity is declining worldwide, most countries lack comprehensive understanding of biological diversity (e.g., location, population data, distribution) (Peuhkuri and Jokinen 1999).

In the absence of detailed historic ecological and social data, some recently issued NPA plans used existing characteristics to assess past conditions. For example, the Sierra de Manantlán BR plan used GIS to validate what resources were there and to add detail to likely scenarios and problems in the area. Current literature often recognizes these 'new' attempts as ecological or environmental assessments (Simenstad and Cordell 2000, Brown et al. 2002, Turner et al. 2003). Ecological or environmental assessments are diverse structurally due to the complexity of the ecosystems they are dealing with or their goals (e.g., restoration, establishment of baseline data, monitoring, impact evaluation) (Simenstad and Cordell 2000, Brown et al. 2002). Attempts to develop protocols that integrate several themes (e.g., ecosystem management, sustainability) are under way. These protocols should provide greater understanding, diagnosis, and monitoring of existing ecosystems (Finlayson and Eliot 2001, Gentile et al. 2001). Turner et al. (2003) believed these methodologies can monitor ecological functions and detect changes in ecosystems by using multiple performance indicators (e.g., social, economic, environmental). Therefore, ecological or environmental assessments will be environmentally sound and socially just (Turner et al. 2003).

3.8.4.2. Pre-analysis of stakeholders and willingness to participate

All NPA and most MDRL projects recognized that successful implementation required collaboration among natural resource and environmental institutions and other interested parties. However, pre-assessment of potential collaborative planning (e.g., potential areas for cooperation, timing, willingness to collaborate, potential stakeholders, expected participation) was missing in most cases, but particularly in NPA plans. According to Brechin et al. (2002), conservationists often endorse moral arguments while promoting biodiversity conservation, but they fail to provide detailed information leading to the recognition of conservation as a social process. This could "…be interpreted as ignoring moral parameters for social action associated with conservation activities." (Brechin et al. 2002: 45).

Peuhkuri and Jokinen (1999) suggested that conservation of nature is a socio-political exercise. Therefore, new approaches for environmental and biodiversity conservation should be framed as questions that deal with human organization and institutions (Walls et al. 1999, Brechin et al. 2002). Conservation programs, and their respective constituency groups, should reevaluate methodologies and concepts for collective action. In particular, expected goals, strategies (Brechin et al. 2002), and performance measures (Kates et al. 2001) should be negotiated among stakeholders and applied within specific local or regional contexts. Authoritarian, government-led, top-down conservation, as suggested by some authors (Terborgh 1999), is unlikely to yield long-term results given the politicized nature of conservation in most developing countries (Brechin et al. 2002, Wilshusen et al. 2002).

The absence of this information places NPA and MDRL staffs in a position of high uncertainty regarding stakeholder management (e.g., existing power struggles, conflict of interests, local attitudes and beliefs) because stakeholders define ecological concepts (e.g., biodiversity, environmental management, conservation) and address these issues in their own terms. Successful implementation also can be threatened due to differences of opinion about the existence of a problem, property-related issues, attitudes and beliefs, and the spatial scale at which these occur (Peuhkuri and Jokinen 1999). Resource managers and planners are likely to be reactive than proactive. Because conservation programs occur in extremely complex political and social settings, resource managers need to address these socio-political conditions diligently (Brechin et al. 2002). If ignored, socio-political conservation and environmental endeavors are likely to encounter negative reactions from a diverse array of stakeholders (Brechin et al. 2002, Haenn 1999b, Wilshusen et al. 2002). In addition, some interviewees suggested that restrictive deadlines and limited funding for participatory processes compromise strong stakeholder involvement.

The only case study that provided clear evidence of negotiated, collective agreements on resource administration was Manialtepec Watershed project (see Appendix C for MDRL projects data sheets). According to planning team members, this was the result of specific project and site characteristics (e.g., watershed degradation, natural disasters) and especially the presence of different indigenous groups. Some conservationists have challenged the 'noble savage' concept when addressing indigenous groups (Terborgh 1999). However, for this planning team, the NPA model was both unfeasible and socially unfair. Successful plan implementation would take place within the Manialtepec watershed only if the perceptions and values of different indigenous groups were validated, respected, and integrated through shared decision-making. This notion of public involvement is supported widely in current conservation and environmental literature (Brandon and Wells 1992, Siar et al. 1992, Thurp et al. 1994, Western et al. 1994, Zazueta 1995, Child 1996a, Hackel 1999, Jentoft 2000, Brechin et al. 2002, Wilshusen et al. 2002). However, as suggested by Thurp et al. (1994), there often are trade-offs when using participatory processes (see Section 2.5).

In the Manialtepec Watershed project, the weight given to developing a collaborative, stakeholder-driven framework (e.g., stakeholder identification, integration of a working stakeholder group, development of agreed land use guidelines) appeared to impact other areas of the planning process. For example, inventory-related activities (e.g., problem identification, critical resources) have yet to be completed after 7 years of continuous work in the watershed. Members from INSO, the facilitating institution in this project, believed that, once inventory-related activities are completed, participating stakeholders from all different spatial scales (e.g., regional, local) should be able to recognize their rights and responsibilities toward conservation of the watershed. Second, the planning processes was orientated strongly toward resource administration and rural development (e.g., control of access, use rates, enforcement). Integration of environmental criteria (e.g., ecological processes, threatened and endangered species, conservation priorities) in the planning process remained vague. Third, INSO anticipates withdrawing from the project by 2004. INSO considers the stakeholder group leading the planning process is strong enough to sustain itself as well as the process from then on.

Conservation is a social exercise. Conservation efforts like NPA and MDRL projects need to learn about stakeholders as early in the planning process as possible. In particular, planning processes should focus on opportunities and threats for the use of participatory processes, areas for potential cooperation, and diversity of potential stakeholders (see sections 3 and 4 on Appendix B). Only through better understanding of social actors will more feasible and successful conservation programs be developed. In addition, conservation planners must be aware that there always will be trade-offs when integrating biological and socio-economic data. Depending on the composition of the planning team, and their personal values, beliefs, and previous experiences, conservation and environmental programs can lose the balance between these 2 areas if unchecked. My research on NPA and MDRL plans clearly showed that NPA plans followed an ecosystem-based approach, whereas MDRL plans centered on resource administration and public involvement.

3.8.4.3. *<u>Inclusion of changing conditions in Mexico into conservation planning</u>*

The recent trend toward globalization of the economy has framed free trade and environmental management as integrated items (Sonnenfeld and Mol 2002a). Although much uncertainty about the impact of the implementation of global trading and environmental governance strategies exists, regional exercises from around the world provide valuable lessons (e.g., European Union) (Ashford 2002). For Mexico, NAFTA introduced the notions of free trade and environmental management in January 1994 (Sanchez 2002). Impacts occurred on 2 major scales: within local, site specific characteristics, country-wide (see section 3.4), and at a regional level (i.e., beyond national borders). See Sonnenfeld and Mol (2002a, 2002b) for further references regarding globalization, ecological modernization and governance.

At the regional level, Sanchez (2002) believes the weight given to trade and environmental issues has varied since implementation of NAFTA. Despite progress reported in areas such as biodiversity conservation (e.g., butterflies, birds, coastal areas) and environmental pollution (e.g., continental pathways of air pollution), NAFTA has remained primarily a trade agreement (Sanchez 2002). NAFTA has retained its trade focus because the North American Commission for Environmental Cooperation (NACEC), the side agreement for environmental protection under NAFTA, is perceived as lacking authority and strength to effectively deal with environmental implications of free trading. This perceived lack of political strength is due to (1) pressure from the 3 governments not to expose information related to negative social and environmental impacts from free trading, (2) internal differences among the 3 governments with the council staff (e.g., differences in perceptions regarding the role of NACEC), (3) political pressure leading to the strengthening of trade stakeholders at the expense of other constituency groups seeking social and environmental welfare, (4) lack of public involvement, particularly from civil organizations or NGOs, in establishing the environmental agenda, and (5) resistance from participating governments to elevate NACEC to an operational, supranational environmental agency (Sanchez 2002).

In addition to structural changes reported in Mexico regarding resource administration (see section 3.4), concern continues to grow about potential environmental threats due to implementation of neo-liberal reforms. Shams and Ahmed (2000) found that, in postwar Cambodia, increasing commercial interests, combined with growing human population, represented major threats to traditional production and their relationships with different resource systems (i.e., private vs. common resource systems). They expressed concern that a market-based economy likely will disregard natural resource and ecological considerations as public policies are developed (Shams and Ahmed 2000). Wainwright and Wehrmeyer (1998) evaluated the transfer of wildlife-based rights (e.g., use, management, enforcement) to indigenous people in Zambia in an attempt to make ICDP projects self-sustainable. They found great uncertainty in the feasibility of transferring wildlife-based rights to local people. Major concerns included questionable capacity of wildlife to continue producing benefits for local people, establishing harvest quotas based on socio-political pressures rather than ecological characteristics, and lack of voluntary compliance with management strategies (e.g., poaching control) from local people. Overall, Wainwright and Wehrmeyer (1998) suggested that wildlife habitat quality in the study areas continued to decrease despite the conservation programs, perhaps because consumptive uses of wildlife might trigger multiple uses of other unregulated natural resources (e.g., grasslands, fuel wood) (Wainwright and Wehrmeyer 1998).

Turner (1999) states that introduction of land-based rights (e.g., territories) represents a major threat to indigenous CPR systems because conceptualization of land as ‘the’ resource to be managed is likely to trigger land use zoning within existing CPR systems. This approach not only disregards existing resource use systems, but ultimately presents a narrow view of the landscape. According to Turner (1999), land embraces only a limited number of biophysical characteristics of native agro-pastoral systems (e.g., transhumance). Other variables and resources such as rainfall and natural vegetation are unpredictable. Thus, the separation of land into artificially created units will affect the mobility of agro-pastoral production. As a result, the ability of local resource users to access randomly distributed resources will be compromised. Turner (1999) suggested that, rather than 'imposing' specific models, such as the CPR approach (Ostrom 1996), it is important to understand how the system works before introducing foreign concepts. Analysis of agropastoral areas in Niger and Mali suggested that this system violated many tenets of the CPR model (e.g., spatially defined resource, clear system of rules governing resource access, defined resource users) (Turner 1999). In these systems, access to key resources is contested and porous, compared with the typical CPR system (Turner 1999). Resource access is maintained only through continuous investment in the continuation of social relations between herders and farmers. Disruption of these relations due to the introduction of new management or economic concepts (e.g., devolution of use rights, regulation) will make the productive system disappear, and create further social and environmental problems.

Ho (2000) analyzed the semi-privatization of communal rangelands in China. Economic reforms launched by the Chinese government appeared to increase degradation of common rangelands. Ho (2000) found that, in spite of efforts to improve rangeland conservation, public policies failed to permeate down to regional and local levels. Rangeland users seemed to understand suggested management recommendations (e.g., boundaries, management regimes). However, exclusion of outside users remained a foreign concept, particularly for resources other than forage (e.g., medicinal plants). The lack of an integrated resource management scheme for all resources within rangelands exacerbated their environmental degradation (Ho 2000).

Absence of adequate valuation of all existing resources by resource users and its incorporation into the planning process contributed to this problem.

The majority of both NPA and MDRL projects failed to acknowledge the potential threats of neo-liberal economic reforms on conservation programs. Planning team members lacked understanding of potential impacts from either NAFTA provisions or the neo-liberal economic reforms that support NAFTA. This was true especially for plans released between 1994 and 1999. Although some of these provisions have been in place for > 9 years (e.g., changes in land tenure, transferring of resource-based rights), planners failed to recognize the effects of this new environment on implementation of conservation programs.

Uncertainty regarding how these neo-liberal economic reforms could impact conservation and environmental planning in Mexico is preventing integration of such information into conservation planning. Planning teams often lacked the theoretical or planning background necessary to integrate this information into the development of management plans. The wording of most management plans suggested that new, emerging models, such as property resource-based rights (Oestereich 2000, Shams and Ahmed 2000) and common property resource systems (Ostrom 1996, Agrawal 2001, Wilshusen et al. 2002), largely were missing from the planning process. The lack of more powerful analytical planning tools, combined with the lack of understanding of new resource management models, prevented full understanding what problems and needs existed.

As seen in Sections 3.8.6 and 3.8.7, lack of more appropriate diagnostic tools will impact developing successful operational and performance measurement strategies. New socio-political and economic conditions require resource planners to diversify traditional approaches and to employ mechanisms and tools that frame environmental problems under new, changing conditions. This is true particularly where collaboration among multiple stakeholders is a key factor for successful design and implementation of conservation programs (Sonnenfeld and Mol 2002a, Wilshusen et al. 2002).

As a result of globalization of the economy, environmental management is evolving into new forms of human organization and environmental governance worldwide (e.g., new stakeholder coalitions, acknowledgment of different layers of environmental governance, alternative planning approaches) (Sonnenfeld and Mol 2002a). This evolution is taking place both within countries and beyond national boundaries, and must include constituency groups both from 'above' (e.g., federal agencies, national programs) and 'below' (e.g., grassroots projects) (Sonnenfeld and Mol 2002a). NPAs could function as catalysts to establish environmental governance at local levels by building bridges between local stakeholders and federal natural resource agencies. This is particularly important for (1) key resources targeted by neo-liberal reforms (e.g., coastal areas, forests, water), (2) NPAs with shared resources (e.g., migratory wildlife, water), (3) increasing involvement of local stakeholders and building mechanisms for environmental accountability and performance, (4) increasing the number of protected land units at the landscape level, and (5) developing links and increasing understanding between local and federal stakeholders. NPA managers should be aware of other conservation programs or projects in the area so that they can establish a broad network of environmental governance. This should transform the institutional framework for environmental management in Mexico so that NPAs accommodate public demands more effectively. NPAs could help local communities by introducing social justice and by preparing communities to face social and economic challenges. More importantly, they may serve as an open channel to maintain Mexico's environmental agenda. NPAs could continue to facilitate implementation of national programs that promote rural development and environmental conservation. However, if NPAs are to be successful, they must be recognized by local, regional, and national stakeholders as such channels.

3.8.5. Strategic planning: findings, limitations, and opportunities

3.8.5.1. Problem identification: challenges in conservation planning

Problem identification served as the pivotal area for planning processes for both NPA and MDRL projects. NPA case studies generally provided a comprehensive list of strategic problem definitions separate from other sections of the plan, whereas MDRL projects used either pre-identified management areas or ongoing operational pilot projects to introduce relevant issues and needs. Problems identified in NPA plans were more comprehensive, but general, whereas problems discussed in MDRL projects were more focused, but limited to specific local conditions. The problem identification section in NPA plans served as a transition between inventory-related activities and strategic planning tasks. Although this transition seemed appropriate, the approach has several weaknesses.

First, the transitions from inventory to problem identification and later into operational planning were disarticulated. Links and relevant background information that provide the context for the description of the problems (i.e., physical, social, and biological characteristics of the area) often were missing. Second, problems often were introduced without proper analysis and documentation through inventory activities. This was true particularly for problems related to social and biological characteristics. Third, strategic problem definitions often lacked information related to temporary or spatial scales, causative agents, and performance indicators. This tendency to oversimplify environmental and social problems results from a lack of detailed information, restricted deadlines, lack of expertise, and use of obsolete diagnostic tools. Cartwright (1973) suggested that metaproblems, such as environmental problems, often are distinguished by their lack of precision because they often are described in terms of unspecified numbers of unknown variables, as well as their inconsistency and lack of demarcation (Hudson 1979). Metaproblems (e.g., poverty, pollution) explain only a portion of the variables accounting for the problem and help to improve only part of the situation (Cartwright (1973). Although metaproblems are rarely solved, they can be addressed partially. However, focusing on individual components of a metaproblem may result in overly simplistic treatment of complex problems (Cartwright 1973).

Describing problems in oversimplified language can hinder the planning process, particularly during the implementation stages. First, oversimplified problem definitions contribute to the inability of potential stakeholders to recognize suggested problems as their own (see Chapter 4 for field examples). This negatively affects their interest in participating and their willingness to negotiate and compromise for successful plan implementation. Second, generalized problems hinder establishing workable, specific goals and objectives. The majority of NPAs and half the MDRL projects contained vague goals and objectives, which hindered developing appropriate operational strategies and effective PMSs. Abbott et al. (1998) suggested that adequate performance monitoring and evaluation could be achieved only if detailed goals and objectives were available. Goals and objectives represent the link between current conditions and desired expectations.

The absence of a systematic, comprehensive, hierarchical analysis of identified problems constrained both NPA and MDRL plans. The approach followed by NPA planners included only the priorization of problems within specific management components based on the immediacy of implementation (e.g., short-term, long-term). However, based on the evidence provided in the plans, I could not determine the conservation priorities in most cases. Interviewed planning team members indicated that, in the case of NPAs, the definition of priorities based on annual operational programs is the responsibility of the NPA staff. Therefore, answers to questions such as what is essential to protect, what is the time framework for the implementation, or who should be involved in the implementation of conservation practices remained unanswered.

3.8.5.2. *Stakeholder analysis*

Despite major differences between NPA and MDRL projects regarding stakeholder analysis, a common trait across all case studies was the absence of stakeholder analysis. I found no evidence of specific analysis of stakeholder normative cores (e.g., interests, beliefs, attitudes, objectives). In at least 3 MDRL projects, understanding of various stakeholders resulted from continuous interactions leading toward development of negotiated land use guidelines. On the other hand, NPA planning processes demonstrated little understanding either of the composition of stakeholders or their normative cores. Stakeholders were pre-identified, in a general sense, based on perceived notions about their potential roles for plan implementation (e.g., legal mandates, property rights, expressed interests). However, classification of stakeholder types, particularly among NPA plans, was very general (e.g., type of federal agencies, type of research centers). Simplistic classification of stakeholders in environmental governance (e.g., federal agencies, business community, NGOs, other parts of civic society) lead to oversimplification of a multifaceted reality. In particular, a generalized classification will disregard the natural heterogeneity among stakeholders by treating them as a homogeneous, stable groups (Sanchez 2002).

The absence of a more detailed analysis of potential stakeholders, particularly in the NPA management plans, results from several factors. First, will be discussed in Chapter 4, stakeholders fundamentally are issue-specific. Thus, the absence of adequate identification and description of environmental problems during inventory stages hinders the ability of planning teams to scan for potential partners across the landscape. Second, planning team members believed that stakeholder management in conservation rarely was proactive. Planning to develop potential collaborations and interactions among stakeholders is considered by resource and conservation planners as a random exercise, that resource planners have little control over who should participate in a planning process. Respondents indicated that voluntary willingness to participate is required. The absence of clearly identified issues, in combination with these beliefs, resulted in disorganized involvement of stakeholders during the development of management plans. A common approach was to make open calls to all interested parties. Therefore, the composition of stakeholder groups represented voluntary compliance and self-selection from interested parties rather than those specific to the problems or tasks at stake. As a result, in all NPA and MDRL cases, key stakeholders for each planning exercise, ranging from federal agencies (e.g., CONAGUA) to state and county officials to resource users (e.g., farmers, sugar cane managers, foresters), were missing.

Inadequate stakeholder analysis negatively affected development of management plans. First, all the plans I evaluated from NPA and MDRL projects recognized that successful implementation required the involvement of multiple stakeholders. However, the 'how' (e.g., what kind of collaboration is needed, at what stages is this collaboration required?) and, more importantly, the 'who,' particularly within large agencies, remained unanswered. I believe conservation planners should be proactive about understanding potential stakeholders and must introduce more powerful diagnostic tools and concepts in early inventory-related stages. For example, resource-based rights (e.g., ownership, management, enforcement) may be used to identify potential stakeholders (Turner 1999, Walls et al. 1999) and to delineate rights and responsibilities toward sustainable resource management. However, such new tools are valid only if considered within the context of existing resource systems (Turner 1999) and potentially affected parties (Theobald et al. 2000). For local land-use planning to be successful, stakeholders must understand all relevant information regarding their surrounding landscape (e.g., ecological data, social data) (Theobald et al. 2000).

Conservation planning relies heavily on scientific evidence. However, successful conservation also relies on the expression of human desires and values (Theobald et al. 2000). In this regard, Brechin et al. (2002) suggested that any type of environmental conservation initiative must be socially just. To achieve social justice, stakeholders must have the right to (1) represent themselves during the entire planning process, (2) exercise cultural, economic, and political self-determination or sovereignty, and (3) participate at all levels of the process as equal partners.

They also suggested that future environmental programs should consider socio-political issues such as human dignity, legitimacy, governance, accountability, and non-local forces. The purpose of conservation planning should be to establish local, regional, or national environmental governance based on shared decision-making power. According to Brechin et al. (2002), the acknowledgment of interdependence in conservation programs and the urgent need for stronger public involvement tools, suggest that governance remain at the core of environmental management. Thus, successful conservation programs occur when (1) such programs socially are just, (2) stakeholders' heterogeneity is understood and validated, (3) participation guidelines are established and agreed upon, and (4) mechanisms for accountability are developed and implemented throughout the entire planning process. Mechanisms for accountability help resource managers and other interested parties to define rights and responsibilities and monitor and evaluate performance of all involved parties. This is true particularly for countries such as Mexico, where the structure of land tenure systems allocates much land administration responsibility to rural inhabitants and landowners (Brechin et al. 2002).

3.8.5.3. Goals and Objectives

Conservation plans in general, and NPA management plans in particular, described goals and objectives in a generic way, where indicators of scale, time, and performance often were missing. On the other hand, goals and objectives in many MDRL projects showed greater detail for selected indicators, but lacked the comprehensiveness of NPA plans. MDRL projects largely failed to integrate goals and objectives specifically related to ecological and socio-economic issues.

This lack of detail in goals and objectives was not surprising given the poor diagnostic power or restricted scope of most NPA and MDRL projects. Goals and objectives were described commonly within pre-identified management components (e.g., environmental education, sustainable resource use, public involvement). In all cases, goals reinforced the mission/vision of a management plan.

'SMART' objectives (Specific, Measurable, Attainable, Realistic, and Time-bounded) (ACRL 2003) have been developed in fields as diverse as library management, health care, and business management. Objectives in most NPA and MDRL projects lacked detailed indicators of temporal and spatial scales, causative agents, and performance measurement. The simplicity with which problems were described leads to overgeneralization of suggested objectives. Instead of active verbs, planners often used passive verbs that suggest a lack of familiarity with suggested topics. The use of open, general statements probably is related to poor interaction with stakeholders. In contrast, although open statements appeared less likely to restrict future discussions, these statements hinder stakeholders' ability to make decisions. Open statements also compromise the ability to change the direction of the plans throughout time. Some planners, particularly from NPAs, consider open statements a safer approach because they allow them more freedom to address uncertainties. Finally, the frameworks used to describe existing problems and potential objectives were inadequate. For example, commonly cited problems, such as fire, soil erosion, or deforestation, if addressed out of context would elicit oversimplified goals and objectives.

Problems, and consequently objectives, need to be understood first as part of the planning process (i.e., process-oriented outputs). Planners and plan implementors should be able to locate, measure, and assess performance while solving these problems (i.e., SMART objectives). Second, problems and objectives should be approached as symptoms or indicators of a higher organizational system (e.g., property rights, ecosystem/ecological processes). This type of information was missing in almost all cases. Conservation approaches, such as ecosystem management (Luzadis et al. 2002), property-resource based rights (Agrawal 2001, Oestereich 2000), and common property systems (Ostrom 1996), still are in developmental stages. Selection and use of specific frameworks depends on the site characteristics and the anticipated management efforts. These conservation approaches must integrate other complementary bodies of knowledge. Briassoulis (1989), and Toledo et al. (2002) believe that progress in environmental management requires development of transdisciplinary research and management. Therefore, pure, absolute models seldom provide feasible answers for all relevant issues.

The use of any model or management framework serves only to clarify for planners what problems need to be addressed and what objectives must be accomplished. It still is necessary to build consensus among stakeholders as to how they will be involved and what their rights and responsibilities will be during implementation of the conservation program. Unless this information comes from negotiated agreements, monitoring collective performance likely will be unsuccessful. Future planning efforts should concentrate on the processes required to achieve desired goals and objectives rather than targeted resources. Water, forests or biodiversity, for example, should be used only as the ultimate performance indicator for monitoring successful implementation. Brechin et al. (2002) suggested that environmental management and governance are human organizational questions at the core. Therefore, conservation planners should identify the mechanisms through which a desired outcome could be achieved.

3.8.6. Operational Planning

Operational planning consisted of 2 main steps: implementation of programs simultaneous with development of management plans, and introduction of strategies and recommendations for plan implementation. Based on interviews with planning team members and my evaluation of management plans, MDRL projects incorporated operational projects during development of management plans more than did NPA projects. Some NPAs, particularly those with a high number of conservation projects prior to the listing of the NPA, used multiple operational projects, like environmental education on sustainable farming. However, this was not consistent among all NPAs.

3.8.6.1. Operational Components in MDRLs

MDRL projects incorporated multiple operational activities ranging from environmental education to rural development and habitat restoration. Overall, these projects served as a platform to introduce resource planners and other interested parties to local communities and other stakeholders. This allowed outside interest groups to gain better understanding of current local conditions and to establish dialogue with local stakeholders. The type of operational projects varied across MDRLs, although many were intended to address urgent environmental crises. However, operational components often were developed based on previous experiences or available expertise rather than conservation priorities.

The areas targeted by MDRL projects had no legal protection or decree as did NPAs. Operational projects provided foundation to promote conservation at local levels. However, the reported benefits of these operational components may be questionable. In some MDRL case studies, the selection and crafting of operational components often appeared to be unrelated to conservation priorities. These projects were designed based on planning team members' pre-conceived idea of what was needed at the local level. Consequently, operational projects often were launched without local support and did little to support the MDRL missions and goals. Because MDRL projects are short-lived, due to limited financial resources and restricted time deadlines, it is crucial to determine early in the process what operational components are needed and how their implementation will advance conservation goals.

Operational components should take advantage of existing local working groups (e.g., grazing cooperatives, environmental educators). Working with these groups can enhance success in several ways. First, these groups often are self-organized and likely to remain active long-term than newly created groups. Second, these groups often have clearly defined goals and objectives. When their goals coincide with those of conservation plans, these groups are likely to engage in conservation practices. Finally, these groups often have a higher level of awareness about environmental issues and alternative solutions.

Incorporation of operational components may divert attention of resource planners from their primary task, that being to develop a management plan. Implementation of operational projects at La Mancha-El Llano required additional time, money, and personnel to maintain their operation, which detracted from the planning process. In 2 MDRLs management plan development was delayed because their most urgent priorities were consolidation of already existing operational projects and strengthening existing stakeholder groups.

3.8.6.2. *Strategies and recommendations for plan implementation*

Strategies and recommendations in all evaluated case studies were introduced in the management plans through pre-selected management areas or performance domains. NPA plans were more comprehensive than MDRL projects. MDRL plans centered around 4-5 major management components, mostly related to resource management and administration. NPA plans offered a wider spectrum of performance domains, including biodiversity conservation, public involvement, and sustainable resource use. Recommended actions were clear and thorough in both NPAs and MDRLs, but each approach had its weaknesses.

Recommended management or performance domains arose from the planning protocol used by planning team members rather than from their inventory-related activities. For example, MDRL projects early in the process identified the management areas or operational components they regarded relevant to the area. These components served as the backbone for establishing and conducting the planning processes (e.g., Babicora Plan identified 4 lines of action: natural resources, environmental education, production systems, socio-economic issues). In contrast, NPA planning teams used management domains suggested by the 'terms of reference' (Figure 3.2). Problems were identified in the plans following a description of the characteristics of the area. Operational components were developed using this information, but they often were poorly justified.

A wide variety of potential activities were suggested, yet they suffered the same lack of detailed information as the preceding planning stages. This was true particularly for components dealing with biological and social issues. Recommendations for biodiversity conservation, public involvement, environmental education, and sustainable resource use often failed to incorporate evidence as to why they were necessary. In particular, planners failed to define responsibilities for plan implementation and potential performance indicators (e.g., benchmarks).

Nonspecific strategies prevent resource planners from identifying performance indicators and, subsequently, developing adequate PMSs. This is particularly important for stakeholder collaboration in plan implementation. Unless clear benchmarks are defined and rights and responsibilities are outlined clearly, it is difficult to assess progress and monitor performance for different stakeholders. Unsupported strategies, particularly those related to social issues, influence planning teams' composition. Scientists from disciplines such as anthropology, social psychology, and political ecology should participate in developing conservation programs. In addition, planning teams should follow a transdisciplinary approach for developing conservation programs. Experts from different fields should be able to understand the planning process, and still recognize their role in the process.

Finally, both NPA and MDRL projects actively should involve stakeholders early in the planning process. Problem definition, identification of goals and objectives, development of operational components, and design of performance measurement tools should be agreed upon by all interested parties. MDRL projects were more participatory than NPAs, where decision-making was centralized within the planning team. Participatory techniques should be evaluated better before implementation so that an adequate balance between conservation and social needs is achieved. Brechin et al. (2002) suggested that authority and control are central pieces to environmental governance. Therefore, arrangements for power sharing and decision-making constantly are being renegotiated and implemented. Negotiation becomes a highly complex enterprise given the natural heterogeneity of interested parties (Brechin et al. 2002)

3.8.7. Monitoring and Evaluation

Monitoring and evaluation tools were the most underdeveloped section in all NPA and MDRL plans. NPA plans often provided examples of outcome-related performance measures, such as time schedules for conducting performance measurement. However, this information was scattered and disorganized, with no clear links to previous sections. MDRL projects, on the other hand, lacked monitoring and evaluation information almost completely. This may be a result of the specificity of MDRL projects. MDRL projects function as contracts, where specific outputs (e.g., environmental education programs, public involvement workshops) were expected. Therefore, development of monitoring and evaluation tools need to comply to expected outcomes rather than needs or regional conditions.

NPA planners focused their attention almost exclusively on performance measures related to implementation of operational components (i.e., output-related performance measures). Thus, planners failed to produce performance measures for outcome- and process-related activities. In addition, no information was available on other components of a PMS (e.g., responsible parties for evaluation, hierarchical analysis, selection of performance measures, road map of the planning process).

I suspect the absence of PMSs in all plans I evaluated ocurrs for several factors. Kates et al. (2001) suggests that program goals and objectives guide development of a PMS by specifying the relationship among different organizational components. However, goals and objectives in Mexican conservation plans generally were vague statements that lacked information on expected purposes and recommended actions. In addition, the wording of goals and objectives failed to present clear performance indicators and links between identified problems and suggested operational components. Thus, the absence of measurable goals and objectives prevents planning teams from developing performance measurement tools.

Kates et al. (2001) also noted that a PMS should allow planners to articulate program purposes, goals, and objectives and the relationships among them. This should facilitate developing a program's logic model(s) and, consequently, the identification of types of accountability and performance throughout all levels of the program (e.g., federal, state). With the exception of Manialtepec Watershed project, this information was missing in all case studies I evaluated. Responsibilities for performance measurement were undefined in MDRL projects or were considered the responsibility of NPA staff. To establish successful conservation and environmental programs, clear links and parameters for socio-political processes linked to environmental goals and objectives must be established (e.g., biodiversity conservation) (Brechin et al. 2002).

Resource planners and administrators must design guidelines for the construction, implementation, and assessment of conservation programs. This facilitates (1) establishing accountability and integrating multiple, evolving interests, and (2) monitoring and evaluation of overall implementation. Thus, performance measurement would not only address outputs and outcomes from plan implementation, but ultimately allows evaluation of individual performances of all interested parties (Brechin et al. 2002).

Chapter 4. Stakeholder Analysis in Conservation Planning

4.1 Introduction.

Stakeholder analysis and management are frequent topics of discussion among natural resource managers worldwide. Resource managers, once focused on the justification for involving stakeholders, now worry more about how to operationalize, monitor and evaluate stakeholder participation (Margerum 1999, Brechin et al. 2002). Stakeholder theory emerged first in the business field (Freeman 1984), where it helped to balance interests and demands of shareholders and stakeholders (Brooks 1994). According to stakeholder theory, firms and corporations have diverse obligations toward a multiple range of stakeholders (e.g., customers, managers, employees) (Cochran 1994). Stakeholder theory was based on the property rights theory, providing a strong social justification. Coase (1960) suggested that property rights are not an unlimited set of rights, since unlimited rights do not require enforcement to support them.

The notion of public involvement in natural resource and environmental management is not new (Grimble and Wellard 1997). However, attitudes and beliefs about required stakeholder involvement have evolved over the last 30 years towards increased stakeholder involvement in environmental decision making (Beierle and Konisky 2001). Beierle and Konisky (2001) suggested that stakeholder involvement in environmental decision making has risen to the top of the environmental policy agenda, both in industrialized and developing countries. Efforts during late 1970s and early 1980s promoted consultative stakeholder involvement, i.e., stakeholders had the opportunity to provide feedback and to react to previously crafted environmental and natural resource management programs. This approach began to change during the late 1980s and early 1990s. For example, the US Forest Service shifted during the early 1990s from a product-based towards an ecosystem-oriented approach (Martin et al. 2000). This shift resulted from both institutional transformations and public demands for stakeholder participation. As a result, public involvement shifted from passive to active participation, with sharing of decision-making power in some instances (Carr et al. 1998, Martin et al. 2000)

In Mexico, the transition was slower. Although stakeholder participation has been recognized both in environmental policy and political speeches, social components for environmental management remained poorly defined. Defeo and Perez-Castañeda (2003) suggested that institutional infrastructure for natural resource administration should shift from government-controlled to a co-management approach. This would allow both the development of socially just environmental programs and the sharing of duties and responsibilities for program implementation.

Stakeholder analysis is a central element of numerous conservation and environmental processes: ecosystem management (Grumbine 1994, Martin et al. 2000), people-oriented programs (Child 1996a, Child 1996b, Carr et al. 1998, Brechin et al. 2002) and integrated environmental management (Margerum 1999). Approaches such as collaborative conservation planning (Bentrup 2001) and natural resource co-management (Castilla and Defeo 2001) are based on the presence of a diverse group of interested parties.

Implementation of such approaches benefits the design, negotiation and implementation of environmental programs. Among those benefits are (1) identification of potential threats for developing and implementing conservation programs (e.g., interest conflicts), (2) development of working partnerships among different stakeholders (Bentrup 2001), (3) development of stakeholder decision-making skills regarding ecological issues, particularly at local and regional levels (Theobald et al. 2000), (4) acknowledgement of local systems diversity (e.g., ecological, social) and (5) assistance in institutional transformation for adequate administration of such systems (e.g., enforcement, management) (Castilla and Defeo 2001). However, despite strong advocacy for stakeholder involvement in environmental planning, few authors have described experiences with stakeholder involvement. Information presented in the following section addresses common problems, needs and alternative action avenues for dealing with stakeholder involvement.

4.2 Stakeholders in conservation planning and natural resource management

Definitions of stakeholders in natural resource and environmental management resemble the definition first coined in the business sector (Freeman 1984). Grimble and Wellard (1997) and De Lopez (2001) defined stakeholders as any organized or disorganized group(s) with expressed interests in particular issues or systems, where stakeholders are likely to either affect a decision or action, or are affected (i.e., positively or negatively) by these decisions. This principle of mutuality or relationship (i.e., affect, being affected) represents the core tenet of the stakeholder concept (Starik 1994, Donaldson and Preston 1997). De Lopez (2001) suggested that despite the similarities, there are basic differences in how stakeholders are perceived in the conservation and business fields. Business experts believe in management of multiple stakeholders in relationship to a corporation. Conservation practitioners propose the involvement of multiple stakeholders likely to relate to multiple natural resources differently (De Lopez 2001). De Lopez (2001) suggested that a successful stakeholder analysis depends on addressing questions such as who are the stakeholders of the project?, what type of interests do these stakeholders possess?, and what type of behavior can be anticipated?.

The stakeholder concept recently gained favor among natural resource and environmental managers worldwide (Decker et al. 1996, Grimble and Wellard 1997, De Lopez 2001). Consequently, terms such as stakeholder analysis and stakeholder management have also gained popularity within conservation-related fields. Grimble and Wellard (1997) defined stakeholder analysis as a methodological approach aimed at gaining knowledge about a system and associated changes in it, through the understanding and recognition of key actors or stakeholders. De Lopez (2001) defined stakeholder analysis as a comprehensive management framework that includes all key stakeholders with the purpose of creating feasible solutions for existing environmental problems. Regardless of the definition, stakeholder analysis represents a tool for responding to the challenge of having multiple interests and objectives associated with multiple resources in a system. It offers a method for creating strategies that are equitable, efficient and environmentally sustainable (Grimble and Wellard 1997).

Grimble and Wellard (1997) suggested that stakeholder analysis is applicable to natural resource and environmental administration because these settings are often characterized by (1) overlapping systems and stakeholder interests, (2) multiple resource uses and users, (3) market failures (i.e., unclear property rights and open access systems, negative externalities, imperfect markets), (4) multiple interests and objectives, (5) temporal trade-offs and subtractability ["subtractability refers to how much one user's consumption of a service subtracts from the ability of others to consume without raising production costs"] (Asian Development Bank 2003), and (6) under-representation and poverty. Stakeholder analysis could be used in 2 case scenarios: improving the design, effectiveness, efficiency and evaluation of projects and policies, and improving the ability to determine distributional political and social impacts of policies and projects (Grimble and Wellard 1997). De Lopez (2001) suggested that stakeholder analysis is consistent with the pluralistic nature of rural development and environmental conservation, and it should promote the recognition and validation of multiple, sometimes conflicting perceptions, values and objectives among different interest groups (De Lopez 2001).

Beierle and Konisky (2001) described 3 benefits of stakeholder involvement in conservation planning. First, quality of decisions increased (e.g., decisions reflected public values, perceptions and objectives) either through direct (i.e., participation in decision-making) or indirect involvement (i.e., use of shared vision, goals). Second, relationships among important players in the decision process improved (e.g., resolution of personal differences, change in attitudes towards other constituencies, increasing trust). Finally, stakeholder involvement builds capacity for managing environmental problems (e.g., no point source water pollution). In contrast, Beierle and Konisky (2001) suggested that improvements in the overall environmental quality of the Great Lakes remained questionable despite stakeholder involvement. They suggested that this could be partly due to the fact that often stakeholder analysis is promoted without an adequate evaluation protocol (e.g., identification of expected benefits, thresholds in decision making) . For example, in their analysis of community-based experiences in the Great Lakes region of the US and Canada, Beierle and Konisky (2001) gained little insight from resource managers as to what potential benefits or lessons are likely to come from stakeholder analysis and stakeholder involvement. Questions about the legitimacy of the process, or timing for public participation remained unanswered throughout the process (Beierle and Konisky 2001). Martin et al. (2001) found that despite possible positive outcomes and current trends advocating stakeholder involvement, some sectors still have great uncertainty about stakeholder active participation. Often, US Forest Service projects involving the public in conservation planning processes are perceived to dramatically increase the potential for conflicts (Martin et al. 2001).

4.3 Stakeholder analysis methodologies: Examples in natural resource management

Systematic analysis of stakeholders is relatively a new idea in natural resource and environmental administration (Grimble and Wellard 1997, De Lopez 2001). The transition in stakeholder involvement in natural resource management has changed from targeting individual stakeholder groups as suggested by traditional approaches such as community-based conservation (Child 1996a, 1996b) and integrated conservation and development projects (Brown and Wyckoff-Braid 1992), towards more structured, focused public involvement (Grimble and Wellard 1997). Newer approaches to stakeholder involvement address not only the analysis of stakeholders' expressed interests and values, but ultimately, attempts to develop more successful collective implementation strategies. Current literature on stakeholders in natural resource management deals either with the study of existing stakeholder groups (Oreszczyn and Lane 2000, Selin et al. 2000, Mahanty and Russell 2002), or analysis of experiences in incorporating stakeholder input into environmental planning (Cardskadden and Lober 1998, Mahanty and Russell 2002, Martin et al. 2002). However, the conceptual foundation for stakeholder analysis in environmental management remains vague.

Grimble and Wellard (1997) and De Lopez (2001) documented the conceptual background of stakeholder analysis and suggested methodological approaches. Reported criteria for stakeholder classification included the concept of mutuality or relationship (i.e., affect a decision, or being affected by a decision), influence (i.e., power that some stakeholders have to influence the success of a program or project) and importance (i.e., those stakeholders whose needs or interests are a priority) (see Section 2.6.2). Spatial scale also may be used to classify stakeholders. Spatial scale analysis acknowledges the diversity of stakeholders at local or regional scales (e.g., rural communities, farmer organizations) and at national and international levels (e.g., international donors, federal natural resource agencies) (Grimble and Wellard 1997).

Stakeholder analysis should improve the performance of donors and natural resource agencies in at least two ways: (1) selection, effectiveness, efficiency and evaluation of projects and policies, and (2) assessment of the distributional, political and social impacts of projects and policies (Grimble and Wellard 1997). Grimble and Wellard (1997) recognized that there is no "road map" for stakeholder identification and analysis because methodologies for stakeholder analysis are context-specific. They described 2 main approaches for performing stakeholder analysis in natural resource management. First, there is the approach developed by natural resource economists in the Natural Resource Institute (NRI approach). This is a diagnostic tool aimed at providing better understanding of complex situations. This approach is designed also to predict likely scenarios, and to address interest conflicts among stakeholders (Grimble and Wellard 1997) (Figure 4.1). The second approach addresses projects that focus on social problems and was developed by the Centre for Development Studies at Swansea University (ODA approach) (as cited in Grimble and Wellard 1997). This approach is design to reduce or avoid potential conflicts among participating stakeholders, and it is similar to the one used by the World Bank (Figure 4.1) (Grimble and Wellard 1997). Working methodologies for both approaches are presented in Figure 4.2.

NRI approach	ODA approach
• Heuristic tool for analyzing situation and predicting consequences	• Management and mediating tool
• Concerned with both project cycle activities and improved understanding of natural resource problems. It suggests structural (institutional) change and policy issues	• Focuses on design, management and implementation of aid projects
• Does not promote participation, although uses participatory techniques for diagnosis and data collection	• Strong advocate of participatory approaches, particularly of ultimate (passive) beneficiaries (e.g., small farmers, women)
• Equally concerned with trade-offs between objectives and conflicts between stakeholders	• Focuses more on diversity of represented stakeholders rather than diversity of present ideas. Deals with conflicts between stakeholders, not with trade-offs between objectives
• Identifies patterns and contexts for interaction between stakeholders	• Identifies methods, risks and assumptions for stakeholder cooperation
• Interdisciplinary tool with strong economic content	• Social development tool with little economic content

Figure 4.1. Comparative analysis of Natural Resource Institute (NRI approach) and Centre for Development Studies at Swansea University (ODA approach) stakeholder analysis approaches for natural resource management (Modified from: Grimble and Wellard 1997).

NRI approach	ODA approach
• Identify the main purpose of the analysis	• Draw up a list of stakeholders
• Develop an understanding of the system. Identify decision-makers in regards to selected problems	• Draw out stakeholder interests in relation to problem addressed
• Identify principal stakeholders	• Assess influence or power of the stakeholder
• Investigate stakeholder interest, characteristics and circumstances	• Assess the importance or need to satisfy specific stakeholders
• Determine views of stakeholders on relevant questions	• Combine influence and importance in matrix diagram
• Identify patterns and contexts of interaction between stakeholders	• Identify risks and assumptions for stakeholder cooperation
• Assess options for management at all levels. Establish round-table negotiations with expert group analysis for resolution	• Determine how and which stakeholders should participate in project cycle activities

Figure 4.2. Comparative analysis of Natural Resource Institute (NRI approach) and Centre for Development Studies at Swansea University (ODA approach) working procedures for two stakeholder analysis approaches (Modified from: Grimble and Wellard 1997).

In spite of the similarities in these two approaches, the NRI protocol focuses mainly on understanding interests associated with natural resource management, whereas the ODA approach is geared toward assessing the likelihood of development of collective projects through consensus building. The ODA protocol assumes that alternative solutions can be crafted jointly, while the NRI protocol assumes that for stakeholder analysis to be successful, it is necessary to clearly understand underlying problems (Grimble and Wellard 1997). The NRI protocol acknowledges that existing problems could be so basic, that negotiated agreements and consensus are unlikely (Grimble and Wellard 1997).

De Lopez (2001) crafted a stakeholder analysis protocol for assisting managers at Ream National Park in Cambodia. The protocol consisted of five major steps: (1) stakeholder characterization (e.g., observed behavior, analysis of expressed interests and values), (2) stakeholder mapping (e.g., logical stakeholder model, establishment of relationships and interventions, expected or potential roles, power analysis), (3) development of strategies and a "road-map" for the most influential stakeholders (e.g., establishment of stakeholder working group, development of joint conservation strategies), (4) public meetings for feedback on suggested strategies and working plan, and (5) implementation of stakeholder strategies. Stakeholder mapping allowed park managers to develop a classification system for stakeholders with 4 identified categories (i.e., supporters, opponents, marginal supporters, and marginal opponents).

4.4 Stakeholder analysis: Limitations and future needs

Stakeholder analysis methodologies continue to evolve. Stakeholder analysis can not ensure fair representation, empowerment or implementation of democratic processes (Grimble and Wellard 1997). Acceptance of truly participatory processes should be the result of the transformation of existing institutional infrastructure. For example, Beierle and Kominsky (2001) found that established stakeholder groups often failed to engage 'the wider public' in decision making and to have fair representation of all stakeholders. De Lopez (2001) reported interest conflicts, confusion about the process and lack of leadership as major limiting factors in the planning process for Ream National Park. Although these problems can not be attributed to the stakeholder analysis per se, they should be warning signs for resource planners (Beierle and Kominsky 2001). Stakeholder analysis ultimately aims to improve environmental quality by way of collective actions. However, Beierle and Kominsky (2001) suggested that such accomplishment is difficult, particularly during the implementation stages. Further research is urgently needed regarding motivations and anticipated roles for implementation of collective actions. Stakeholder analysis is not a "road map" to be copied or implemented. The processes should be sensitive to local conditions and should provide the opportunity to clearly understand all key stakeholders (De Lopez 2001).

4.5 Goals and objectives

To use the Laguna de Babicora planning process, and the principles of stakeholder theory and the common property resources model to:

4.5.1 Develop classification criteria and analysis tools to identify stakeholder groups at Laguna de Babicora's Watershed,

4.5.2 Characterize stakeholders' behavior towards identified conservation threats at Laguna de Babicora's watershed, and to assess the feasibility for collaborative implementation of Laguna de Babicora's Watershed management plan,

4.5.3 Analyze potential threats and obstacles associated with conservation and management of common lands due to changes in land tenure at Laguna de Babicora's Watershed, Chihuahua, Mexico.

4.6 Methods

4.6.1. Laguna de Babicora Conservation Plan (LBCP)

Laguna de Babícora (Figure 4.3) is considered one of the 32 most important wetlands in Mexico and the only natural wetland within the semi-arid interior highlands of north-central Mexico. Located 240 km northwest of Chihuahua City within Gomez Farías and Madera counties, Laguna de Babícora watershed encompasses 200,000 ha. Almost 85% of its surface is communal land (ejidos and colonias), with an estimated human population of 30,000. Major economic activities include agriculture, cattle ranching and timber harvesting. The region is considered a priority area by the tri-lateral cooperation treaty among Canada-US-Mexico, and constitutes the largest wintering habitat for snow geese (*Chen caerulescens*) and sandhill cranes (*Grus canadensis*) in Mexico. This area also provides refuge for up to 5 million other waterfowl and neotropical migrating birds in the Central Flyway during winter and spring migrations. Species such as bald eagle (*Haliaeetus leucocephalus*), white pelican (*Pelecanus erythrorhynchos*), and aplomado falcon (*Falco femoralis*) benefit from the area. Over the past 40 years, accelerated degradation due to agriculture, cattle ranching and timber harvesting has eroded the natural conditions of the basin. As a result, waterfowl, which originally benefited from the proximity with agriculture, are now facing threats from water pollution, soil erosion, poaching and the continuing conversion of wetlands to agriculture. In 1993, several organizations (e.g., North American Wetlands Conservation Council [NAWCC], Autonomous University of Chihuahua [UACH], Ducks Unlimited [DU]), Turner Foundation) began a multidisciplinary planning effort to develop a conservation management plan for the region.

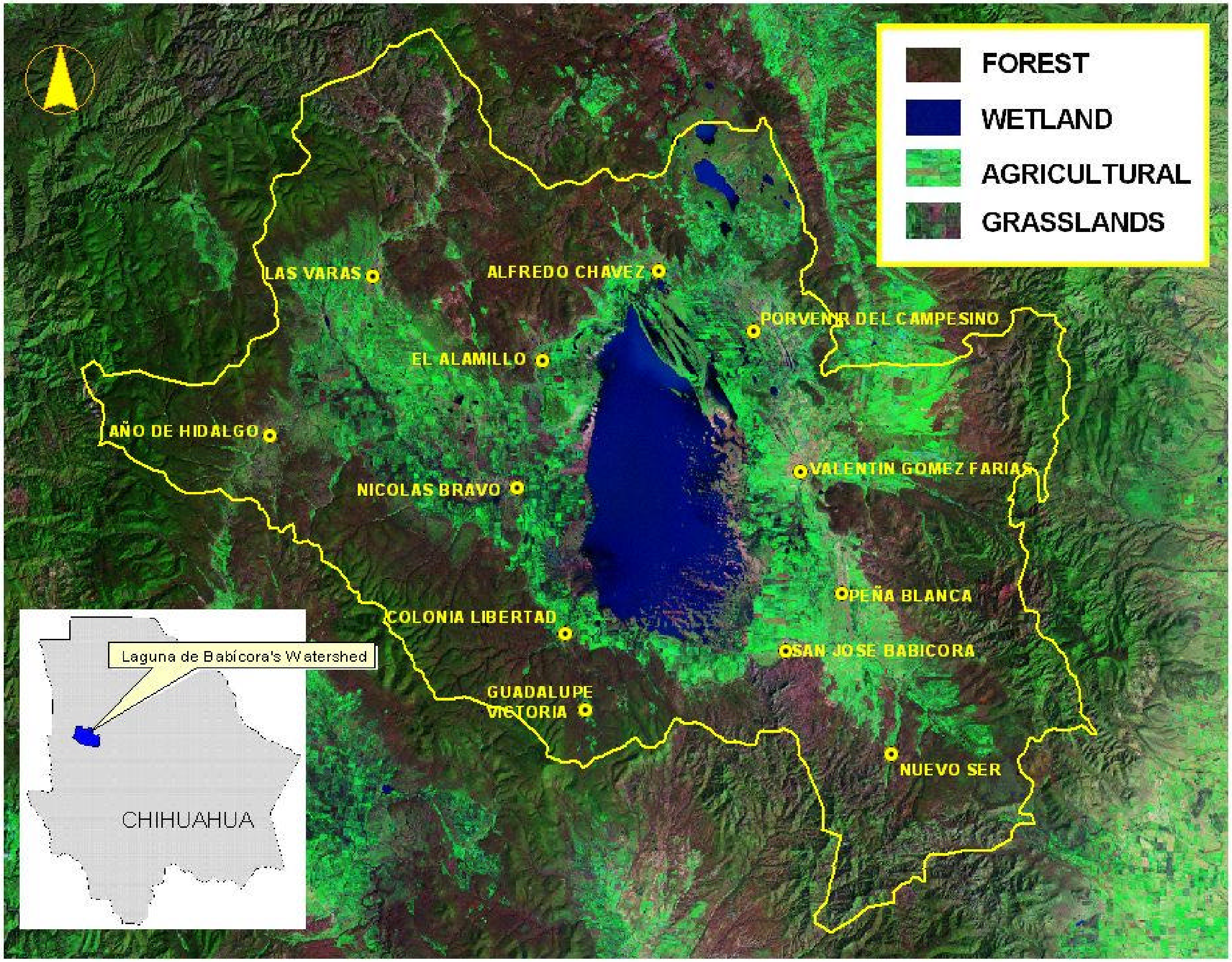

Figure 4.3. Geographic location of Laguna de Babicora's watershed, local communities and natural resources.

Conservation planning included a wide range of tasks, including different types of inventories (i.e., biological, socio-economic), environmental education workshops, demonstration and rural development pilot projects, and dissemination of information (i.e., workshops, local newspapers, radio programs) (Facultad de Zootecnia-UACH 1998a). I selected Laguna de Babicora's planning effort to conduct this research for several reasons. First, I had direct access to individuals involved in the development of the management plan (e.g., planning team members, local communities). Second, the management plan was recently released (1998), therefore, planning team members' memory of the planning experience was still fresh. Third, the LBCP provided an opportunity to study conservation planning outside of natural protected areas.

4.6.2. Questionnaire design, stakeholder selection, and interviews

The first phase of questionnaire design consisted of identifying the most important conservation problems in the Laguna de Babicora Basin. Seven planning team members identified 10 of the 86 problems described in the LBCP management plan as the conservation priorities of the watershed. Then planning team members were asked to redefine, in as much detail as possible, these conservation priorities (e.g., indicators of geographic location, causative agents, scale). In addition, team members were asked to identify potential partners and relevance of potential stakeholders for plan implementation. The interview protocol designed to perform these interviews is found in Appendix D. The 10 problems selected were later tested with 8 potential stakeholders outside the planning team. Based on these responses, the 10 conservation priorities were subdivided into 26 problem-related statements (Appendix E).

In the second phase of questionnaire design, I developed an interview instrument to assess opportunities and limitations associated with addressing identified problems. The interview instrument consisted of 2 major sections: the list of 26 identified conservation priorities for the watershed and 14 open-ended questions specifically crafted to present likely scenarios while addressing the conservation priorities for the watershed. In addition, relevant issues to the structure and functioning of local communities, including changes in land tenure were explored (Appendix E). This questionnaire was pre-tested with 7 potential respondents during the summer of 2000.

4.6.2.1. *<u>Selection of potential interviewees</u>*

Potential respondents were identified based on the recommendations of planning team members. Identification criteria included legal mandates (e.g., local, state and federal agencies), ownership rights (e.g., landowners), resource use (e.g., outfitters) and expressed interests (e.g., consultants). Potential interviewees were classified in 3 spatial scales (1) local community authorities, (2) representatives from regional stakeholders (e.g., farmer organizations), and (3) staff from federal natural resource agencies. I conducted 75 interviews between August and December 2000 with respondents from 12 rural communities, 11 regional interest groups, and 3 federal natural resource agencies (Table 4.1). All respondents were first asked to rate the 26 problems on a 1-10 scale.

Due to differences of spatial scale, potential respondents from each stakeholder category were approached differently. For example, rural community members and regional stakeholders (e.g., county authorities) were asked to indicate the relevance of solving the problems for their constituencies (i.e., 1 - not important, 10 - very important), while staff from natural resource agencies were first asked to indicate whether or not these problems were their responsibility. Then they were asked to identify the priority of these problems for their agency (i.e., 1 – there is no interest in addressing this problem, 10 – it is a high priority in our agenda).

Table 4.1. Number of interviews, and acronyms used for identification purposes among stakeholder categories related to the conservation of Laguna de Babicora's Watershed

Stakeholder	Acronym	# Interviews
A) Rural Communities		
a.1) Colonias		
San Jose Babicora	**SJB**	4
Colonia Libertad	**CLB**	4
Nicolás Bravo	**NB**	5
Colonia Alamillo	**CAL**	4
Año de Hidalgo	**ADH**	4
Las Varas	**LVS**	3
a.2) Ejidos		
Alfredo Chávez	**ACH**	4
Porvenir del Campesino	**PC**	4
Gómez Farías	**GF**	4
Peña Blanca	**PB**	4
Nuevo Ser	**NS**	4
Guadalupe Victoria	**GV**	4
B) Regional stakeholders		
Gómez Farías Mayor	**GFM**	1
Madera Mayor	**MM**	1
Gómez Farías Cattlemen Association	**GFCA**	1
Madera Cattlemen Association	**MCA**	1
Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (G. Farías' office)	**GFSAG**	1
Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (Madera's office)	**MSAG**	1
Conservation and Development Forestry Unit (Babícora-Casas Grandes)	**UCDF**	1
Fiduciaries for Agriculture (FIRA) – Bank of Mexico	**FIRA**	2
National Research Institute for Forestry, Agriculture and Animal Husbandry (Madera County)	**INIFAP**	1
Hunting Expeditions (outfitters) (Babícora)	**OFIT**	1
Secretariat of Health (Gómez Farías office)	**SSA**	1
C) Federal Natural Resource Agencies		
Secretariat of the Environment and Natural Resources	**SEMARNAT**	4
National Water Commission	**CONAGUA**	7
Federal Prosecutor Office of the Protection of the Environment	**PROFEPA**	4
Total		75

After rating the problems, respondents from all stakeholder categories were asked to select the problem they considered to be the most important or urgent based on their expressed interests, perceptions or responsibilities. Interviews focused on the problems selected as most important. Descriptive statistics (e.g., frequency tables, median ratings) were used to analyze differences in ratings among the 5 stakeholder categories (e.g., local communities, regional stakeholders). Qualitative data were analyzed using content analysis.

4.7 Results

4.7.1. Quantitative Data: Problem ratings

4.7.1.1. *Problem ratings by stakeholder category*

I grouped problems into 5 natural resource categories (water, soils, forest, grasslands, and wildlife). An additional 5 problems related to either resource administration or quality of life were grouped under an "other" category (Appendix E). Problems ratings were initially analyzed by stakeholder category. Three major categories were defined: local communities (n=12), regional stakeholders (n=11) and federal natural resource agencies (SEMARNAT, CONAGUA, PROFEPA). Median ratings and range of ratings were identified for each problem within each stakeholder category. Although this level of analysis appeared to provide an initial, overall understanding of stakeholders' priorities and interests, this approach disregarded the natural diversity in stakeholder responses. This affected how stakeholder responses could be interpreted, particularly for responses from local communities and regional stakeholders.

First, high or low median rating values from individual groups were likely to be concealed by using median ratings per stakeholder category. For example, according to rating ranges, some regional stakeholders (RSTKs) rated some water-related problems a high priority (7 or higher). However, median ratings for the regional stakeholder category suggests that all water-related-problems were medium or low priority for this stakeholder category (Table 4.2). Similar patterns were detected for problems in remaining resource categories with the exception of problems in the "other" category (Table 4.3).

Table 4.2. Median ratings, minimum and maximum ratings (in parentheses) for water, soils and forest-related problems for local communities (LC), regional stakeholders (RSTKs), and federal natural resource agencies determined during interviews at Laguna de Babicora, Chihuahua, and Chihuahua City, Mexico between August and December 2000.

	STAKEHOLDER CATEGORY				
	LC	**RSTK**	**SEMARNAT**	**CONAGUA**	**PROFEPA**
Inefficient/non-existent sewage infrastructure (Water 1)	8 (1-10)	2 (1-10)	1 (1-9)	9 (1-10)	7.5 (1-8)
Lack of garbage collection service or dumping sites (Water 2)	7 (1-10)	6 (1-10)	1 (1-3)	8 (1-10)	6 (1-10)
Lack of law enforcement for trash disposal on creeks (Water 3)	8 (1-10)	2 (1-10)	1 (1-1)	10 (4-10)	7 (1-10)
Lack of sewage treatment program or facilities (Water 4)	8 (1-10)	5 (1-10)	1 (1-1)	10 (1-10)	7.5 (1-10)
Intense use of fertilizers in agriculture (Water 5)	5 (1-10)	2 (1-8)	3 (1-9)	10 (1-10)	7.5 (1-10)
Drainage of the wetland for agricultural purposes (Soil 1)	2 * (1-10)	3 (1-10)	1 (1-10)	3 (1-10)	6 (1-10)
Drilling of wells for agriculture (Soil 2)	10 (1-10)	5 (1-10)	1 (1-1)	10 (5-10)	4.5 (1-5)
Extraction of sand and pebbles from creek banks (Soils 3)	4.5 ** (1-10)	2 (1-6)	5 (1-10)	10 (5-10)	8 (1-10)
Soils erosion (Soil 4)	6 (1-10)	6 (1-10)	5.5 (1-10)	5 (1-10)	10 (10-10)
Salinization in some areas of the watershed (Soil 5)	3 * (1-10)	2 † (1-5)	1 (1-10)	5 (1-10)	4 (1-7)
Opening of forested land for agriculture (Forest 1)	1 (1-9)	3 (1-10)	10 (1-10)	5 (1-10)	10 (9-10)
Overexploitation of forested areas within your community (Forest 2)	3 (1-10)	3 (1-10)	10 (1-10)	10 (1-10)	10 (10-10)
Harvesting of pine and oak trees for fuel, and Juniper for poles (Forest 3)	5 (1-10)	3 (1-10)	9 (1-10)	5 (1-10)	10 (9-10)
Higher abundance of f Juniper around your community (Forest 4)	5 (1-10)	2 (1-10)	5 (1-10)	5 (1-10)	6.5 (5-10)

* 29 valid observations; † 9 valid observations; ** 44 valid observations

Table 4.3. Median ratings, minimum and maximum ratings (in parentheses) for grassland-, wildlife-related problems, and problems in other categories for local communities (LC), regional stakeholders (RSTKs), and federal natural resource agencies determined during interviews at Laguna de Babicora, Chihuahua, and Chihuahua City, Mexico between August and December 2000.

	STAKEHOLDER CATEGORY				
	LC	**RSTKs**	**SEMARNAT**	**CONAGUA**	**PROFEPA**
No interest in collective work for grasslands use/protection (Grass 1)	5 (1-10)	5 ★ (1-10)	1 (1-9)	5 (1-8)	7 (1-10)
Opening of grasslands for agriculture (Grass 2)	1 + (1-7)	1 (1-5)	4.5 (1-10)	5 (1-10)	6 (1-8)
Overgrazing (Grass 3)	8 (1-10)	4 (1-10)	5 (1-10)	5 (1-10)	7 (1-10)
Disappearance of native grasslands species and higher weed densities in the wetland (Grass 4)	5 (1-10)	4 (1-10)	1 (1-10)	5 (1-10)	5.5 (1-7)
Damage to corn and oat crops by cranes (Wildlife 1)	5 (1-10)	2 (1-5)	1 (1-9)	5 (1-10)	5 (1-5)
No interest on collectively pursuing new economic enterprises such as hunting (wildlife 2)	2 (1-10)	3 (1-9)	5.5 (1-10)	2 (1-10)	7 (2-10)
Little local interest on protecting the lagoons for the cranes (Wildlife 3)	7 ✉ (1-10)	5 (1-10)	5.5 (1-10)	4 (1-10)	10 (6-10)
Overall lack of enforcement in natural resource protection (Others 1)	8 (1-10)	8.5 ★ (1-10)	1 (1-10)	10 (5-10)	10 (8-10)
Flooding (Others 2)	2 (1-10)	1 (1-3)	1 (1-5)	10 (1-10)	5.5 (1-8)
Lack of training in agriculture (Others 3)	8 (1-10)	5 ★ (1-10)	1 (1-9)	5 (1-10)	5.5 (1-10)
Lack of training in cattle raising (Others 4)	8 (1-10)	7 ★ (1-10)	1 (1-9)	5 (1-10)	6.5 (1-10)
Lack of training in forest use and protection (Others 5)	8 (1-10)	7 ★ (2-9)	9.5 (8-10)	5 (1-10)	10 (1-10)

+ 36 valid observations; ✉ 40 valid observations; ★ 10 valid observations

Second, median ratings failed to provide detailed information when specific problems were irrelevant or not applicable for stakeholder groups. For example, the problem of drainage of wetlands for agricultural purposes was only relevant for local communities with access to the wetland (n=7) (Table 4.4). Communities such as colonia Año de Hidalgo, and ejido Nuevo Ser, among others, regarded this problem as irrelevant for them since they are located in the upstream portion of the watershed (Figure 4.3). Similar patterns were identified for some grassland- and wildlife-related problems (Table 4.5).

Finally, ranges of rating had little descriptive power. For example, with the exception of the problems of opening of forests (forest 1), and grasslands (grass 2) for agriculture, ranges of ratings from local communities ranged from 1 to 10 for the remaining 24 problems (Table 4.2, Table 4.3). This is likely to hinder of the ability resource planners to identify individual stakeholder groups that behave considerably different from the rest of individual groups within a stakeholder category. For example, at least 7 local communities showed widespread ranges (e.g., 3 to 10 from respondents from ejido Nuevo Ser) for the problem of lack of appropriate sewer systems (water 1) whereas 5 communities showed consistent, less widespread ranges. All respondents from colonia San Jose Babicora rated this problem as a 10, whereas respondents from ejido Guadalupe Victoria rated this problem 8 or higher (Table 4.4). In order to recognize response variability within stakeholder categories, data were analyzed based on natural boundaries: 12 local communities, 11 regional stakeholders, and 3 federal natural resource agencies.

4.7.1.2. Frequency per problem: Variability within stakeholder categories

Respondents from local communities rated most water-related issues as a high priority. With the exception of respondents from Porvenir del Campesino (PC), and San Jose Babicora

(SJB), median ratings were consistently high across all local communities (Table 4.4). Median ratings from PC were medium or low for all water related problems, whereas median ratings from San Jose Babicora were medium or low for 2 water-related problems (e.g., lack of garbage dumping sites - water 2). In contrast, between 5 and 7 regional stakeholders rated every water-related problem a medium or low priority (Table 4.5) including Gomez Farias cattlemen association (CA), outfitters, and the Madera County Mayor. Median ratings from SEMARNAT respondents were low for all water-related problems, whereas median ratings for CONAGUA and PROFEPA were high for most of these problems (Table 4.6).

Median ratings from local communities for soil-related problems were mixed. Three problems had low median ratings from almost all local communities (wetland drainage for agricultural purposes – soil 1, extraction of sand and pebbles – soil 3, wetland salinization – soil 5). Well drilling for agriculture (soil 2) was the only soil-related problem consistently rated a high priority by local communities (Table 4.4). Six or more regional stakeholders rated soil-related problems a medium or high priority (Table 4.5). Two problems received no high priority ratings by regional stakeholders (extraction of sand and pebbles – soil 3, wetland salinization – soil 5). In contrast, problems such as wetland drainage for agriculture (soil 1), and well drilling for agriculture were rated a high priority by 2 and 5 regional stakeholders, respectively. Median ratings from SEMARNAT respondents were medium or low for all soil-related problems. Well drilling for agriculture (soil 2) and extraction of sand and pebbles (soil 3) were the only problems with high median ratings from CONAGUA respondents. Only two soil-related problems (extraction of sand and pebbles, soil erosion) received high median ratings from respondents from PROFEPA. Remaining problems were a medium or low priority from respondents from PROFEPA (Table 4.6).

Table 4.4. Median ratings values and rating ranges for water-, soil-, and forest-related problems at the watershed level (W) and from respondents from ejidos of Gomez Farias (GF), Peña Blanca (PB), Porvenir del Campesino (PC), Nuevo Ser (NS), Alfredo Chavez (ACH), and Guadalupe Victoria (GV), from colonias Alamillo (CAL), Año de Hidalgo (ADH), San Jose Babicora (SJB), Colonia Libertad (CLB), Nicolas Bravo (NB), and Las Varas (LVS) from ratings collected during interviews conducted between August and December 2000 at Laguna de Babicora, Chihuahua, Mexico.

	Problem Ratings												
		Ejidos						**Colonias**					
	W	**GF**	**PB**	**PC**	**NS**	**ACH**	**GV**	**CAL**	**ADH**	**SJB**	**CLB**	**NB**	**LV**
Lack sewer systems (Water 1)	8 1-10	7 5-10	8.5 8-10	2 1-5	6 3-10	7 2-9	10 8-10	8.5 7-10	9.5 7-10	10 10-10	8 3-8	8 3-10	10 7-10
Lack of garbage dumping sites (Water 2)	7 1-10	2.5 1-4	7.5 5-10	5.5 1-6	8 6-10	7.5 4-8	6 2-8	10 8-10	6 1-10	2 1-3	7 1-10	8 3-8	10 8-10
No enforcement for trash disposal (Water3)	8 1-10	9.5 5-10	8 8-10	5.5 2-7	7.5 5-9	9.5 9-10	8 6-10	8 7-10	9 3-10	5 1-8	8.5 6-10	7 7-9	7 5-10
No sewage treatment programs (Water 4)	8 1-10	8.5 5-10	8 8-9	5.5 2-6	5.5 2-9	7 4-10	9.5 7-10	10 8-10	7.5 5-10	9 7-10	7 2-8	9 6-10	1 1-10
High fertilizer use in agriculture (Water 5)	5 1-10	2.5 1-4	5.5 2-8	5.5 5-8	4 1-9	4 2-9	2.5 2-7	4.5 4-5	5.5 3-6	7 5-10	3.5 1-5	6 1-8	1 1-1
Wetland drainage for agricultural purposes (Soil 1)	2 * 1-10	2 1-3	2 1-8	1 1-2	NA	NA	NA	1.5 1-6	NA	1.5 1-2	2-5 1-10	2 1-6	NA
Well drilling for agriculture (Soil 2)	10 1-10	9.5 3-10	10 9-10	6.5 4-10	9.5 1-10	10 10-10	8.5 2-10	10 5-10	10 10-10	10 8-10	9.5 8-10	9 8-10	9 8-10
Extraction of sand and pebbles (Soils 3)	4.5 ** 1-10	4 2-8	8 5-10	4 1-5	1.5 1-8	5 2-9	1 1-1	4.5 1-10	NA	5 5-8	3 1-7	5 1-8	5 3-7
Soils erosion (Soil 4)	6 1-10	9 5-10	9.5 8-10	7 3-10	2 1-9	4 1-9	7 1-10	10 9-10	4.5 3-10	5 1-8	2.5 1-5	6 3-9	3 3-4
Wetland salinization (Soil 5)	3 * 1-10	3.5 2-10	5.5 2-7	2 1-3	NA	NA	NA	7.5 1-10	NA	3.5 1-8	3.5 3-8	3 1-9	NA
Opening of forested land for agriculture (Forest 1)	1 1-9	1 1-4	3 2-4	2 1-4	1 1-9	1 1-2	1.5 1-4	2.5 1-5	1 1-1	1 1-1	1 1-1	1 1-1	1 1-1
Forest overexploitation (Forest 2)	3 1-10	9 1-10	10 8-10	7.5 1-10	2.5 1-8	2 2-4	2.5 2-9	2.5 1-10	4 1-8	3 3-8	1.5 1-3	5 1-8	1 1-1
High harvesting of fuel wood and poles (Forest 3)	5 1-10	10 7-10	9.5 8-10	6.5 2-10	4 1-8	6 3-10	3 1-5	6.5 1-9	4.5 3.6	9 4-10	5.5 3-10	5 1-8	1 1-1
Higher Juniper densities (Forest 4)	5 1-10	3 1-5	6 4-6	1.5 1-3	2 1-8	8 3-9	2.5 1-6	9 3-10	9 8-10	6 1-8	4.5 2-5	2 1-8	10 10-10

* 29 valid observations; ** 44 valid observations

Table 4.5. Median ratings and ratings values for water-, soil-, and forest-related problems at the watershed level (region) and from individual regional stakeholders from the counties of Gomez Farias and Madera including county mayors, cattlemen associations (CA), regional offices of secretariat of animal husbandry and rural development (SG) health department (SSA), national institute of research on agriculture and forestry (INIFAP), and fiduciaries for agriculture (FIRA), local outfitters (OUFIT), and forestry consultants (FC) from ratings collected during interviews conducted between August and December 2000 at Laguna de Babicora, Chihuahua, Mexico.

	Problem Rating											
		Gomez Farias County				**Madera County**						
	Region	Mayor	CA	SG	SSA	OFIT	Mayor	CA	SG	FC	INIFAP	FIRA
Lack sewer systems (Water 1)	2	10	10	1	2	10	7	1	8	2	1	1
Lack of garbage dumping sites (Water 2)	6	10	10	6	3	8	8	1	10	1	1	1
No enforcement for trash disposal (Water3)	2	1	10	8	2	10	8	1	10	1	1	1
No sewage treatment programs (Water 4)	5	6	10	5	2	10	9	1	8	1	1	1
High fertilizer use in agriculture (Water 5)	2	2	8	1	1	2	2	2	5	1	8	6
Wetland drainage for agricultural purposes (Soil 1)	3	6	5	1	2	1	10	2	3	3	7	1
Well drilling for agriculture (Soil 2)	5	1	10	10	1	5	9	5	10	1	4	7
Extraction of sand and pebbles (Soils 3)	2	5	5	1	1	5	2	5	6	1	1	2
Soils erosion (Soil 4)	6	8	10	8	1	1	6	5	6	6	8	4
Wetland salinization (Soil 5)	2†	2	5	2	1	1	3	1	4	1	5	2
Opening of forested land for agriculture (Forest 1)	3	2	5	1	1	1	9	3	2	7	10	3
Forest overexploitation (Forest 2)	3	3	5	2	1	10	8	3	2	9	10	2
High harvesting of fuel wood and poles (Forest 3)	3	3	10	10	2	1	4	1	3	8	10	2
Higher Juniper densities (Forest 4)	2	2	10	1	1	2	5	1	3	5	10	2

† 9 valid observations

Table 4.6. Median ratings and rating ranges for water-, soil-, and forest-related problems from respondents from SEMARNAT, CONAGUA, and PROFEPA from ratings collected during interviews conducted between August and December 2000 at Chihuahua City, Chihuahua, Mexico.

	Problem Rating		
Problem Identification	**SEMARNAT**	**CONAGUA**	**PROFEPA**
Lack sewer systems (Water 1)	1 1 – 9	9 1 – 10	7.5 1 – 8
Lack of garbage dumping sites (Water 2)	1 1 – 3	8 1 – 10	6 1 – 10
No enforcement for trash disposal (Water3)	1 1 – 1	10 4 – 10	7 1 – 10
No sewage treatment programs (Water 4)	1 1 – 1	10 1 – 10	7.5 1 – 10
High fertilizer use in agriculture (Water 5)	3 1 – 9	10 1 – 10	7.5 1 – 10
Wetland drainage for agricultural purposes (Soil 1)	1 1 – 10	3 1 – 10	6 1 – 10
Well drilling for agriculture (Soil 2)	1 1 – 1	10 1 – 10	4.5 1 – 5
Extraction of sand and pebbles (Soils 3)	5 1 – 10	10 5 – 10	8 1 – 10
Soils erosion (Soil 4)	5.5 1 – 10	5 1 – 10	10 1 – 10
Wetland salinization (Soil 5)	1 1 – 10	5 1 – 10	4 1 – 7
Opening of forested land for agriculture (Forest 1)	10 1 – 10	5 1 – 10	10 9 – 10
Forest overexploitation (Forest 2)	10 1 – 10	10 1 – 10	10 10 – 10
High harvesting of fuelwood and poles (Forest 3)	9 1 – 10	5 1 – 10	10 9 – 10
Higher Juniper densities (Forest 4)	5 1 – 10	5 1 – 10	6.5 5 – 10

Local communities in general had medium or low median ratings for all forest-related problems. Low ratings were particularly consistent for the problem of opening of forested areas for agriculture (forest 1). Among the few problems to receive high priority ratings were forest overexploitation (forest 2) and high harvesting of fuel wood and poles (forest 3) which were highly rated by the communities of Gomez Farias and Peña Blanca. Three colonias (Alamillo, Año de Hidalgo, Las Varas) had high median ratings for the problem of high juniper densities (forest 4). Seven or more regional stakeholders rated these problems a medium or low priority. Forestry consultants and personnel from the National Institute of Research on Agriculture and Forestry (INIFAP) were the two regional stakeholders consistently rating forest-related problems a high priority. Madera County Mayor rated 2 problems as a high priority (opening of forested lands for agriculture – forest 1, forest overexploitation – forest 2). Median ratings from personnel of SEMARNAT and PROFEPA were high for 3 problems (opening of forested lands for agriculture, forest overexploitation, high harvesting of fuel wood and poles). In contrast, median ratings from CONAGUA personnel were high only for one problem (forest overexploitation).

Only two grassland-related problems were consistently rated a high priority by most local communities (overgrazing – grass 3, changes in plant composition – grass 4). Three participating ejidos (Porvenir del Campesino, Nuevo Ser, Alfredo Chavez) and one colonia (Alamillo) had high median ratings in grassland management (grass 1) (Table 4.7). All local communities either rated the problem of opening of grasslands for agriculture (grass 2) a low priority or the problem was irrelevant for them. The Gomez Farias Mayor and cattlemen association were among the few regional stakeholders who rated 3 of the grassland-related problems as a high priority (Table 4.8).

Table 4.7 Median ratings values and rating ranges for grassland-, and wildlife-related problems, and problems in "other" category at the watershed level (W) and from respondents from ejidos of Gomez Farias (GF), Peña Blanca (PB), Porvenir del Campesino (PC), Nuevo Ser (NS), Alfredo Chavez (ACH), and Guadalupe Victoria (GV), from colonias Alamillo (CAL), Año de Hidalgo (ADH), San Jose Babicora (SJB), Colonia Libertad (CLB), Nicolas Bravo (NB), and Las Varas (LVS) from ratings collected during interviews conducted between August and December 2000 at Laguna de Babicora, Chihuahua, Mexico.

	Problem Ratings												
	W	**GF**	**PB**	**PC**	**NS**	**ACH**	**GV**	**CAL**	**ADH**	**SJB**	**CLB**	**NB**	**LV**
No interest in grasslands management (Grass 1)	5 1-10	3.5 1-10	6.5 5-10	8.5 1-10	7.5 5-8	9 5-10	4 2-7	7 4-10	6.5 5-8	2.5 1-6	3 1-10	3 2-6	4 3-9
Opening of grasslands for agriculture (Grass 2)	1 + 1-7	1 1-5	2.5 1-5	2 1-4	1 1-7	NA	NA	2.5 1-4	NA	1 1-1	1 1-2	1 1-1	3 1-4
Overgrazing (Grass 3)	8 1-10	9 2-10	8 1-8	7 3-8	9 6-10	9 2-10	6 1-8	10 7-10	8 5-10	4 1-8	6.5 3-9	8 7-10	9 8-10
Changes in plant composition (Grass 4)	5 1-10	10 5-10	9.5 3-10	4 3-8	6.5 2-8	3 2-5	2 1-5	8 4-8	6 2-8	5 3-6	8 1-10	8 5-9	1 1-2
Damage to corn and oat crops by cranes (Wildlife 1)	5 1-10	6.5 1-10	8 5-10	4.5 2-7	1 1-4	2.5 1-8	1 1-1	7.5 4-9	5.5 3.7	6.5 6-8	7 5-8	5 3-8	1 1-1
No interest on pursuing enterprises like hunting (wildlife 2)	2 1-10	2 1-9	4 1-9	5.5 2-6	1.5 1-2	5.5 1-10	4.5 2-8	3 1-5	2.5 1-6	7 2-8	2 1-2	4 1-8	1 1-1
No interest on wetland conservation (Wildlife 3)	7 ✉ 1-10	5 3-10	7 2-8	6 2-7	NA	NA	NA	3 1-4	NA	7.5 1-9	3.5 1-10	8 7-8	NA
Lack of environmental enforcement (Others 1)	8 1-10	7.5 1-10	9 8-10	8 4-8	8 5-9	8.5 7-10	6 2-10	9 6-10	9.5 4-10	5 2-10	7.5 3-10	8 5-8	6 4-7
Flooding (Others 2)	2 1-10	1 1-1	2.5 1-5	3 2-10	1 1-8	1 1-5	1 1-1	4.5 2-10	8 5-8	2 1-8	2.5 1-9	2 1-4	3 1-8
Lack of training in agriculture (Others 3)	8 1-10	9.5 8-10	8.5 6-10	7 4-10	8.5 5-9	7 2-9	6.5 5-10	9 5-10	9.5 8-10	3.5 1-8	4.5 2-7	8 7-8	7 4-9
Lack of training in cattle raising (Others 4)	8 1-10	9 1-10	8.5 7-10	8 6-10	8 5-9	7 2-9	6.5 1-10	8.5 3-10	10 9-10	8 2-10	4 2-8	8 5-8	8 7-10
Lack of training in forest management (Others 5)	8 1-10	9 7-10	8.5 8-10	8 3-10	9 7-10	5 4-9	7 2-8	8.5 4-10	9 5-10	7 1-10	7 6-8	8 7-9	8 8-9

+ 36 valid observations; ✉ 40 valid observations;

Table 4.8. Median ratings and ratings values for grassland-, wildlife-related problems, and problems in "other" category at the watershed level (region) and from individual regional stakeholders from the counties of Gomez Farias and Madera including county Mayors, cattlemen associations (CA), regional offices of secretariat of animal husbandry and rural development (SG) health department (SSA), national institute of research on agriculture and forestry (INIFAP), and fiduciaries for agriculture (FIRA), local outfitters (OUFIT), and forestry consultants (FC) from ratings collected during interviews conducted between August and December 2000 at Laguna de Babicora, Chihuahua, Mexico.

	Problem Ratings											
		Gomez Farias County				**Madera County**						
	Region	Major	CA	SG	SSA	OFIT	Major	CA	SG	FC	INIFAP	FIRA
No interest in grasslands management (Grass 1)	5	10	10	6	NA	7	6	3	4	1	4	4
Opening of grasslands for agriculture (Grass 2)	1	1	5	1	1	1	1	5	1	1	4	2
Overgrazing (Grass 3)	4	8	10	5	1	5	2	5	2	4	4	4
Changes in plant composition (Grass 4)	4	8	10	5	2	1	3	5	3	3	3	4
Crop damage and oat crops by cranes (Wildlife 1)	2	2	5	5	2	3	1	3	3	1	2	1
No interest on hunting enterprises (wildlife 2)	3	2	5	1	1	7	6	5	9	3	3	3
No interest on wetland conservation (Wildlife 3)	5	6	5	1	1	10	8	5	9	1	3	1
Lack of environmental enforcement (Others 1)	8.5	5	10	9	NA	10	10	2	10	7	8	1
Flooding (Others 2)	1	1	1	1	1	2	1	2	3	1	2	1
Lack of training in agriculture (Others 3)	5	7	7	9	NA	10	3	3	3	1	3	7
Lack of training in cattle raising (Others 4)	7	7	9	9	NA	8	4	10	4	1	3	7
Lack of training in forest management (Others 5)	7	7	9	2	NA	9	8	2	5	7	9	7

Regional stakeholders groups consistently rated the problem of opening of grasslands for agriculture (grass 2) as a low priority (Table 4.8). Remaining grassland-related problems were rated either a medium or low priority by regional stakeholders. With the exception of median ratings for grassland management (grass 1) and overgrazing (grass 3) from PROFEPA personnel, median ratings for grassland-related problems were either medium or low from most natural resource agencies. (Table 4.9).

Wildlife-related problems had medium or low median ratings from most communities. Only respondents from ejido Peña Blanca, and colonias Alamillo and Libertad rated crop damage by cranes and geese (wildlife 1) a high priority. Lack of interest in pursuing hunting enterprises (wildlife 2) received a high priority rating only from respondents from colonia San Jose Babicora. Lack of interest in wetland conservation (wildlife 3) was considered a high priority in only three communities (e.g., Nicolas Bravo). This problem was either a low priority or was not relevant for many of local communities (e.g., ejido Nuevo Ser, ejido Guadalupe Victoria) (Table 4.7). Only local outfitters (OUFIT) and the regional office of the Secretariat for Animal Husbandry and Rural Development at Madera County (SG) considered some wildlife-related problems a high priority (hunting enterprises – wildlife 2, wetland conservation – wildlife – 3) (Table 4.8). The majority of regional stakeholders rated wildlife-related problems as a low priority. Median ratings from personnel from SEMARNAT and CONAGUA were either medium or low for wildlife-related problems. Only personnel from PROFEPA recognized hunting enterprises and wetland conservation a high priority in the area (Table 4.9).

Overall, most local communities had high median ratings for problems related to enforcement of environmental laws or training. Flooding (other 2) was the only problem in the "other" category with low median ratings from 11 communities.

Table 4.9. Median ratings and rating ranges for grassland-, and wildlife-related-problems, and problems in "other" category from respondents from SEMARNAT, CONAGUA, and PROFEPA from ratings collected during interviews conducted between August and December 2000 at Chihuahua City, Chihuahua, Mexico.

	Problem Rating		
Problem Identification	**SEMARNAT**	**CONAGUA**	**PROFEPA**
No interest in grasslands management (Grass 1)	1 1 – 9	5 1 – 8	7 1 – 10
Opening of grasslands for agriculture (Grass 2)	4.5 1 – 10	5 1 – 10	6 1 – 8
Overgrazing (Grass 3)	5 1 – 10	5 1 – 10	7 1 – 10
Changes in plant composition (Grass 4)	1 1 – 10	5 1 – 10	5.5 1 – 7
Crop damage and oat crops by cranes (Wildlife 1)	1 1 – 9	5 1 – 10	5 1 – 5
No interest on hunting enterprises (wildlife 2)	5.5 1 – 10	2 1 – 10	7 1 – 10
No interest on wetland conservation (Wildlife 3)	5.5 1 – 10	4 1 – 10	10 6 – 10
Lack of environmental enforcement (Others 1)	1 1 – 10	10 5 – 10	10 8 – 10
Flooding (Others 2)	1 1 – 5	10 1 – 10	5.5 1 – 8
Lack of training in agriculture (Others 3)	1 1 – 9	5 1 – 10	5.5 1 – 10
Lack of training in cattle raising (Others 4)	1 1 – 9	5 1 – 10	6.5 1 – 10
Lack of training in forest management (Others 5)	9.5 8 – 10	5 1 – 10	10 1 – 10

Only respondents from Año de Hidalgo had high median ratings for flooding (Table 4.8). Three problems in the "other" category (enforcement of environmental regulations – other 1, lack of training in cattle ranching – other 4, lack of training in forest management and conservation – other 5) had high median ratings from at least 7 or more regional stakeholders (e.g., Gomez Farias County Mayor, cattlemen association, local outfitters). In contrast, median ratings from SEMARNAT's respondents were high only for training in forest management (other 5). Median ratings from PROFEPA representatives were high only for the problem of enforcement of environmental regulations (other 1). Only enforcement of environmental regulations (other 1) and flooding (other 2) were considered high priorities from CONAGUA personnel. Although some CONAGUA respondents regarded training-related problems as high priorities, these problems received medium median ratings (Table 4.9).

4.7.1.3. *<u>Selected highest priorities across stakeholder categories</u>*

Sixteen community respondents spread across 9 participating communities identified drilling of wells for agriculture as the highest priority problem (Table 4.10). Only 2 other problems were identified as highest priorities by community respondents in at least 4 communities (lack of sewage infrastructure and overgrazing). Overall, 13 problems were identified by at least one community respondent as highest priority. Thirteen other problems were not identified by any community respondent as highest priority.

The 11 regional stakeholders identified 10 different problems as their highest priorities (Table 4.11). Only drilling of wells for agriculture (soil 2) and lack of training in forest management and conservation (other 5) (n=2) were identified by more than one regional stakeholder. Highest priority problems were spread across all problem categories except for wildlife.

Table 4.10. Selected highest priorities among local community leaders based on interviews conducted at Laguna de Babicora's watershed, Chihuahua, Mexico between August and December 2000.

	Local Communities														
Problem ID	**GF**	**PB**	**PC**	**NS**	**ACH**	**CAL**	**ADH**	**GV**	**SJB**	**CLB**	**NB**	**LVS**	**Total**	**Valid %**	**Cumulative %**
Wells for agriculture (Soil 2)		1	1	2	2	2		1	2	4	1		16	32.0	32.0
Lack sewer systems (Water 1)							2	2	1		1		6	12.0	44.0
Overgrazing (Grass 3)			1	1		1	1				1	1	6	12.0	56.0
Soils erosion (Soil 4)	2		1	1									4	8.0	64.0
Forest overexploitation (Forest 2)	1	1	1										3	6.0	70.0
High Juniper densities (Forest 4)												3	3	6.0	76.0
Plant diversity changes (Grass 4)	1	1									1		3	6.0	82.0
No environmental enforcement (Other 1)					1		1	1					3	6.0	88.0
High fuel wood/poles use (Forest 3)		1							1				2	4.0	92.0
No sewage treatment programs (Water 4)											1		1	2.0	94.0
Lack of training in agriculture (Other 3)						1							1	2.0	96.0
No training in cattle raising (Other 4)						1							1	2.0	98.0
Lack of training in forestry (Other 5)						1							1	2.0	100.0
No garbage dumping sites (Water 2)													0	0	
No trash disposal enforcement (Water 3)													0	0	
High fertilizer use in agriculture (Water 5)													0	0	
Wetland drainage for agriculture (Soil 1)													0	0	
Extraction of sand and pebbles (Soils 3)													0	0	
Wetland salinization (Soil 5)													0	0	
Opening forests for agriculture (Forest 1)													0	0	
No interest in rangeland upkeep (Grass 1)													0	0	
Clearing of grasslands (Grass 2)													0	0	
Waterfowl crop damage (Wildlife 1)													0	0	
No interest on hunting projects (wildlife 2)													0	0	
No interest on wetland conservation (Wild3)													0	0	
Flooding (Other 2)													0	0	

Table 4.11. Selected highest priorities among regional stakeholders based on interviews conducted at Laguna de Babicora's watershed, Chihuahua, Mexico between August and December 2000.

	Regional Stakeholders										
Problem ID	**GFCA**	**FIRA**	**OFIT**	**INIFAP**	**GFM**	**MM**	**GFSAG**	**MCA**	**UCDF**	**MSAG**	**Total**
Wells for agriculture (Soil 2)							1			1	2
Lack of training in forestry (Other 5)	1	1									2
Lack sewer systems (Water 1)					1						1
No sewage treatment programs (Water 4)			1								1
Wetland drainage for agriculture (Soil 1)						1					1
Opening forests for agriculture (Forest 1)				1							1
High Juniper densities (Forest 4)									1		1
Overgrazing (Grass 3)								1			1
Lack of training in agriculture (Other 3)		1									1
No training in cattle raising (Other 4)		1									1
No garbage dumping sites (Water 2)											0
No trash disposal enforcement (Water 3)											0
High fertilizer use in agriculture (Water 5)											0
Extraction of sand and pebbles (Soils 3)											0
Soils erosion (Soil 4)											0
Wetland salinization (Soil 5)											0
Forest overexploitation (Forest 2)											0
High fuel wood/poles use (Forest 3)											0
No interest in rangeland upkeep (Grass 1)											0
Clearing of grasslands (Grass 2)											0
Plant diversity changes (Grass 4)											0
Waterfowl crop damage (Wildlife 1)											0
No interest on hunting projects (wildlife 2)											0
No interest on wetland conservation (Wild3)											0
No environmental enforcement (Other 1)											0
Flooding (Other 2)											0

Fourteen representatives of 3 federal natural resource agencies identified only 7 different problems as their highest priorities (Table 4.12). Four of the 7 respondents from CONAGUA identified drilling of wells for agriculture as their highest priority. Excessive timber harvesting in the area (forest 2) was the only problem identified by more than one agency as its highest priority. Sixteen of the 26 problems were considered the highest priority in the watershed by at least one respondent within individual stakeholder categories. No problem was rated as the highest priority by respondents in more than 3 stakeholder categories (Table 4.13). Only 4 problems were rated as highest priorities for the watershed by members of 3 different stakeholder groups (water 1, soil 2, forest 2, other 5). Drilling of wells for agriculture (soil 2) was identified as the highest priority problem far more often than any other problem. Lack of sewage infrastructure (water 1) was the next most often problem identified as highest priority.

Problems not selected as highest conservation priorities for Laguna de Babicora's watershed were primarily related to human activities linked to environmental degradation of the area. This included either establishment/enforcement of environmental guidelines (enforcement of trash disposal – water 3), complex, unspecific problems (e.g., soil erosion – soil 4, changes in plant diversity – grass 4), resource administration (e.g., extraction of sand and pebbles – soil 3, high use of fuel wood and poles – forest 3). Only the wildlife-related problem category no problem rated as highest priority (Table 4.13).

Table 4.12. Selected highest priorities among natural resource agencies based on interviews conducted at Laguna de Babicora's watershed, Chihuahua, Mexico between August and December 2000.

	Natural Resource Agencies			
Problem ID	**SEMARNAT**	**CONAGUA**	**PROFEPA**	**Total**
Wells for agriculture (Soil 2)		4		4
Forest overexploitation (Forest 2)	1		2	3
Lack sewer systems (Water 1)		2		2
No environmental enforcement (Other 1)			2	2
Extraction of sand and pebbles (Soils 3)		1		1
Soils erosion (Soil 4)	1			1
Lack of training in forestry (Other 5)	1			1
No garbage dumping sites (Water 2)				0
No trash disposal enforcement (Water 3)				0
No sewage treatment programs (Water 4)				0
High fertilizer use in agriculture (Water 5)				0
Wetland drainage for agriculture (Soil 1)				0
Wetland salinization (Soil 5)				0
Opening forests for agriculture (Forest 1)				0
High fuel wood/poles use (Forest 3)				0
High Juniper densities (Forest 4)				0
No interest in rangeland upkeep (Grass 1)				0
Clearing of grasslands (Grass 2)				0
Overgrazing (Grass 3)				0
Plant diversity changes (Grass 4)				0
Waterfowl crop damage (Wildlife 1)				0
No interest on hunting projects (wildlife 2)				0
No interest on wetland conservation (Wildlife 3)				0
Flooding (Other 2)				0
Lack of training in agriculture (Other 3)				0
No training in cattle raising (Other 4)				0

Table 4.13. Comparisons across stakeholder categories for selected highest priorities at Laguna de Babicora's Watershed, Chihuahua, Mexico from interviews conducted at Laguna de Babicora, and Chihuahua City between August and December 2000.

Problem ID	Local Communities	Regional Stakeholders	SEMARNAT	CONAGUA	PROFEPA	Total	Valid %	Cumulative %
Soil 2	16	2	0	4	0	22	28.9	28.8
Water 1	6	1	0	2	0	9	11.8	40.6
Grass 3	6	1	0	0	0	7	9.2	49.8
Soil 4	4	0	1	0	0	5	6.6	56.4
Forest 2	3	0	1	0	2	6	7.9	64.3
Forest 4	3	1	0	0	0	4	5.3	69.6
Grass 4	3	0	0	0	0	3	3.9	73.5
Other 1	3	0	0	0	2	5	6.6	80.1
Forest 3	2	0	0	0	0	2	2.6	82.7
Water 4	1	1	0	0	0	2	2.6	85.3
Other 3	1	1	0	0	0	2	2.6	88.0
Other 4	1	1	0	0	0	2	2.6	90.5
Other 5	1	2	1	0	0	4	5.3	95.8
Soil 1	0	1	0	0	0	1	1.3	97.1
Forest 1	0	1	0	0	0	1	1.3	98.4
Soil 3	0	0	1	1	0	2	2.6	100.0

4.7.2. Qualitative Data: Interviews across stakeholder groups

In this section, I summarize responses to interview questions related to the 3 problems most commonly rated as the highest priority by respondents from 3 stakeholder categories: drilling of wells for agriculture (soil 2), lack of sewage infrastructure (water 1) and excessive timber harvesting in the area (forest 2) (Table 4.13). In addition, I summarize responses to questions that were not issue specific (e.g., changes in land tenure in Mexico). The text of all questions is contained in Appendix E.

Differences in scale (e.g., local communities vs. natural resource agencies) among stakeholder categories required some modifications to stakeholder questionnaires in several major areas. First, the question "Explain why it is important for your community to solve this problem?" was rephrased when addressing natural resource agency personnel because their involvement is defined by legal mandates and national policies and programs rather than personal perceptions. To gather information relevant to this issue, natural resource agency personnel were asked to indicate whether or not the problem was part of their responsibility. Once responsibility was established, respondents were asked how much of a priority this problem was for their agency. Second, respondents were asked to explain how their priorities were being defined, and also whether or not their priorities could be modified.

4.7.2.1. Drilling of wells for agriculture (soil 2)

This problem was selected as the highest priority by members from 5 ejidos, 4 colonias, 2 regional stakeholders and 4 personnel from CONAGUA (Table 4.14). Respondents from local communities selected this problem mostly for economic reasons. Local respondents believed that drilling wells for agriculture would (1) improve existing farming systems, (2) complement

Table 4.14. Respondents who selected the problem of drilling of wells for agriculture (soil 2) as their highest priority during interviews conducted between August and December 2001 at Laguna de Babicora, and Chihuahua City, Chihuahua, Mexico.

STAKEHOLDER TYPE	Frequencies
a) Local Communities	
Ejido Alfredo Chavez (ACH)	2
Ejido Guadalupe Victoria (GV)	1
Ejido Nuevo Ser (NS)	2
Ejido Peña Blanca (PB)	1
Ejido Porvenir del Campesino (PC)	1
Colonia Alamillo (CAL)	2
Colonia Libertad (CLB)	4
Colonia Nicolas Bravo (NB)	1
Colonia San Jose Babicora (SJB)	2
b) Regional Stakeholders	
SAGAR at Gomez Farias County	1
SAGAR at Madera County	1
c) Federal Natural Resource Agencies	
CONAGUA	4
TOTAL	22

cattle ranching by increasing agricultural by-products, (3) allow for winter farming, (4) allow farming of more profitable crops such as barley or beans instead of corn or oats, and (5) increase the number of harvests (e.g., oats for forage). Respondents who selected this problem often indicated they were not supporting the creation of intensive irrigation systems, but rather supplementary watering particularly for early in the growing season.

Regional stakeholders who selected this problem were local representatives of the Secretariat of Agriculture, Cattle Ranching, Rural Development, and Fisheries (SAGARPA). Both representatives indicated that local communities urgently needed wells for agriculture because most farmers have large debts mostly due to the drought. Furthermore, they indicated that local farmers needed something to reinvigorate their economy by focusing on something that is more reliable than rain-fed agriculture. Regional stakeholders appeared to be unaware of potential environmental threats (e.g., salinization of the soil) if an irrigation district is developed in the watershed.

Representatives of CONAGUA who selected drilling of wells for agriculture as their highest priority mentioned that this problem was not their only priority, but it was their highest priority from the 26 problems they rated. The 4 respondents expressed being related to this issue in different ways, from monitoring of water use and issuing of permits, to funding, and law enforcement. These responsibilities were established based on legal mandates and national and regional policies. For example, CONAGUA in Chihuahua City belongs to a regional office that also includes Nuevo Leon and Coahuila states. Their operational, annual plan includes this region.

Fourteen of the 16 community respondents felt that it was their responsibility to participate in addressing the problem of drilling wells for agriculture, not only because it was in their best interest, but also because they felt that their involvement would guarantee a faster response if the problem was addressed as a collective need. Also, these 14 respondents believed that the community as a whole has the moral responsibility to support any project, even if it only benefits few individuals. The 2 community respondents hesitant about community involvement felt that community members should have the choice to decide whether or not they want to be involved. They felt that community authorities should still be representing those interested in acquiring wells, but it should not be handled as a communal project.

Both regional stakeholders were reluctant to get involved in addressing this problem, simply because they did not believe it was part of their responsibilities. However, both respondents expressed great interest in developing more wells because this would represent more agriculture in the region, an activity that is a core part of their mission. In contrast, all personnel from CONAGUA felt they should be involved in this problem because it is part of their responsibilities and a high priority part of their mission. They felt that if new wells are to be drilled anywhere in the state, then they need to either monitor water use, enforce water management regulations or locate the most optimal areas for drilling the wells. At least 2 respondents indicated that the wording of the problem was narrow, since it only included wells for agriculture, instead of other potential uses (e.g., industrial, animal husbandry, domestic use).

Although the various stakeholders differed about potential obstacles for establishing wells in the region, the dominant obstacle appeared to be lack of funding, particularly among local communities and regional stakeholders. Lack of funding is a problem for drilling wells, but also for equipping them (e.g., pumps, power stations, irrigation infrastructure, fees). Most respondents from local communities suggested that even with government subsidies, they would be unable to provide their share of the costs, because the 7 year drought in the area has made their financial situation more difficult.

At least 8 of the 16 community members who selected this problem suggested that lack of adequate organization within communities represented a major problem. Lack of interest in pursuing collective projects, high emigration rates and low attendance at community meetings were perceived as major threats for successfully establishing wells in the communities. At least 4 communities (Porvenir del Campesino, Colonia Libertad, Nicolas Bravo, Alfredo Chavez) have had wells drilled in the past that are either not currently in use, have been abandoned and dismantled, or have been taken over by single individuals. According to some respondents, organizational problems accounted for a high number of failures in well administration. For example, Benjamin Vargas, president of Colonia Libertad, described the problem in the following terms:

> "…the main problem would be people organization, and after that, lack of money…in regards to organization, we no longer have meetings as before…whenever we try to do something we get together, but we almost never reach consensus …if we want to go through with something like wells, we need all 100% of landowners, not the 25-30% of attendance we've been having lately…."

Respondents from CONAGUA recognized the limitation of inadequate funding. However, CONAGUA as an agency is only responsible for administering, monitoring, enforcing or issuing feasibility studies for approval of projects. This agency is not responsible for the development of wells for agriculture. The only perceived obstacle to drilling of wells was the apparent resistance from some community members to comply with laws related to water administration. But even this problem appeared to be waning.

All respondents were asked to identify additional stakeholders they perceived should be able to help them in addressing this issue. Respondents from local communities listed between 2 and 4 stakeholder groups, including the community itself. Most commonly mentioned stakeholders were CONAGUA (n=6), and the Chihuahua state government office for rural development (SGORD) (n=8). At least 6 respondents simply identified 'the government' as the responsible party likely to be involved in supporting them. However, they failed to provide detailed information about what agency or institution at any government level should support them (e.g., state vs. federal government, state vs. federal agencies). Similar patterns were observed with respondents identifying CONAGUA and SGORD. Community respondents failed to identify what department within those agencies should be involved. Other stakeholders mentioned included SAGARPA (n=5), and the county Mayor (n=3), among others. However, respondents were uncertain as to how SAGARPA, and the county Mayor should be involved, or if they should be involved at all. Only one community respondent was unable to identify other interested parties.

The 2 regional stakeholders identified two stakeholders each, with CONAGUA as the only agency in common among both stakeholders. No additional information was provided as to who within the agency should be involved. Other stakeholders mentioned included SGORD, and SEMARNAT, although there appeared to be some confusion as to whether or not SEMARNAT should be involved. Finally, respondents from CONAGUA felt that only personnel from within the agency were required to address this issue since this was solely CONAGUA's responsibility Two respondents felt that other stakeholders, including county officials, SGORD and county water user associations, should be involved in the execution of the projects.

All respondents expressed willingness to collaborate with identified potential partners. Some community leaders indicated that before attempting any project, they need to conduct meetings in order to obtain community support. Regional stakeholders expressed interest in collaborating, even though the issue of wells for agriculture is not part of their mandate. At least 2 respondents from CONAGUA expressed no need for collaboration with other stakeholders since dealing with issues of water administration and law enforcement is their responsibility solely.

Seven community respondents suggested that they should make some financial contribution to addressing this issue. However, in all cases, respondents expressed that 'the government' should provide at least 50% of the funding needed. None of the respondents identified what government agency or institution should provide financial support. Other community respondents suggested that additional contributions could include labor, conducting paper work and organization of people within communities. Although drilling wells for agriculture was regarded as a major priority for local communities, all interviewees indicated that unless some economic support is provided, communities are unlikely to get involved in such projects.

Regional stakeholders expressed that their contribution most likely would be in farmer organization, as liaisons between farmers and non-regional stakeholders (e.g., CONAGUA, SGORD) and technical assistance in agriculture. Respondents from CONAGUA indicated their responsibility would strictly involve the feasibility analysis of the project and establishment of use guidelines. No financial support for the project implementation was offered.

4.7.2.2. Lack of sewage infrastructure (water 1)

This problem was selected as the highest priority by respondents from 3 colonias and one ejido, as well as the Gomez Farias County Mayor and 2 representatives of CONAGUA (Table 4.15). Respondents from local communities selected this problem either because of perceived health or environmental problems. Reported health problems included cattle disease outbreaks and overflowing septic tanks. Environmental problems included pollution of creeks and springs and particularly of soils.

Colonia Año de Hidalgo and Ejido Guadalupe Victoria not only lacked sewage infrastructure, but because of impermeable soils, septic tanks have limited utility. The Gomez Farias County Mayor was the only regional stakeholder selecting this problem, primarily because of his personal interest in improving the appearance of the towns in the county. Respondents from CONAGUA selected this problem because it is related to the core responsibilities of the agency. Ensuring adequate supplies of potable water and sewage management are two of CONAGUA's highest priorities both for rural and urban populations. One respondent from CONAGUA indicated that for a sewage infrastructure project to be approved it must: (1) receive a formal petition from the community, (2) work with communities of least 2,500 inhabitants and (3) the community must be recognized as being marginalized (e.g., no public services, geographically isolated). Laguna de Babicora is located in central-west Chihuahua, a region considered by CONAGUA as marginalized.

Even though respondents from all stakeholder categories felt they should be involved in addressing the sewage treatment issue, reasons for such involvement varied greatly. Local community members recognized that addressing this issue was in their best interest, however, their responses suggested that they expected some support, particularly from county officials.

Table 4.15**.** Respondents who selected the problem of lack of sewage infrastructure (water 1) as their highest priority during interviews conducted between August and December 2001 at Laguna de Babicora, and Chihuahua City, Chihuahua, Mexico.

STAKEHOLDER TYPE	Frequencies
a) Local Communities	
Ejido Guadalupe Victoria (GV)	2
Colonia Año de Hidalgo (ADH)	2
Colonia Nicolas Bravo (NB)	1
Colonia San Jose Babicora (SJB)	1
b) Regional Stakeholders	
Gomez Farias Major	1
c) Federal Natural Resource Agencies	
CONAGUA	2
TOTAL	9

Their reasons for involvement included improvement of the quality of living conditions, protection of the wetland and improvement of cattle ranching operations in the watershed. The Mayor of Gomez Farias County indicated that the county should be involved because sewage infrastructure is a public service and also because the county could be the liaison between local communities and other authorities (e.g., state office for water administration, CONAGUA) Finally, respondents from CONAGUA felt that they should be involved primarily because it is part of their administrative role to deal with sewage-related problems. Even though they were not executors of sewage infrastructure projects, they were legally mandated to conduct feasibility analysis of these projects and to monitor and evaluate installed systems. Respondents from CONAGUA indicated that they had some latitude in defining their own priorities, within current laws, regulations and expressed needs.

Perceptions of potential obstacles varied greatly among stakeholder categories. Respondents from local communities focused more on problems leading to the establishment of sewage infrastructure in the communities, while respondents in other categories, especially CONAGUA employees, focused on the long-term sustainability of such projects. Respondents from local communities felt that the major obstacle for installing sewage infrastructure was the lack of money. They perceived sewer systems as very expensive enterprises, for which major governmental support was required. Organizational problems related to project implementation were also rated a major obstacle. Ejido Gomez Farias, and Colonia Nicolas Bravo were the only communities with existing sewage infrastructure. Respondents from Nicolas Bravo recognized that resistance to paying for sewage-related fees was a major obstacle in operating and maintaining sewage infrastructure. As one respondent noted, all inhabitants at Nicolas Bravo are interested in having sewage infrastructure but very few are willing to pay for it. The Mayor of

Gomez Farias County shared similar concerns, indicating a widespread lack of motivation among community members for collective projects such as sewage infrastructure was mostly due to negative experiences in the past (e.g., collective wells for agriculture). Finally, respondents from CONAGUA suggested that among the obstacles for successful implementation of sewer systems is the lack of resources within state and federal agencies. Since their primary goal is to provide tap water for both urban and rural communities, installation of sewer systems is often relegated to second priority.

On average, 3 or more stakeholders were identified as potential collaborators in addressing this issue. All respondents from local communities suggested that county officials should participate. In addition, state and federal governments were also listed as potential collaborators. However, almost all respondents failed to identify who within the state or federal governments should be involved. Only respondents from Nicolas Bravo identified the state office for water and sewer systems and CONAGUA as agencies responsible for addressing this issue. The Mayor of Gomez Farias County advocated involvement of all 3 levels of government (i.e., county, state, federal), but particularly local communities. However, he expressed some doubts about local communities' ability to maintain strong involvement and commitment for the maintenance of sewer systems. Respondents from CONAGUA agreed that state and county offices for water and sewer systems should be the primary executors of this project. However, they felt that for the project to be successful, strong community participation was needed. In addition to financial and technical expertise, state and county offices should provide communities with training about the use, administration, and maintenance for sewer projects. Agencies such as SEMARNAT and CONAGUA should be involved to see that projects comply with environmental laws and regulations. All respondents from all stakeholder categories expressed willingness to participate with responsible parties for addressing this issue regardless of who the stakeholders could be.

Finally, respondents were asked about their potential contribution to solving this problem. Respondents from local communities overwhelmingly suggested that their primary contribution should be labor. They considered sewer systems to be costly projects, therefore, they expected “the government” to be heavily involved. Only respondents from Colonia Nicolas Bravo, a community that has separate accounts for social projects, suggested that financial contributions also were part of their responsibility. The Mayor of Gomez Farias County recognized that his responsibility is to be the liaison and main executor of the project. Under current conditions, county and state government water and sewer system offices are responsible for managing financial resources and for monitoring project implementation and maintenance. Respondents from CONAGUA indicated that their main responsibility in the installation of new sewer systems consisted mainly of regulating sewer systems (e.g., amount of discharges, guidelines for treatment plants). In addition, CONAGUA provides funding for up to 50% of new operations, money that is handled through either state or county water and sewer system offices. Modification of priorities remains a difficult issue for respondents from CONAGUA, simply because their legal framework has already been established. Unless this framework is changed, there is little room for modifications to their agenda. In spite of this, respondents felt that the existing legal framework covered all likely scenarios related to water administration.

4.7.2.3. *<u>Excessive timber harvesting in the area (Forest 2)</u>*

This problem was selected by respondents from 3 ejidos, and representatives of PROFEPA and SEMARNAT (Table 4.16). The 3 ejidos were within the County of Gomez Farias in the eastern portion of the watershed (Figure 4.3). Expressed interest in addressing this

Table 4.16. Respondents who selected the problem of excessive timber harvesting in the area (forest 2) as their highest priority during interviews conducted between August and December 2001 at Laguna de Babicora, and Chihuahua City, Chihuahua, Mexico.

STAKEHOLDER TYPE	Frequencies
a) Local Communities	
Ejido Gomez Farias (GF)	1
Ejido Peña Blanca (PB)	1
Ejido Porvenir del Campesino (PC)	1
c) Federal Natural Resource Agencies	
PROFEPA	2
SEMARNAT	1
TOTAL	6

problem varied across stakeholder categories. Respondents from local communities suggested past forestry projects, in addition to unregulated fuel wood cutting resulted in overexploitation of forested areas. They suggested that this was due at least in part to corruption among community authorities, increasing human population and expansion of housing complexes in some communities.

The perceived lack of control of timber harvesting is considered a major contributor to the lack of income generating opportunities in the watershed in recent years. In 2001, only the colonias of Las Varas and Nicolas Bravo had approved timber harvesting operations. In contrast, respondents from SEMARNAT and PROFEPA indicated that their expressed interests in addressing this issue stemmed from their legal mandates and from their desire to comply with national programs for water and forest conservation issued in year 2001. SEMARNAT deals with use and management of forests among other resources. PROFEPA deals mostly with law enforcement and compliance with environmental regulations.

Respondents from SEMARNAT indicated that control of timber harvesting operations had reduced illegal harvesting from previous years. Respondents from PROFEPA suggested that focusing on protection of forests allowed them to protect other resources (e.g., wildlife, flora). This approach stemmed from the Units of Management and Administration (UMAs) (1997), a management tool introduced by SEMARNAT to frame sustainable uses for nontraditional, renewable natural resources (e.g., songbirds, cacti, oregano).

All community members felt that it was in their best interest to be involved in addressing this issue, because they owned the resource. Staff from SEMARNAT suggested that they should also be involved in controlling excessive timber harvest in order to avoid unsustainable harvest, and to monitor management and harvesting plans. Respondents from PROFEPA felt that they should be involved in addressing this issue, mostly in terms of securing legal practices for harvest of timber, but particularly of timber by-products (e.g., flooring material).

Lack of judicial power among community authorities was listed as a major obstacle by all community respondents. In particular, respondents noted that in the past when community authorities enforced harvesting regulations within the community, offenders took the enforcing of community regulations as a personal attack. In addition, lack of money and organizational problems were reported as potential obstacles, particularly in communities such as Porvenir del Campesino, where the majority of landowners no longer live in the community. Staff from SEMARNAT indicated that one of their major obstacles in addressing this issue was the lack of financial resources and personnel, restricting their ability to monitor harvesting operations and compliance with prescribed harvesting quotas. Respondents from PROFEPA also indicated that lack of personnel (14 field inspectors for the entire state) and funding represented major obstacles in addressing excessive timber harvesting. They suggested that lack of resources restricted their ability to be more proactive in developing a more diverse enforcement agenda (e.g., interagency collaboration agreements) rather than focusing only on reported violations. PROFEPA's employees reported a widespread lack of interest from private and communal landowners in addressing this problem. They suggested that since economic returns from timber harvesting outweigh fine charges, landowners are more likely to violate forestry regulations.

In general, respondents from local communities were largely uncertain as to who should be involved in addressing this problem. However, they suggested that in addition to local communities, county officials, SAGARPA and state police should be involved. Respondents were largely unaware of what federal natural resource agency dealt with forest-related issues, although they clearly identified SEMARNAT as the agency responsible for forest management and conservation. Respondents from both SEMARNAT and PROFEPA agreed that this problem is the responsibility of PROFEPA, SEMARNAT, the state forestry office, and particularly of local communities or private landowners. Respondents from all stakeholder categories expressed willingness to collaborate in addressing this issue, regardless of the composition of the stakeholders involved. Respondents from PROFEPA indicated that they already collaborated with personnel from the state forestry office and some private landowners in monitoring timber harvesting in the state.

Finally, community members considered that their main responsibility should be constantly monitoring forest uses within their communities. In particular, respondents suggested that extraction of poles, and fuel wood use among landless people should be of particular interest. In contrast, SEMARNAT personnel indicated that the agency's responsibility in regards to this problem should include lending of expertise and databases of past harvest operations, as well as monitoring of current harvesting projects. This would not only facilitate the establishment of more efficient operations, but ultimately it would help in promoting more sustainable forestry in the state. Respondents from PROFEPA indicated that their major contribution to this problem would be monitoring of compliance with forestry regulations, and approved harvesting quotas. Additionally, PROFEPA employees anticipated the development of grassroots law enforcement groups, particularly in rural areas. These groups are likely to include members from local communities and county officials.

4.7.2.4. What would it take for you to make a formal commitment ?

Responses from local community members covered a wide range of issues, however, respondents consistently expressed their lack of trust in state and federal projects. Fifteen community respondents were unable to answer this question. Answers from 33 respondents centered around 4 major elements. First, respondents indicated that in order for them to commit to any project, they would require a signed agreement among all interested parties. This agreement should delineate expected outcomes, goals and objectives, scheduled activities, and clearly identified rights and responsibilities. Second, 8 respondents suggested that implementation of early activities (e.g., arrival of drilling equipment, training in project administration) would greatly help to motivate local people to participate. Third, involvement of motivated individuals both from local communities and agencies was suggested as a crucial element in raising awareness for any project. This is particularly relevant since throughout all interviews with community members, respondents expressed the existence of a widespread sense of frustration and lack of interest in the pursuit of collective projects. This was true even for projects representing economic alternatives aimed at improving their living conditions (e.g., wells for agriculture). Finally, presence of decision-making individuals was recognized as an important element for strengthening the nature of any project. Their previous experiences of having only technicians, and low rating level agency personnel deal with local inhabitants was considered evidence of lack of interest, particularly from federal agencies (e.g., CONAGUA, SEMARNAT). Additional elements suggested as critical in eliciting local interests included clarity as to what was expected from them, opportunity to self-diagnose their own needs and respectful treatment. All of the recommended elements focused on external conditions. Community respondents offered no comments regarding community internal organization or conflicting interests among locals.

Regional stakeholders had fewer requirements in order to make a commitment to a project. Nine of the 11 regional stakeholders focused on 3 major topics. First, respondents desired a clear intention and interest for addressing the issue from federal agencies. Ability to establish a working agenda, deadlines and anticipated contributions (e.g., expertise, funding) were recognized as positive indicators. In addition, respondents felt that potential beneficiaries could demonstrate a clear intent to participate, either by disclosing their potential contribution or by organizing local inhabitants. Second, respondents indicated that having decision-makers from all involved parties would represent a positive signal of their commitment. In particular, they recognized that community authorities, rather than ordinary community members should be involved. Finally, respondents suggested that willingness to commit financial resources by several stakeholders, particularly from local communities, would be highly desirable. Respondents suggested that unless local communities share financial risks, projects and programs would continue to be perceived as free gifts. Additional responses included open discussions about expected collaborations and signed agreements by all participating stakeholders.

Responses from federal natural resource agencies varied by agency. None of the PROFEPA representatives and only 4 representatives of CONAGUA responded to this question. Each respondent from SEMARNAT had a different response, including thorough analysis and discussion of problems and alternative solutions, clear understanding of potential contributions (e.g., expertise, funding) among all interested parties and signed agreements once all possibilities are discussed. In addition, SEMARNAT respondents suggested that final decisions (e.g., goals, objectives, time deadlines) should be by consensus. In contrast, respondents from CONAGUA suggested that before making a commitment, results from previous experiences should be evaluated. This was particularly true in regards to wells for agriculture and sewer systems. In addition, field corroboration of demands, clearly stated contributions (e.g., money) and responsibilities (e.g., organization of community groups) would be needed before making any formal commitment.

4.7.2.5. <u>Describe previous collaborative experiences with other stakeholder</u>

Responses for this question varied dramatically in regards to diversity of involved parties and purpose of the experience. In general, answers from local community members involved either implementation of national programs (e.g., financial support for agriculture) or social demands involving current living conditions (e.g., rural health clinic, schools). Previous experiences of regional stakeholders showed the highest variability among all stakeholder categories. Responses suggested that each relationship reflected individual agendas, either in pursuing economic benefits, providing services, or implementing national programs. Ten of 11 regional stakeholders indicated having previous experiences with local communities, however, respondents from local communities only recognized having previous relationships with 4 regional stakeholders (i.e., county Mayors, and SAGARPA local offices at Gomez Farias and Madera counties). Local offices of SAGARPA at Gomez Farias and Madera counties were the only two regional stakeholders sharing similar experiences, that is, implementation of national programs. Respondents from federal natural resource agencies had relationships with multiple stakeholders either for the implementation of national programs or for enforcement of environmental guidelines and laws.

Thirty-seven respondents from local communities were able to recall previous interactions with other stakeholders. Eleven respondents failed either to remember previous experiences or to understand the question. Fifteen different types of previous relationships were identified, including drilling and equipping of wells (n=13), issues with property legal boundaries (n=6), training for documenting timber harvest operations (n=4) and development or repair of rural roads (n=4) (Table 4.17). Overall most reported experiences had positive outcomes and were considered as beneficial relationships. On average, 2 stakeholder groups were involved in each cited experience. Most commonly cited stakeholder groups included CONAGUA, state rural development office, county officials and financial institutions (e.g., National Bank of Mexico – BANAMEX, Rural Development Bank – BANRURAL).

Negative experiences were reported for incidents dealing with building and equipping wells and for all experiences involving issues of definition of property legal boundaries. These relationships were considered frustrating mostly due to excessive bureaucracy and lack of accountability and support for expressed needs. Most commonly cited stakeholders included CONAGUA, former Secretariat of Agrarian Reform (SRA), and former Secretariat of Agriculture and Hydraulic Resources (SARH). Reported experiences contained on average, 2 stakeholder groups in addition to local communities. Most negative experiences involving wells were reported by residents of ejidos. Negative experiences involving issues of land boundaries involved both ejidos and colonias.

Regional stakeholders had a wide variety of experiences in working with other stakeholders. Most past interactions occurred between regional organizations and federal agencies. In contrast to experiences among community leaders, no regional stakeholder mentioned negative interactions. All respondents considered these relationships as positive and necessary in achieving their own missions. These experiences included training in various topics (e.g., agriculture, forestry), delivering of public goods (e.g., construction of sewer systems) or implementation of state and federal support programs (e.g., 'better livestock' program from the state rural development office) (Table 4.18).

Table 4.17. Previous experiences involving other stakeholder groups as discussed during interviews with community leaders from 12 local communities at Laguna de Babicora, Chihuahua, Mexico between August and December 2000.

Previous Experiences	**Frequency**	**STK number range**	**Positive (frequency)**	**Negative (frequency)**
1. Drilling/equipping of wells	13	2-4	9	4
2. Agrarian issues, and land boundary conflicts	6	2	0	6
3. Training for documenting of timber extraction operations	4	2-3	4	0
4. Fixing of secondary roads	4	2	4	0
5. Mapping of community and landholdings boundaries	2	2	2	0
6. Construction of sewer systems	2	2	2	0
7. Implementation of national support program 'PROCAMPO'	2	2	1	1
8. construction of rural health clinic	1	2	1	0
9. Assessment of potential rural industries	1	2	1	0
10. Loans for agriculture	1	2	1	0
11. Construction of ponds in grazing areas	1	2	1	0
12. Construction of elementary school	1	2	1	0
13. Construction of garbage disposal sites	1	2	1	0
14. Construction of sedimentation lagoon for sewer systems	1	2	1	0
15. Equipping windmill for domestic use	1	2	1	0
TOTAL	**41***		**30**	**11**

* respondents were allowed to identify one or more previous experiences

Table 4.18. Previous experiences involving other stakeholder groups as discussed during interviews with regional stakeholders from 12 local communities at Laguna de Babicora, Chihuahua, Mexico between August and December 2000.

Previous Experiences	**Frequency**	**Number participating stakeholders**	**Positive (frequency)**	**Negative (frequency)**
1. Participation in training in grassland/prairie management	1	2	1	0
2. Providing training in agriculture and forestry	1	4	1	0
3. Lending expertise in forestry management and research	1	48	1	0
4. Implementation of national support programs in agriculture	2	2	2	0
5. Construction of sewer systems	1	3	1	0
6. Introduction of new crop varieties	1	2	1	0
7. Introduce state programs for improving cattle quality	1	2	1	0
8. Assessment and prescription of prearranged clearings	1	3	1	0

* respondents were allowed to identify one or more previous experiences

These experiences appeared to be specifically tailored to the specific agendas of regional stakeholders. For example, cattlemen associations from each county participated exclusively in cattle management practices (i.e., rangeland management training, acquisition of genetically superior livestock), whereas forestry consultants participated with federal agencies in prescribing required clearings. There appeared to be little interaction among regional stakeholders.

Contrary to responses from local communities and regional stakeholders, responses from natural resource agencies' personnel reflected individual responsibilities within the agencies for each respondent, but still directed towards achieving the overall mission of each agency. For example, previous experiences reported by respondents from CONAGUA covered a wide array of issues related to water administration, from construction and monitoring of sewer systems, to law enforcement, flooding control and water use monitoring. Similar patterns were recorded from respondents from SEMARNAT and PROFEPA. Respondents from SEMARNAT described experiences related to land use changes, public policy, forest management and conservation and management of natural protected areas. Respondents from PROFEPA described past experiences related to environmental law enforcement including changes in land use, water and soil pollution and biodiversity conservation. In comparison with community leaders and regional stakeholders, past experiences described by agency personnel were more likely to be more complex and diverse, as well as long lasting. For example, the 3 agencies have been key members of the Chihuahua Forestry Consultative Committee since 1996. This committee, appointed by the state governor, provides a public forum for addressing public policies related to forest management and conservation. It includes 48 different agencies, institutions and organizations representing county, state and federal interests related to forest use and administration.

Personnel from the 3 agencies indicated that they engaged in other collaborative relationships outside of this committee, particularly when the issue was agency specific. For example, personnel from CONAGUA and the state water administration office have a long-term collaboration agreement for the monitoring and maintenance of sewer systems. Collaborative arrangements described by agency personnel were distinctive for several reasons. First, more stakeholders were involved compared to other stakeholder categories. Second, natural resource agencies were more likely to have multiple collaborative partnerships occurring at the same time. Third, agency personnel were more likely to have collaborative partnerships that involved each other. For example, conservation of riparian habitats involve personnel from all 3 agencies in the issues of biodiversity conservation (SEMARNAT), water quality (CONAGUA) and water pollution (PROFEPA). Finally, collaborative partnerships are more likely to have stakeholders from county, state and federal levels of government.

4.7.2.6. Ejidos and Colonias Organization

Nineteen respondents from local communities were unable to identify alternative actions to improve the organizational structures of local communities. Seven respondents considered the current rural community structure (e.g., administration committee, vigilance committee) was appropriate, whereas 22 recommended alternative organizational strategies. Those unable to provide new organizational approaches stated that they had never thought about the issue but recognized that current organization is no longer adequate. Respondents advocating new organizational approaches provided 9 alternative organizational recommendations (Table 4.19). Recommendations included division of existing common lands, training in leadership and motivational skills, strengthening of collective purpose, corruption control, and development of more accountable systems.

Table 4.19. Recommended actions for improving community organizational structure as expressed by community leaders during interviews between August and December 2001 at Laguna de Babicora, Chihuahua, Mexico.

Recommended Actions for Improvement of Community Organization	**Frequency***
1. Division of landowners in smaller working groups	20
2. Motivational training, with the intention of improving attitudes towards collective projects	2
3. Training for development of leadership skills	1
4. Establish communication with successful communities in the region (i.e., ejido Los Ojos)	1
5. Divide (privatizing) all community land among all landowners	1
6. Democratic elections of community authorities; avoid power control by few individuals	1
7. Amicable, inviting atmosphere at community meetings; facilitator needed for discussions	1
8. Development of accountability systems for all community members	1
9. Elaborate community bylaws that include all community authorities	1

* respondents were allowed to provide more than one recommendation

Twenty respondents (mostly ejido members), suggested that establishment of smaller working groups would be the most appropriate solution for improving the organization of local communities. These groups already existed in all colonias and in half (n=3) of ejidos selected for this research. Working groups were first used in the watershed nearly 12 years ago. Colonia Nicolas Bravo is one of the communities with the longest experience in the use of working groups as organizational tools.

Working groups were used to improve the management of commonly owned resources such as forests and grasslands. Their apparently successful use prompted some communities to use them for other purposes (e.g., grazing, access to agricultural lands). Despite apparent positive benefits from these groups, this organizational approach remained questionable for some community members.

Eight out of 11 regional stakeholders were able to identify alternative means for addressing organizational needs in local communities. They identified 2 alternative organizational approaches for local communities: smaller working groups and selection of motivated individuals as community leaders. Seven respondents advocated implementation of smaller working groups, particularly for the management and conservation of forested areas.

With the exceptions of two representatives from PROFEPA, all agency respondents were able to identify one or more organizational suggestions for local communities. In spite the diverse range of suggested alternatives, the common alternative across all agencies was the privatization of rural communities, particularly of ejidos. Two respondents from CONAGUA, 2 from SEMARNAT, and one from PROFEPA supported this recommendation. Additional responses included selection of motivated leaders, creation of alternative committees for resource administration (e.g., law enforcement) and development of better distribution systems for collective goods (e.g., revenue from timber harvesting).

All respondents were asked to identify advantages and disadvantages associated with current organizational structure of rural communities. Four community members were unable to identify advantages to the existing organizational structure. Nine community respondents identified a total of 4 major advantages: the existing structure provided a sense of direction for the communities, it allowed for collective decisions to be reached, it enabled communities to have access to national programs and it served as the liaison with other stakeholders. Regional stakeholders failed to identify advantages associated with current organizational structure of rural communities. One respondent from CONAGUA suggested that existing organizational structure made community decisions more reliable for outsiders. Remaining respondents from CONAGUA and all respondents from SEMARNAT and PROFEPA identified no advantages of the existing structure.

Eleven community respondents suggested there were no disadvantages associated with the current community structure. Twelve community members suggested that absence of leadership, corruption, misrepresentation of some intra-community stakeholder groups, lack of judicial authority, lack of adequate channels for discussion and decision making, and unmotivated community members constituted the major disadvantages of the current organizational structure. A member of the Ejido Guadalupe Victoria described the problem as follows:

> "…I think sometimes our own community works against ourselves…in the past, when we had good rainy seasons people never came for our meetings, and still, we got all our wells, we got everything for free from the government. However, we let everything go to waste. What is happening now? Now that all the wells are destroyed, and all the pumps and other equipment are gone as well, people want to get more funding for wells…"

Mayors from Gomez Farias and Madera counties were the only regional stakeholders who suggested that manipulation, control and corruption were the major disadvantages associated with this organizational structure. Only respondents from CONAGUA identified low attendance to community meetings as a major disadvantage. No other disadvantages were listed by any natural resource agency personnel.

Finally, all respondents were asked if the ejido and colonia land tenure system was working properly in regards to resource administration and social welfare. Forty community members indicated that despite recognized problems, the existing system was functioning properly. However, when asked to elaborate, no respondent provided evidence as to why they felt the system was working. Only 4 regional stakeholder respondents (i.e., cattlemen associations, and county Mayors from both counties) indicated that the system was working properly. They suggested that although faulty in some aspects, this land tenure type could be improved by addressing issues related to internal organization and forest administration. They also recommended development of more fair distribution systems as an alternative solution. The remaining 7 regional stakeholders suggested that commonly owned lands such as ejidos and colonias were no longer a feasible alternative in Mexico. They suggested that low meeting attendance, lack of motivation, increasing depopulation rates and overexploitation of their resource base were evidence of the system's failure.

Finally, only 4 respondents from CONAGUA suggested that the system of commonly owned lands in Mexico is currently working. Three respondents from CONAGUA and all respondents from SEMARNAT and PROFEPA suggested that this land tenure system was no longer functioning properly. Supporters of the land tenure system indicated that although not perfect, there were clear examples in the state where this approach was functioning well. They attributed the success of such communities to strong leadership, high degree of solidarity among community members, successful agricultural practices and fair distribution systems for collective goods. Remaining natural resource agency personnel suggested artificially created communities such as ejidos and colonias have become less reliable throughout time. They attributed this situation to several problems, including low attendance at community meetings, widespread lack of internal accountability, absence of strong community leaders, growing interest among landowners to pursue individual agendas, lack of trust and corruption. According to respondents from SEMARNAT, corruption in particular represented a major problem in forest management mostly due to unfair benefit distribution and questionable negotiations for timber harvesting.

4.7.2.7. Constitutional amendments to natural resource tenure in Mexico

All stakeholders were asked to comment about the reforms in tenure of commonly owned lands and other public resources in Mexico. Rather than expressing a single answer, respondents were allowed to elaborate as needed. A majority of respondents in all stakeholder categories supported privatization of common lands. Twenty-seven answers from community members suggested that land privatization was an acceptable proposal because it would allow them to gain control over their lands. Fourteen respondents either had no comments or disregarded it completely. Six and 7 respondents, respectively, regarded this transition either as bad, or with a great degree of uncertainty. Nine regional stakeholders considered these land tenure modifications as a positive step towards improving living conditions in rural Mexico. Only respondents from the Madera County, cattlemen's association and SAGAR office considered this a bad transition. All respondents from CONAGUA, SEMARNAT, and PROFEPA supported modifications to existing land tenure system. In general, respondents supported these changes because they felt the changes would improve implementation of environmental public policies and programs.

Community members supported land tenure changes for 3 primary reasons. First, under the new administration, community members felt they would gain a better sense of ownership for their land and its resources. Second, respondents perceived that once ownership titles have been issued, agricultural and urban land landholdings could be used as collateral with financial institutions. Third, community members felt that once ownership rights were granted, landowners would be more likely to invest in their lands, therefore increasing their chances of higher economic returns.

Regional stakeholders supported changes in land tenure for a wide variety of reasons. Agencies such as FIRA, INIFAP, local offices of SAGARPA and the Mayor of Madera County suggested that these changes would benefit local farmers in several ways, including improvement of agricultural production in the region, enhancement of natural resource use and management of resources, better appreciation of the land, and a higher level of financial security.

All personnel from natural resource agencies agreed on 4 major anticipated benefits. First, they suggested that land privatization would make rural communities more accountable and reliable institutions primarily because landowners would be more likely to develop vested interests in their properties. Second, since a significant number of community members are likely to sell or transfer their lands, it will change the community structure and reduce the number of landowners agencies must negotiate and work with. Third, community members are more likely to develop stronger stewardship attitudes toward land conservation. Fourth, more clearly defined land-based rights should improve implementation of national programs and policies in the long term.

Only community members expressed uncertainty and even disapproval about the meaning of changes to the existing land tenure system. In particular, respondents expressed uncertainty about 3 specific issues: management and administration of commonly owned lands, future structure and role of existing community authorities and persistence in the near future of local communities. Respondents indicated their doubts as to how common lands would be managed, and if divided, how land would be partitioned. Considering that community authorities were initially appointed as mediators and negotiators among all landholders, they suggested that land privatization would only contribute to the loss of authority and respect for community authorities. Finally, respondents indicated they felt that this set of recommended changes would likely contribute to the return of pre-revolutionary conditions, i.e., large landholdings owned by few, wealthy individuals. As a consequence, many rural communities were likely to disappear.

4.8 Discussion

4.8.1. In context: analysis across vs. within stakeholder categories

Methodologies for stakeholder analysis (STA) discussed in conservation and environmental management literature often rely on pre-identified stakeholder categories (e.g., local communities, NGOs, natural resource agencies, financial donors) to recognize existing stakeholder diversity and understand stakeholder's interests and needs (Grimble and Chan 1995). In this context, STA is suggested as a comprehensive methodological approach focused on assessing stakeholders' goals, objectives, interests, values, and attitudes regarding identified environmental needs. Grimble and Wellard (1997) described 2 examples of methodologies used in natural resource management for STA. These methodologies are focused on either delivering social benefits and avoiding conflicts or predicting likely scenarios and negotiating trade-offs between objectives. Similarly, Mitchell (1997) discussed a system for classifying stakeholders based on criteria such as urgency, legitimacy and power.

Although initially appealling, the STA methodologies I reviewed often remained at a conceptual level, focusing on activities related primarily to strategic planning only (inventories, establishment of goals and objectives). Here, one of the primary goals is to understand differences and similarities across stakeholder categories in how they view conservation needs. These methodological approaches provide a robust foundation for developing conservation plans and programs through participatory planning. However, my findings suggest that successful implementation of conservation programs and plans (i.e., *in situ* conservation activities) is also dependent on understanding this variability within stakeholder categories.

Assuming that stakeholder analysis tools (e.g., interviews, focus groups) were used during the development of the Babicora Plan, and that identified problems and needs were classified through consensus among planning team members and stakeholders, stakeholder analysis as used in this research was designed to understand opportunities and limitations about conservation priorities in Babicora (Appendix E). In my review, I assessed differences and similarities across, but particularly within, stakeholder categories (e.g., problem rating, selection of highest conservation priorities). Although my results in Section 4.7 report specifics about this analysis, the information I gathered also provides insights about stakeholder analysis during strategic planning.

4.8.2. Problem ratings: analysis among and within stakeholder categories

I. Analysis across stakeholder categories: limitations for plan implementation

I initially separated stakeholders into 3 major stakeholder categories (local communities, regional stakeholders, federal natural resource agencies) based on geographic location and organizational structure. However, my analysis across stakeholder categories suggested that, despite external similarities used to classify existing stakeholder groups (e.g., similar land tenure type, wetland access), stakeholder groups within categories often behaved more as individual groups (See Section 4.7.1.1). Thus, analysis of stakeholder perceptions across stakeholder categories may provide misleading information about potential avenues for plan implementation.

First, by focusing on understanding "the big picture" (i.e., differences and similarities across stakeholder categories), resource planners fail to identify problems or needs that carry specific weight for individual groups. For example, the problem labeled "extraction of sand and pebbles" (soil 3) was deemed a high priority only for the ejido of Peña Blanca (Table 4.4).

Remaining communities and all regional stakeholders (Table 4.5) had median ratings or ratings low or medium for this problem (6 or lower). Peña Blanca contains natural sand banks within its community lands. Respondents from this community noted that the lack of guidelines to regulate use of this resource currently allows inhabitants from at least 4 surrounding communities to freely harvest this resource, as they have since the 1940s. These "foreigners" also have been associated with an increase in illegal timber and fuel wood harvesting, soil pollution and overgrazing.

In contrast, "drilling wells for agriculture" (soil 2) was regarded a high priority (8.5 or higher) in 11 of the 12 surveyed communities. Establishing new wells in the watershed seems an appropriate issue for initial cooperation in most communities, but this was not true for at least one ejido. Problem ratings from Porvenir del Campesino suggested that drilling wells for agriculture was only a medium priority for this community. This was due partly to high emigration rates from the community ($\geq$ 50% of original landholders no longer live in the community) and low attendance of remaining landholders at community meetings. Respondents suggested that wells for agriculture would not be feasible in this community, given the widespread lack of interest in developing collective projects. Similar concerns about communal enterprises were expressed in at least 4 other communities (Alfredo Chavez, Nuevo Ser, Guadalupe Victoria, Alamillo) even though median ratings in these communities were high (7 or higher).

Second, grouping stakeholders under general categories will not reveal stakeholder groups who display contrasting behavior. For example, when the 11 regional stakeholders were grouped under a single category none, of the 26 priority problems had high median ratings (Table 4.2, Table 4.3). However, when regional stakeholders were looked at individually, they rated as high priorities on average 7 or more problems (range 1-16). The Gomez Farias' Cattlemen Association had the highest number of problems rated as a high priority (n=16), while its counterpart in Madera County and the SSA office in Gomez Farias County had the lowest number of problems rated as a high priority (n=1 and n=0, respectively) (Table 4.5, Table 4.8).

Third, when grouped across stakeholder categories, range values for problem ratings provided little descriptive power. This was more apparent for local communities, where problem ratings, as a group, ranged from 1 to 10 for 24 of the 26 problems (Table 4.2, Table 4.3). However, when within communities' values are examined, on average only 2 problems per community produced ratings that ranged from 1-10. Rating ranges from individual communities allow the identification and grouping of those communities showing consistency in their ratings (high or low). For example, 6 local communities had ranges either 7-10 or 8-10 for the problem of lack of sewer systems (water 1) (ejidos Peña Blanca and Guadalupe Victoria, and colonias Colonia Alamillo, Año de Hidalgo, San Jose Babicora, and Las Varas) (Table 4.4). Although these communities differed in both land tenure type and geographic location within the watershed (Figure 4.3), such consistent responses may provide clues to alternative strategies that will enhance plan implementation.

In contrast, consistency in problem ratings among groups within specific stakeholder categories may also provide insights about problems not deemed important by stakeholder groups. For example, "drainage of wetland for agricultural purposes" (soil 1) was either not applicable (n=5) or had low median ratings (≤ 4) in 7 local communities. Ejidos such as Gomez Farias and Porvenir del Campesino, and colonia San Jose Babicora consistently gave lower ratings compared to other communities. Respondents from these communities indicated that wetland drainage in the watershed was not only unfeasible because of poor soil quality, but the opening of these wetland areas would disrupt the structure and functioning of their agricultural system since areas surrounding the wetland are used as grazing areas during summer months.

II. Causes for differences across stakeholder categories

Ratings across stakeholder categories differed for reasons that appeared to be category-specific. Local community ratings were analyzed by land tenure type (6 ejidos, 6 colonias) and differences in geographic location within the watershed (Figure 4.3). Regional stakeholder ratings varied the least among all stakeholder categories, probably because only 3 regional stakeholders (hunting outfitters, forestry consultants, researchers) were involved directly in conservation and natural resource management. Other regional stakeholders' expertise was limited to rural development or social welfare (e.g., county Mayors, cattlemen associations).

In contrast, ratings by natural resource agency personnel reflected their legal mandates, diversity within those agencies, and, in some instances, the lack of clarity of their responsibilities. For example, the problem of "wetland drainage for agriculture" (water 1) elicited a wide variety of responses among respondents from SEMARNAT. All respondents acknowledged that regulating land use changes was SEMARNAT's responsibility. However, only 1 respondent rated this problem both a high priority and as his responsibility. Remaining respondents from SEMARNAT rated this problem low, simply because they believed it was not part of their personal responsibilities within the agency.

Often, respondents from the same agency showed confusion about responsibility on specific problems. For example, "higher densities of juniper in the watershed" (forest 4) was not recognized by high ranking officers from PROFEPA either as a responsibility nor as a high priority. However, field inspectors from PROFEPA identified it as an agency responsibility and listed it as a high priority for the agency (Appendix F). High ranking officers in PROFEPA indicated that, even though the problem clearly was linked to parts of their legal responsibilities under the National Forestry Program 2001-2006, changes in plant composition were not viewed as violations. Thus, in their minds this issue remained SEMARNAT's responsibility.

III. Differences within stakeholder categories: Problem ratings

My findings suggest that, if stakeholder analysis is to contribute meaningfully to plan implementation, the first level of analysis should focus on variability within stakeholder categories. This enables resource planners and interested parties to identify areas for cooperation where stakeholders from several categories can participate. For example, "high juniper densities" (forest 4) was rated medium to low by most stakeholder group respondents. However, this problem had high median ratings in 4 local communities (ejido Alfredo Chavez, colonias Alamillo, Año de Hidalgo, Las Varas), and 2 regional stakeholders (Gomez Farias's Cattlemen Association, INIFAP). Stakeholders facing this problem suggested that excessive timber harvesting and overgrazing were primary reasons for higher juniper densities. In particular, affected local communities suggested quality of grazing areas declined as a consequence of increasing juniper densities (Table 4.4, Table 4.5).

Similarly, "soil erosion" (soil 4) had medium or low median ratings or ratings from most communities, regional stakeholders and natural resource agencies. However, 4 communities (ejidos Gomez Farias, Peña Blanca, Porvenir del Campesino, Guadalupe Victoria, colonia Alamillo), 4 regional stakeholders (Gomez Farias County Mayor, Gomez Farias cattlemen association, regional office of SAGAR, and INIFAP) and 1 federal natural resource agency (PROFEPA) rated this issue "high". Three of the communities rating this problem "high" were located in the northeast portion of the watershed, where strong spring and fall winds contribute to high erosion.

The use of median ratings as a measure to analyze variability within stakeholder categories conceals relevant issues. For example, median ratings from local communities and natural resource agencies suggest that the problem of “crop damage by cranes and geese” (wildlife 1) was of little or no interest (Table 4.7, Table 4.9). This could be interpreted by individuals not familiar with the area that this problem either is nonexistent or had no relevance among interested stakeholders. However, when examined within individual stakeholder groups, $\geq$ 1 respondents from 9 local communities (e.g., Alamillo, San Jose Babicora) and 2 natural resource agencies (SEMARNAT, CONAGUA) rated this problem high (Appendix F). Although this problem was not recognized as an urgent need, developing adequate strategies for dealing with crop damage would create positive reactions from a number of stakeholders, particularly from communities such as Peña Blanca, where 3 of 4 respondents rated this problem high.

In addition, key stakeholders missing from the implementation process are likely to be identified, particularly those related to conservation or environmental problems not currently recognized by existing participating interest groups. For example, most grassland- and wildlife-related problems received medium or low ratings from respondents from all stakeholder categories. Agencies such as CONAZA (National Commission of Arid Zones), SEDESOL (Secretariat of Social Development), and SAGARPA (Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food) represent potential stakeholders willing to engage in and address issues such as changes in plant composition and overgrazing (grass 3 and 4 respectively). Currently these groups are not represented as active players in the existing plan.

IV. Problem ratings: equal responses, different meanings

High, medium or low ratings across stakeholder categories convey different meanings. For example, high ratings ($\geq$ 7) from community members indicated that the problem existed in the community and that community members had high interest in addressing it. Medium ratings (> 4 but < 7) indicated that the problem existed in the community, but was not considered a priority. Problems with low ratings (≤ 4) meant the problem was either irrelevant for the community or, if it was present, there was little interest in addressing it.

In contrast, high ratings from regional stakeholders and agency personnel meant that the problem was recognized as part of their duties. However, high ratings often did not convey an expressed interest to address that problem immediately. This was due partly to existing priorities (e.g., national programs, present demands) and limited funding and personnel. Although high ratings often coincided with problems being related to their legal mandates, high ratings often were given to problems not related directly to their missions and responsibilities. This was true particularly among respondents from PROFEPA, who indicated that even though several of the problems in the watershed (Appendix E) were not related specifically to their mandates (e.g., riparian habitat conservation), addressing these issues would enable them to further their agenda as an institution or would eliminate potential obstacles. Medium ratings suggested that, although the problem was not directly part of their responsibilities, respondents still had interest in seeing the problem solved. Low ratings indicated that the problem was not a part of their responsibilities and goals within the agency, therefore, they had no interest in addressing it. This does not necessarily mean that the problem is not a part of somebody else's responsibilities within the agency.

V. Tailoring problem definitions: problem ratings within stakeholder categories

Contrary to strategic problem definitions, stakeholder analysis within stakeholder categories requires specifically defined problems. My findings suggest that lack of adequate references to spatial scales, geographic locations and problem phrasing accounted for some of the variability in problem ratings. First, local communities or regional stakeholders (i.e., spatial scale) better understood the magnitude of selected problems than did respondents from natural resource agencies. (e.g., recognition of the problem as such, severity, description of previous attempts to resolve it). For example, whereas local communities and regional stakeholders often rated the problem of opening of forested lands for agriculture (forest 1) as a low priority, natural resource agencies' personnel considered it a major potential threat.

These different reactions resulted from several factors. No community members believed this problem presently occurred in their community. Because the division of all land already was completed, no new forest lands have been opened for agriculture. Most regional stakeholders shared similar attitudes. Only personnel from INIFAP's office in Madera County (regional stakeholder group) saw this as a major problem. Respondents from this forestry-related research center suggested that new forest clearings still were being created in the area, but these new openings often were small-scaled operations scattered widely within common lands. These clearings resulted from internal pressure from landless people trying to subsist. Even though no evidence that this problem was occurring in the area was introduced during the interviews, respondents from SEMARNAT and some staff from PROFEPA still rated this problem as a potential threat. Similar response patterns were registered within each stakeholder category regarding other problems associated with changes in land use (e.g., opening of grasslands for agriculture – grass 1).

Additionally, problem definitions that lacked appropriate indicators of geographic location often made respondents believe problems were not irrelevant to their community, or led to confusing ratings. For example, flooding (other 2) and drainage of the wetland for agriculture (i.e., soil 1) were not relevant problems for 5 communities. Colonias Año de Hidalgo and Las

Varas, and ejidos Nuevo Ser, and Guadalupe Victoria geographically are isolated from the wetland (Figure 4.3). Consequently, wetland-related problems were deemed irrelevant. Had these problems been defined properly to recognize communities where this problem was relevant, it would have simplified respondent / interviewer interactions. Similarly, most grassland-related problems were not relevant to communities located in the upper reaches of the watershed; natural grasslands are associated only with the lower watershed (Figure 4.3).

Use of qualifiers such as ‘excessive’ and ‘little interest’ in problem definitions prompted respondents from several stakeholder groups to either provide confusing answers or react negatively. For example, problems such as excessive timber harvesting in your community (forest 2) and little interest in protecting the wetland for the cranes (wildlife 3) often were interpreted by respondents as a direct challenge to their current management practices or their interest in promoting proper natural resource stewardship. Consequently, respondents often rated these problems either as a low priority, or irrelevant for them as a way for justifying their behavior. Respondents from SEMARNAT reacted negatively to the phrasing of excessive timber harvesting because they interpreted it as a negative assessment of their existing performance in the watershed.

In addition, some respondents had difficulty rating problems phrased negatively (i.e., little interest in protecting the wetland for the cranes). Often respondents rated these problems as low priorities, suggesting that contrary to the problem statement, conditions in their communities were not bad (i.e., No, we do care for the wetland and the cranes, therefore, it is a low priority). Resource and conservation planners need to be aware of problem phrasing, particularly when assessing opportunities and threats for plan implementation and to gather reliable information from participating stakeholders about existing conservation issues.

VI. Selection of Highest Priorities

Half of the 26 pre-identified conservation priorities were not listed as a high priority by any respondents. Only 3 problems were identified as a high priority by $\geq$ 3 respondents (Table 4.13). This difference in priorities between original planning team members and interviewed stakeholders could be the result of several factors. First, participatory processes used in the development of the management plan were consultative (McMullin 1996), in that decision-making power for defining problems was retained by planning team members. This accounts for the predominance of technical verbiage in problem definitions and the difficulties community members and some regional stakeholders had in understanding problem statements.

Second, planning team members recommended agency stakeholders for this research. Although most key agencies were contacted, I did not reach as deeply into the agency as I would have liked. In addition, other agencies that had important roles were ignored. For example, the National Commission for Arid Lands (CONAZA), which oversees range management in Mexico, was not contacted for this research. Similarly, agencies in charge of rural development and social welfare (e.g., SAGARPA, SEDESOL) were omitted. Third, the planning team lacked expertise and knowledge in facilitating participatory planning processes. This hindered their ability to organize and maintain communication with other relevant stakeholders, particularly state government agencies (e.g., Chihuahua rural development office).

Those problems selected most often as the highest priorities in the watershed by stakeholders might represent opportunities to begin plan implementation in Babicora. However, planners must understand the full context of these problems to successfully address them. Planning team members identified the problem of drilling of new wells for agriculture (soil 2) as a major threat to the watershed. However, wording used by planning team members to define this issue conveyed a different meaning to all interviewed stakeholders. For example, regional and local community interviewees interpreted this as the need to develop new wells in the area. Thus, the issue received support from local communities, regional stakeholders, and the majority (n=4) of the personnel from CONAGUA (Table 4.14). If such activities were pursued, planning team members noted that this would only further degrade the wetland and the habitat for migrating waterfowl.

In addition, $\geq$ 4 communities (e.g., Ejido Gomez Farias, Colonia Libertad) spoke of having past experiences developing new wells for agriculture. Members of these communities recognized that these projects were not always successful, largely due to weak organizational structure, internal disputes, and lack of interest in pursing collective projects. In conclusion, listing of wells for agriculture as a high priority should not translate into immediate implementation. There is a need to evaluate these projects within individual communities.

Motivations for selecting highest priorities differed among stakeholders. Community members selected problems associated with improving living standards (e.g., sewer systems), resource management and administration (e.g., overgrazing), or advancing existing production systems (e.g., emergency irrigation). Regional stakeholders selected problems associated with controlling land use changes (e.g., opening of forest for agriculture), restricting resource use rates (e.g., control of timber harvesting), or alleviating social problems (e.g., financial debts). In contrast, natural resource agency personnel selected problems associated with improving implementation of public policies (e.g., law enforcement, training and monitoring of natural resource agencies), or national programs (e.g., national forest program, national water program).

I view community members as the stakeholder group with the most vested interests linked to identified problems, primarily because their livelihoods often depend on successfully addressing these problems. Regional stakeholders had the least direct interests, perhaps because most regional stakeholders were implementors of local, regional and national program initiatives. Regional stakeholders often had more restricted priorities and financial resources, serving mostly as important liaisons between federal agencies or other institutions and local communities. Regional stakeholders may provide an opportunity for understanding local conditions from a perspective different from that of local communities. This enables planners to better craft potential strategies and programs. Understanding the position of federal agencies provides resource planners with additional insight as to where and how to gear their operational planning activities. In addition, resource planners should consider existing public policies to avoid making recommendations that conflict with state or federal regulations.

The federal natural resource agencies I contacted during my research constantly were looking for ways of improving their performance in implementing national policies and programs, both regionally and state-wide. Most agency personnel saw the conservation priorities listed for Babicora as part of their priorities. However, unless there is an emergency situation (e.g., public health problem, wild fires, flooding) these problems would be weighed equally with problems elsewhere in the state or region.

Although obstacles to resolving high priority problems were issue specific, there were commonalities among stakeholder categories within a classification category. Overall, community members indicated that lack of financial resources and internal organization problems were major obstacles to successful project implementation. Local communities in Babicora experienced problems similar to those of most rural communities in North Mexico, including a 7-year drought, considerable financial debts, and a perceived lack of federal support. These conditions, coupled with lack of motivation to pursue collective projects, left most rural farmers in the region with little or no financial means. Community members indicated that unless they received substantial federal financial support, they would be unable to pursue any project, including wells for agriculture or sewer systems. They believed that pursuing these projects required funding far in excess of what could be generated locally.

In contrast, regional stakeholders and especially natural resource agency personnel, indicated that in addition to lack of financial resources, a lack of personnel and vehicles and a weak community structure contributed as further obstacles. Employees of CONAGUA and PROFEPA indicated that local communities had a long history of being unaccountable and unreliable authorities. They recognized that this problem often was the result of implementing federal programs that delivered unsolicited services (e.g., rural development aid, wells for agriculture, training). Because agencies also face financial constraints, stronger grassroots support must develop within local communities before agencies will engage in new projects.

4.8.3. Issues associated with stakeholder analysis

I. Stakeholders are issue specific

I believe stakeholders fundamentally are issue-specific. However, stakeholder analysis can introduce different levels of specificity relevant to needs at particular planning stages. Stakeholders will be identified during strategic planning based on expressed interests or legal mandates relating to problems defined only in general terms. For example, the following statement from Laguna de Babicora management plan illustrates this situation:

"…Water pollution of four of the five hydrological systems (e.g., fat, oil, detergent, nitrogen, suspended particles, turbidity, alkalinity) due to sewage mismanagement and agrochemicals (e.g., Gomez Farias, Nicolas Bravo, Las Varas)…"

Although problem definitions like this convey a general idea of the state of the environment in the area, the definition lacks sufficient detail for stakeholders to be identified or to express specific interests. To increase the probabilities for successful plan implementation, resource managers must establish operational definitions of identified problems. Operational definitions used in this research often helped identify potential collaborators, but this task remained difficult, especially with definitions dealing with complex problems (e.g., soil erosion, salinization of the wetland, changes in biodiversity). Resource managers must clearly identify causative agents behind such complex problems.

II. Commitment towards collective projects

Regardless of current stakeholder composition or targeted conservation priority, respondents from all stakeholder categories indicated a willingness to participate in addressing identified highest priorities. However, their commitment to participate was conditional for various reasons. First, stakeholders from local communities and federal resource agencies agreed that a primary requirement for collaborative projects would be establishing mechanisms that ensure mutual enforcement of project accountability. Community respondents believed that federal agencies often failed to provide desired outcomes, based on prior experiences with a wide range of projects, from wells for agriculture to access to national relief programs. As a result, local stakeholders were hesitant to engage in collaborative projects. In contrast, respondents from natural resource agencies indicated that community authorities have lost credibility over time, largely due to lack of interest among local inhabitants to pursue collective projects, high rates of rural migration and lack of financial resources. Suggested recommendations included signed collaboration agreements, establishing of agreed upon deadlines, committing financial resources, organizing internal groups and identifying potential beneficiaries. Regional stakeholders did not identify specific attributes necessary for them to make formal commitments. However, most respondents emphasized that stronger, more committed attitudes from local inhabitants would be required.

Wilshusen et al. (2002) recognized that contemporary conservation initiatives failed to embrace the diversity of interested parties and the presence of different perceptions about conservation priorities. Differences in perceptions of nature and associated issues affect stakeholder interactions, and limits the scope of identified potential partners. In addition to hypothetical-deductive reasoning, conservation managers need to rely on intellectual and philosophical traditions to identify and engage potential partners (Wilshusen et al. 2002). Unless a shared base of knowledge, concepts, and ideas is developed, chances for successful conservation are low.

4.8.4. Land privatization and local community structure in Mexico

Respondents from all stakeholder categories believed that institutionally-created common property systems, such as ejidos and colonias, do not adequately address social, economic and environmental problems in rural Mexico. Respondents suggested an alternative approach, division of common lands. The concept of land division elicited different reactions among stakeholder categories regarding perceived consequences and the uncertainty associated with it.

The transformation of existing land tenure types must be handled with caution because of the impacts it can have on individuals. First, regional stakeholders and personnel from natural resource agencies saw the land division issue as complying with the constitutional amendments on land tenure approved in 1992. In contrast, community members associated the concept of land division with internal division of common lands. This division is not based on constitutional amendments, but rather on community interest to improve management of commonly owned resources. Second, all colonias and at least 3 ejidos in the watershed already have implemented working groups. In most cases, these groups were created to improve timber operations and to enhance revenue distribution. This activity was not known for most regional stakeholders and agency personnel.

Working groups initially appealed to many as a method for dealing with problems like "free riding", benefit distribution and social welfare. However, underlying factors need further examination. First, according to the 1992 constitutional amendments, common lands (e.g., grasslands, forests) will remain common property under current environmental and land management laws. However, these working groups, in combination with the new sense of ownership derived from land privatization reforms, have generated new beliefs. In several communities in the Babicora watershed, landowners have been legitimatizing these working groups as formal community structures. Even though the purpose of the groups initially was to improve management of commonly owned resources, current practices in at least 2 communities (i.e., Colonia Libertad, Colonia Alamillo) currently are excluding some community members from using other commonly owned resources (e.g., fuel wood, grasslands). Responses from other community members, particularly from those with newly created working groups, expressed great concern about this emerging situation.

Despite the support of natural resource agencies and regional stakeholders for land privatization reforms in Mexico, other potential threats need additional consideration. First, land privatization may degrade the social fabric of rural communities, particularly ejidos. Cornelius and Myhre (1998) and García-Barrios et al. (1998) found that land privatization will impact small-scaled, commonly owned resource systems (e.g., subsistence agriculture, water and irrigated agriculture, fisheries and forests) by accelerating decomposition of social systems of cooperation and authority. Whiteford et al. (1998) studied 2 ejidal areas in Mexico (Mexicali Valley, Panuco River Irrigation Project) undergoing land tenure changes. Despite continuous support from the federal government (e.g., credits, technical assistance), they found that social disorganization remained constant, showing symptoms of structural disintegration and reconstitution such as erosion of local authorities, absenteeism at local meetings and selling of land to foreigners.

Since the establishment of these institutionally-created common property systems, there has been a constant illegal accumulation of land by rich community members all across Mexico. Previously, this practice was illegal because farmers were not owners, but users of these lands before land tenure changes. Now, a few landowners have access and control of almost one-third of community lands in some cases. In the Babicora watershed, this has been reported in colonias San Jose Babicora and Libertad. If this practice continues, in concert with the working groups described earlier, common lands will be fragmented and existing community authorities will be disempowered. Land accumulation by the wealthy was viewed as a problem especially by community members advocating land privatization reforms. The negative effects of land privatization reforms likely will cause landowners to pursue individual projects instead of participating in community-oriented projects. Natural resource managers and planners need to be particularly aware of this potential problem, with the understanding that involvement of traditional community authorities in future projects might not be as representative or meaningful as in the past.

Land privatization reforms need to be monitored closely because community members potentially can be displaced by selling or transferring of land-based rights. Already some communities in the watershed, such as ejido Porvenir del Campesino and colonia Alamillo, have lost > 50% of their original inhabitants. This restructuring of local communities will influence how conservation planners consider involving local communities. Future participatory processes must examine traditional community authorities and the communities' internal structure. Existing working groups, legitimacy of community authorities and management of common lands all should be analyzed carefully.

Natural resource planners and administrators must pay special attention to the amount of executive power granted to community authorities. At the regional level, only county authorities have judicial power. Under existing law, community authorities have the power to enforce only community regulations. Environmental violations can not be prosecuted by community authorities. Instead, community authorities must rely on federal agencies (e.g., PROFEPA) or state police to prosecute these violations. Community members indicated that this situation also contributes to the loss of credibility for community authorities.

4.8.5. Implications for stakeholder management and conservation planning

Although problem rating, as used in this research, involves one aspect of a comprehensive stakeholder analysis, it sheds light on the relationship between stakeholder analysis and conservation planning. First, resource managers and conservation planners must view stakeholder analysis as a constant exercise throughout the entire planning process. A major methodological consideration in effective planning is that stakeholders fundamentally are issue specific. As problems begin to be identified during early stages of the planning process (strategic problem definitions), stakeholder analysis should be carried out to the extent that these generalized problem definitions allow. As problem definitions evolve into more specific operational problem definitions, identification of key stakeholders will become easier and more specific, particularly when identifying potential partners for plan implementation.

Effective operational problem definitions and a thorough analysis of variability within stakeholder categories enable resource managers to establish feedback loops to help redefine problems and establish potential areas for cooperation. Although ideally such cooperation should center on conservation and management priorities, this analysis allows planners to identify other management areas for which optimal conditions for cooperation already exist (e.g., funding availability, existing stakeholder groups with clear mission and goals, political will). This provides alternative means to diversify the range of potential activities during plan implementation and targets audiences that otherwise may have been ignored.

Local and regional stakeholders had great difficulty identifying potential partners to resolve complex problems (e.g., soil erosion) (Cartwright 1973), biodiversity conservation issues (e.g., changes in plat composition), or environmental processes (e.g., wetland salinization). Although this may have resulted from poor strategic problem definitions, other factors may include (1) low level of environmental awareness among local and regional stakeholders, (2) lack of personal experiences among local stakeholders in how to address these issues, (3) limited knowledge about the composition and responsibilities of existing natural resource agencies, and (4) inappropriate wording to describe existing problems.

Regardless of the degree to which stakeholder analysis is performed (among vs. within stakeholder categories), stakeholders in natural resource management will have multiple interests associated with multiple resources. Although local community members often express interest in a great number of problems, the spatial scope of those interests remain local. Also, their perceptions, beliefs and values about expressed interests reflect personal needs. In contrast, stakeholders at higher spatial strata such as natural resource agencies, will show interest in fewer problems, but their scope will be widespread (e.g., state-wide, nation-wide). Although perceptions, beliefs and values may vary with position in within the agency, this set of principles will be guided by agency mission rather than personal interests.

Although the initial selection of highest priorities among stakeholders may suggest a desired course of immediate action, planners must place these responses within the context of each stakeholder category. Whereas members from local communities often relate to issues relating to their living conditions, personnel from agencies and institutions (either regional or national) approach identified issues from a responsibility stand point. High priorities selected by respondents from local communities conveyed a sense of immediacy to address these identified interests. However, respondents noted that, unless ample financial support and clear commitments are established, they would be reluctant to engage in new undertakings, even if they included projects clearly linked to their well-being (drilling wells for agriculture). Similarly, highest priorities selected by respondents from regional stakeholder groups and natural resource agencies communicated a sense of urgency, not from a need to implement new programs, but in complying with their mission and goals. Unless there is an explicit reason to act with urgency (e.g., flooding, fire), they are content to address identified priorities under existing guidelines and procedures.

Effective natural resource planners now recognize that successful conservation planning comes only with successful participatory processes. The degree of stakeholder involvement needed and the stages of the planning process during which stakeholder participation will occur is unique to each planning process. However, my research suggests that stakeholders should be involved constantly when identifying and defining problems and needs. Stakeholders in all categories, from community members to regional and national agencies and institutions, should be able to relate to the problems discussed in planning meetings. Unless stakeholders are able to recognize these problems as their own, they will not engage actively to resolve them.

Conservation planning in Mexico needs to adopt a new planning protocol. Although traditional participatory planning suggests stakeholder involvement in all planning stages, this approach often is unrealistic or impractical. If conditions are not conducive for stakeholder involvement throughout the entire process, resource planners should ensure that key stakeholders participate during critical stages (e.g., strategic planning) and share decision-making power with involved parties.

In addition, problem definitions must use terms and wording understandable to all interested parties. Planning teams should provide opportunities for all stakeholders to understand identified issues. This will produce more reliable management plans and increase chances for successful implementation. Early stakeholder involvement allows planners to identify obstacles to and opportunities for stakeholder involvement, particularly during plan implementation.

Romero-Lankau (2000) suggested that lack of specificity has been one of the most detrimental factors in the design, implementation and evaluation of environmental policies in Mexico. Natural resource managers and planners need to become aware of how reactions from stakeholders differ in regards to a given set of problems. First, resource managers need to recognize that problem definitions lacking detailed information (e.g., indicators of scale, geographic location, causative agents) are likely to elicit unreliable answers. Respondents may react negatively, fail to understand, or fail to recognize the problems as theirs. Such confusion impedes both the planning process and development of management plans. It also reduces credibility and creates negative attitudes among stakeholders.

Chapter 5. Performance Measures for Conservation Planning

5.1 Concepts of Performance Measurement

Performance measurement consists primarily of performance domains, performance measures (PMs), and performance indicators. Performance domains capture the program purpose and functions (e.g., access, utilization, unmet need, quality, continuum of care, capacity building). Kates et al. (2001) recommended that performance domains should be identified during early stages of planning processes. PMs are the variables that describe a performance domain (e.g., rate, quantity, duration). Often, > 1 PM is required to describe a performance domain. In contrast, PMs with higher descriptive power can describe > 1 performance domain. Finally, performance indicators locate the measured variable within the continuum of a particular dimension of performance (e.g., numerical value of the provider-client ration). Performance indicators allow comparisons between 2 values or positions of the indicator (e.g., comparison between the years 1997 and 2000 for patient visits ratios) (Kates et al. 2001).

Development and implementation of management plans or programs should include both outcome- and output-related PMs. Outcome PMs are designed to yield information related to the general performance of the plan, and consequently, to success in achieving mission-oriented goals. Output PMs are crafted to measure individual activities or services delivered or produced during plan implementation (e.g., roads, sidewalks, traffic control, patching) (Abbott et al. 1998). Thus, output-related PMs deal with individual tasks, whereas, outcome-related PMs evaluate overall progress and success of the program or plan. Because outcomes are considered the sum of many outputs, output- and outcome-related PMs are equally important, and mutually dependent (Abbott et al. 1998). In addition to outcome- and output-related PMs, Harbour (1997) suggests developing PMs to evaluate and monitor planning processes. These process-related PMs target specific actions (e.g., stakeholders involvement) within specific stages of the planning process (e.g., inventory, implementation).

5.2 Criteria for the development of PMSs

PMSs should be linked directly to the program or plan goals, objectives, strategies and legal mandates (Hoelzer et al. 2001). Once the performance domains have been defined, the next step is to define the criteria for selecting adequate PMs. Criteria found in the literature include (1) selection of only those PMs that are crucial for the system; eliminate trivial or highly correlated PMs (i.e., duplicity), (2) data needs, data availability, and an assessment of the capacity for data collection (Harbour 1997), (3) if applicable, identify benchmarks (i.e., potential thresholds of performance given the current conditions) (Crawford et al. 1998), (4) reliability and validity, (5) determine needs for evaluation where no PM is available (i.e., information gaps) (Hoelzer et al. 2001), (6) when possible, choose PMs that represent more than one aspect of the process, (7) select those PMs reported as important for the field, and (8) use or build a shared body of knowledge (e.g., concepts, definitions) that is understandable to all stakeholders (Jiang et al. 2000).

Kates et al. (2001) believed that no definitive roadmap or blueprint for developing a PMS exists. Concepts such as outcome measures, and report cards are relatively new and poorly developed within the public sector. Different approaches or protocols have been used to develop performance measurement tools, including stakeholder involvement (Crawford et al. 1998, McDonald 1998, Jiang et al. 2000), legal mandates (Kates et al. 2001) and information gaps (Coutts and Rogers 2000). Before attempting to develop a PMS, 2 major areas must be considered. First, a PMS should reflect the mission, goals and objectives of a management plan or program. For example, the statewide long-range transportation plan for the Delaware Department of Transportation included both output- and outcome–based measures and followed a hierarchical approach based on the plan's goals, strategies, policies and actions (Abbott et al. 1998). Second, performance measurement in most fields focuses on developing a code of national and international standards of performance (Hoelzer et al. 2001). For this to happen, it is important to build and share a body of common knowledge (e.g., concepts, principles, definitions) and identify the main performance domains relevant for each field. Acquisition of this shared knowledge will facilitate comparisons among different case studies (e.g., benchmarking, expected outcomes, performance domains) (Crawford et al. 1998).

5.3 Conservation planning in Mexico: Planning process performance measures

My evaluation of current conservation planning approaches in Mexico (See Chapter 3) suggests that, to develop successful PMSs for plan implementation (i.e., output- and outcome-related PMs), it is necessary to create appropriate PMs to monitor the planning processes. The scant evidence linked to performance measurement I found in both NPA and MDRL management plans primarily was related to plan implementation, mostly output-related PMs (e.g., control of soil erosion by 30% within 5 years of plan implementation). No outcome-related PMs for plan implementation were found in any management plan. Process-related PMs were not found in any NPA case studies, and in 2 MDRL projects. The Manialtepec's and La

Mancha-El Llano MDRL projects were the only ones containing process-related PMs (e.g., all key stakeholders should understand and endorse problem definitions).

Absence of adequate process-related PMs detrimentally affected development of management plans in several ways. First, management plans lacked adequate use of appropriate environmental reference frameworks (e.g., ecosystem management, endangered species management). This hindered planning teams' ability to identify relevant performance domains. The performance measurement literature suggests that identification of performance domains provides research questions and direction for developing management plans, but also, provides a foundation to define and hierarchically analyze existing problems (Abbott et al. 1998). For example, a declining population approach will yield different performance domains than will an ecosystem management or sustainable forestry approaches. Performance domains under a declining population protocol include critical habitats, population dynamics, habitat restoration, and captive breeding (Caughley 1994, Caughley and Gunn 1996). Performance domains under an ecosystem management approach include maintenance of ecological services, stakeholder involvement, promotion of sustainable resource use, and protection of evolutionary processes (Grumbine 1994).

Second, planning teams often failed to recognize that early detection of performance domains establishes not only the structure and content of a management plan (e.g., identified issues, goals and objectives, strategies), but ultimately the structure of a PMS. Performance measurement information contained in management plans I reviewed resulted from random planning exercises, rather than the natural transition from previous planning stages. This issue is particularly relevant for NPA planning processes. Respondents from NPA planning teams indicated that planning teams are expected to closely follow the protocol used in the NPA system in Mexico (Figure 3.2). Thus, management plans are formatted using pre-identified performance domains described in this planning protocol (e.g., natural resource conservation, environmental education, outreach, research, monitoring and evaluation). Respondents from NPA planning teams indicated that this situation impeded their ability to tailor management plans to specific local conditions and to develop additional performance domains required to address specific problems. In addition, these pre-identified performance domains often were phrased more in terms of actions to be accomplished (e.g., conservation, management) rather than elements of a specific environmental reference framework.

My conservation planning protocol (Appendix B) focuses on process-oriented elements. Therefore, most performance measurement tools described in this chapter will concentrate on process-related activities. I believe that a PMS for conservation planning should include 2 parallel systems: one to evaluate and monitor planning processes and another to monitor plan implementation. Monitoring planning processes serves resource planners in 3 ways (1) it allows them to be proactive in addressing emerging issues (e.g., difficult stakeholders, unidentified data needs), (2) enables planning teams to maintain the natural flow and continuity from one planning stage to another (e.g., inventory and issue identification to strategic and operational planning), and (3) facilitates development of PMSs for plan implementation.

Performance domains from a process-related PMS usually can not be transferred directly to a system used to measure plan implementation. However, it is possible that some performance domains related to planning processes can facilitate identification of relevant domains for plan implementation. For example, the performance domain of assessment of stakeholder normative cores during the planning process could be translated into new, more meaningful areas relevant for the plan implementation such as establishment of stakeholder coalitions or monitoring of stakeholder participation. Also, if crafted properly, a process-oriented PMS may provide additional information to evaluate environmental soundness of a management plan. Even though the soundness of a plan primarily is a result of the composition of planning teams and identified goals and objectives, the use of more integrated, powerful diagnostic tools during early stages will increase plan viability. Finally, process-related PMs, if implemented, provide some relief for personnel from natural resource agencies. Instead of monitoring compliance with a specific protocol, these alternative PMs will enable them to track the progress of individual planning processes and identify potential process-related obstacles. This allows planning teams more flexibility to identify performance domains that are relevant for specific regions instead of simply complying with a required protocol.

5.4 Goals and Objectives

Based on information available from the planning process for the development of the management plan for Laguna de Babicora's Watershed and other management plans in Mexico, my objectives in this chapter are:

5.4.1 Establish a descriptive protocol for collaborative conservation planning that incorporates major requirements, limiting factors, and opportunities for successful design and implementation of conservation plans in Mexico;

5.4.2 Evaluate the planning process at Laguna de Babicora to assess effectiveness of that planning approach, identify missing components of effective planning, and identify and describe potential limitations to future implementation; and

5.4.3 Develop process-related as well as output, outcome and input-related performance measures to monitor and evaluate the planning process for either modified rural landscapes or natural protected areas' planning processes in Mexico.

5.5 Evaluation of Laguna de Babicora's Planning Process

The planning process for the Laguna de Babicora watershed occurred over a 3-year period. Planning focused on inventory-related activities, strategic planning, and implementation of pilot projects, and operational planning. Inventory-related activities included gathering and analyzing existing information, establishing new data sets (e.g., hydrology of the watershed, flora and fauna inventories) and description of agricultural systems. Performance in all 4 pre-identified performance domains (i.e., natural resources, social characteristics, agricultural production systems, and environmental education) by planning team members was comprehensive and integrated, particularly the natural resources and environmental education components. For example, the environmental education program contains 40 different activities tailored specifically for the characteristics of the area. Also, 2 new plant species were described and cataloged. In contrast, description of social characteristics was the weakest of all 4 domains. Although social information was provided, the management plan provided little evidence of the relevance of social science information for conservation of the area.

The Babicora plan shared limitations with other NPA and MDRL plans I evaluated. First, problems often were poorly defined and identified. Problem definitions often were vague and phrased as general statements that lacked indicators of scale, geographic location, causative agents or links to affected resources, among others. Use of stronger diagnostic tools (e.g., GIS systems, stakeholder analysis) and application of alternative models for resource administration and conservation (e.g., resource-based rights, common property resource systems) would improve the ability of conservation planners to identify problems more accurately.

Strategic (e.g., goals, objectives) and operational planning components in this management plan were comprehensive, but they often lacked specificity, similar to problem definitions. Although several stakeholders helped developing this management plan, the planning effort would have benefited from involving more stakeholders, particularly in designing recommended actions. Similar to other MDRL projects, planning team from Babicora launched multiple operational components during the planning process, ranging from environmental education activities to cattle management workshops (Table 5.1 to Table 5.3). Twenty-one activities conducted during the planning process were not conservation-related activities. Most MDRL projects are short-lived and have limited financial and human resources. Given that, planners should identify operational components that will have long-lasting impact on the area and increase the likelihood of achieving conservation goals and objectives. In addition, few of the implemented operational components involved stakeholder groups already doing in conservation or resource management projects in the area. Planners should look for ongoing endeavors for potential partners to help implement potential pilot projects.

Rather than creating new projects, resource planners should understand how these groups operate and then introduce alternative ideas likely to be adopted by existing working groups. This promotes more efficient use of financial and human resources and increases the possibility that recommended projects will continue once the planning process is completed. For example, in Babicora, working groups existed in at least 8 communities managing commonly owned forests and grasslands. Although these groups were small in scale, they were established, monitored and stimulated by local landowners. Some of these groups have been in place for $\geq$ 10 years. No process-related or plan implementation PMs were found in Babicora plan, a common shortcoming found among management plans I evaluated, particularly NPA plans.

Table 5.1. Operational components related to conservation, natural resource management, sustainable resource use and community development implemented by planning team members between 1994 and 1997 in the Laguna de Babicora's Watershed, Chihuahua, Mexico.

**1. Conservation, Management, and Sustainable Resource Use ** **
1.1 Recommendations to Nicolas Bravo authorities for building sewage and residual water treatment facilities
1.2 Establishment of a protected area for waterfowl at colonias Libertad and San Jose Babicora with support from Ducks Unlimited Mexico.
1.3 Establishment of 7 Management Units (UMAs) for hunting of valuable game species (e.g., turkey, waterfowl)
1.4 Planning, and implementation of sewage treatment lagoons in colonias Las Varas, and Nicolas Bravo, and ejido Gomez Farias in collaboration with CONAGUA, county authorities and the University of Chihuahua
1.5 Support in the establishment of pest control program in one community
1.6 Publication of guidelines for grassland management and conservation, and garbage collection
2 Community Development **
2.1 Career counseling for senior high school students (70 students)
2.2 Arranging for meetings between architecture school students and locals for remodeling local buildings (e.g., schools, jail)
2.3 Collaboration among the University of Chihuahua, Gomez Farias County Mayor, CONAGUA, state office for rural development and 3 political parties in the negotiation, drilling and equipping of a well for domestic water at ejido El Nuevo Ser.
2.4 Establishment of two regional museums at ejido La Pinta, and colonia San Jose Babicora
2.5 Implementation of the first youth cultural awareness program in the watershed
2,6 Development of a video with the most relevant features of the region (e.g., historical, natural).
2.7 Implementation of the first youth self-help and self-esteem course with collaboration from Gomez Farias County Mayor
2.8 Forty workshops about nutrition, baking and cooking for housewives
2.9 Distribution of seeds and assistance for the establishment of domestic gardens
2.10 Technical support for the establishment of a broiler chicken farm in cooperation with Las Varas authorities, University of Chihuahua's animal science school and state government

** These management categories were identified for the purpose of this research. They are not identified as such in the original document.

Table 5.2. Operational components related to education, capacity building and building presence among local communities implemented by planning team members between 1994 and 1997 at Laguna de Babicora's Watershed, Chihuahua, Mexico.

3 Education**
3.1 Arranging for NGOs and private companies to donate furniture and sound equipment for local schools
3.2 Arranging for the donation of 50,000 books by different schools at the University of Chihuahua to county and school libraries
3.3 Design and implementation of an environmental education program specifically tailored for the watershed. This program reached the entire watershed and lasted for the 3 years of the project.
3.4 Implementation of the "Worldwide Bird Festival" with the theme "endangered bird species"
3.5 Twenty workshops for local landowners addressing environmental issues (e.g., solid waste management, wildlife conservation)
3.6 Three summer camps with the participation of 140 children from 7 local communities
3.7 Technical assistance and donation of printed material for the development of a course on sustainable development and organic agriculture with the technical high school and Madera County officials
3.8 Arranging for the donation of laboratory equipment to Guadalupe Victoria's high school by the animal science and chemistry schools at the University of Chihuahua
4. Capacity building/building presence in the communities**
4.1 Assistance with agrarian problems at ejido Guadalupe Victoria
4.2 Negotiations for the establishment of a monitoring station through agreements between SEMARNAT and the University of Chihuahua
4.3 Workshops with local women aimed at discussing social, environmental and life quality issues
4.4 Follow-up meetings with community authorities for gathering feedback from inventory-related activities and remaining planning stages
4.5 Publishing of the bulletin "Ecos de la Babicora" for three years. A total of 50,000 issues were published and delivered to 14 communities
4.6 Participation in the improvement of sewage facilities at communities Las Varas, Nicolas Bravo, Libertad, San Jose Babicora and Gomez Farias
4.7 Organizational meetings for outstanding corn producers in the region
4.8 Logistic support to rainbow trout producers in Madera (e.g., organization, marketing)
4.9 Support for blue corn farmers for the certification before the Organic Inspection Consulting Services for exports of blue corn overseas

** These management categories were identified for the purpose of this research. They are not identified as such in the original document.

Table 5.3. Operational components related to restoration and research implemented by planning team members between 1994 and 1997 at Laguna de Babicora's Watershed, Chihuahua, Mexico.

5. Restoration**
5.1 Rehabilitation of two wells both for watering cattle and as wildlife habitat (e.g., nesting habitat for resident waterfowl)
5.2 Rehabilitation of 3 permanent springs in order to improve cattle access to water, and wildlife habitat
5.3 Establishment of nursery for pine and oaks
6. Research/Demonstration/Training**
6.1 Grassland demonstration exclusions
6.2 Trials for corn production and establishment of artificial prairies
6.3 Workshops for alternative grazing systems and range management
6.4 Four talks with topics like "technical services from the animal science school" and "reproductive management of extensive cattle ranching." A total of 50 cattle producers from 4 communities attended the talks
6.5 Workshop for trout production in Colonia La Pinta

** These management categories were identified for the purpose of this research. They are not identified as such in the original document.

5.6 Process-related Performance Measures

PMs described in the following sections correspond to major categories used in the planning protocol I developed in Chapter 3 (Appendix B). These PMs were created based on 4 assumptions. First, conservation planning and implementation of conservation programs and plans are dynamic, social exercises. Under current conditions in Mexico, successful conservation practices occur only when conservation initiatives are framed as social and organizational questions. Although higher levels of stakeholder participation are recommended in conservation fields (Brechin et al. 2002), the degree and type of involvement should be defined on a case-by-case basis. Second, planning processes primarily are issue-driven. Unless problems are identified adequately, successive planning stages will be affected negatively. Third, although conservation planning appears to be a linear exercise (i.e., from point A to point B), different planning processes follow different routes. Regardless of how conservation planning is performed, conservation planners must recognize and enforce the interconnection among all planning stages, from inventory-related activities to performance measurement tools. PMSs should result logically from previous stages in the planning process. Finally, performance measurement, either of the planning process or implementation of a management plan, should be a continuous activity beginning with early stages of a conservation planning process. Planning team members and participating stakeholders should look constantly for potential performance indicators and performance measures. A successful PMS provides solid feedback and data and is recognized and endorsed by all participating parties.

PMs described in the following sections all are process-related. There are 2 distinct sets of PMs. Those PMs within the first 10 sets are specific to a particular performance domain from the conservation planning protocol I developed in Chapter 3 (Appendix B). If appropriate, sets of PMs are introduced after a brief description of problems commonly found while evaluating NPA and MDRL management plans. Remaining PMs are designed to assess the overall connection among individual planning stages or activities.

Definition of conservation problems and needs: Vague problem definition was one of the most persistent problems found among management plans I evaluated, particularly NPA plans. Because planning processes fundamentally are problem-solving exercises, ill-defined problems will affect development of successful management plans. Unclear goals and objectives, negative reactions from key stakeholders, and difficulty in developing adequate performance measurement tools are potential consequences. The first 6 performance domains in my conservation planning matrix (e.g., description of the area, resource base tenure system, participatory processes, definition and effects upon common property resource systems, problem identification) were designed to establish a strong foundation for proper identification of conservation problems given current conditions in Mexico. Suggested PMs for these 6 performance domains are:

1. Description of the Area:

- 1a Is the appropriate environmental reference framework identified in the management plan? If so, is this framework supported by all planning team members and participating stakeholders?
- 1b Do participating resource planners and stakeholders understand the principles, tenets and purpose of the selected environmental reference framework?
- 1c Are suggested performance domains for the plan justified in inventory-related sections?
- 1d Does the definition of the original physical, biological and social characteristics of the area contain indicators of spatial scale, geographic location and aerial coverage?
- 1e Does the description of past physical, biological and social characteristics of the area allow for the establishment of benchmarks for future evaluation and monitoring?
- 1f Are past pro-conservation and resource misuse activities accounted for?
- 1g Does the conservation mission reflect the tenets and goals of the selected environmental reference framework?

1h Are experts from required disciplines available in the area? If so, were these experts involved in the planning process?
1i Do initial participants agree on the composition of required disciplines?

2. Resource Base Tenure System:

2a Is the tenure system for each individual existing natural resource quantified?
2b Is the physical distribution of existing resources mapped at the landscape level?
2c Are resource-based rights and responsibilities (e.g., use, ownership, administration, maintenance, enforcement) defined for all existing natural resources?
2d Are current projects involving the use of natural resources clearly defined?
2e Is it clear how these projects (if present) are likely to contribute to or jeopardize successful conservation practices in the area?
2f Is the structure of rural communities and how they respond to changes in land tenure (e.g., meeting attendance, credibility of community authorities, rural migration) well understood?
2g Is it well understood how changes in land tenure are affecting resource use and administration by rural communities (e.g., illegal harvesting, low law enforcement)?

3. Participatory Processes:

3a Is it clear how stakeholder participation will be conducted? Is this decision collectively supported by planning team members and stakeholders participating at this stage?
3b Are problems or limitations for the use of participatory methodologies identified? (e.g., lack of expertise, unfamiliarity with existing methodologies, lack of funding, inappropriate timing)
3c Are opportunities for conducting stakeholder participation identified? (e.g., adequate expertise, use of successful methodologies)
3d Is it clear in what planning stages stakeholder participation is expected?
3e Is there an initial list of potential stakeholders (e.g., natural resource agencies, conservation organizations, research centers, resource users) already available? Is this group of stakeholders agreed upon by planning team members and participating stakeholders?
3f Are expectations for stakeholder involvement outlined for all stakeholder groups?

4. Scoping for Evaluative Factors for Stakeholder Analysis

4a Is participation of state or federal agencies required for the development of this management plan? If so, is it clear in what stages of the planning process agencies' participation is required?
4b If agencies' involvement is required, is it clear why (e.g., data requirements, existing expertise, required involvement) this participation is required? If so, is this a shared belief among planning team members and participating stakeholders?
4c Are opportunities (e.g., available funding, previous successful experiences) and limitations (e.g., conflicting interests, unwillingness to participate among some key

stakeholders) identified? If so, is this information understood by planning team members and participating stakeholders?

4d Is there clear understanding about pre-identified criteria for the identification of potential stakeholders? Is this information shared by planning team members and participating stakeholders?

4e Is it evident to planning team members and participating stakeholders who among pre-identified stakeholders should be involved in the development of the management plan?

4f Has willingness to participate been assessed for pre-identified stakeholder groups?

4g Is there evidence of existing, local working groups?

5. Definition and Effects upon Common Property Resource Systems (CPRs)

5a Are planning team members and participating stakeholders familiar with the common property resource system model?

5b Have existing common property resource systems been described, quantified and geographically located in the area? If so, is this information shared and understood by planning team members and participating stakeholders?

5c Are current management practices and regulations for commonly owned/used resources understood by all planning team members and participating stakeholders?

5d If institutionally-created and indigenous common property resource systems are present, do planning team members and participating stakeholders understand the differences between the 2 types of systems?

5e Are threats for indigenous common property resource systems identified (e.g., incompatibility between community values and market integration, non-autonomous governing of resource use and management, non-recognition of indigenous institutions). If so, do planning team members and participating stakeholders understand their relevance?

5f Are threats for institutionally-created common property resource systems identified (e.g., decomposition of rural communities, shift from internal to external means for enforcement of collective agreements, unrealistic economic expectations, poor organization and leadership). If so, do planning team members and participating stakeholders understand their relevance?

6. Problem Identification

6a Are planning team members and participating stakeholders able to identify who is facilitating the planning process? If so, is the involvement of this institution or agency supported among all planning team members and participating stakeholders?

6b Does the planning team include all required disciplines? If so, is this a shared understanding among all participating parties?

6c Are disciplines balanced within the planning team? If so, is this supported by all planning team members and participating stakeholders?

6d Do planning team members and participating stakeholders understand the roles, deadlines and expected outcomes from facilitating institutions?

6e Do all stakeholders and planning team members agree on the type of decision-making for problem identification?

6f Are problems associated with the physical, biological and social characteristics of the area identified?
6g Does available information about physical, biological and social characteristics of the area support identified problems?
6h Do problem definitions contain scale indicators (e.g., local, regional)?
6i Do problem definitions contain indicators of geographic location (e.g., upper side of watershed)
6j Are problem definitions linked to specific resource(s)?
6k Do problem definitions describe causative agents?
6l Do problem definitions involve potential performance indicators? If so, has a baseline been established for future comparisons?
6m Do problem definitions contained time indicators?
6n Do planning team members and participating stakeholders agree upon the phrasing of identified problems?
6o Do stakeholders recognize these problems as their own?
6p Do planning team members and participating institutions understand and agree upon criteria for hierarchical analysis of issues?
6q Have identified issues been hierarchically analyzed? If so, do planning team members and identified stakeholders agree on what the priorities are for the area?
6r Are uncertainties (e.g., unknown population status for endangered species, attitudes from local stakeholders in regards to changes in resource management) recognized and framed in the management plan?
6s Are criteria for hierarchical analysis of uncertainties defined?
6t Have identified uncertainties been prioritized? If so, do stakeholders and planning team members agree upon this classification?
6u Are criteria for hierarchical analysis of data needs identified?
6v Have data needs been prioritized? If so, do participating stakeholders and planning team members agree upon this classification?
6w Do planning team members and participating institutions understand and agree upon criteria for hierarchical analysis of data needs?
6x Have identified data needs been hierarchically analyzed? If so, do planning team members and identified stakeholders agree on the priorities for the region?

Stakeholder analysis and stakeholder involvement: My findings in Chapters 3 and 4 indicate that stakeholder analysis and stakeholder involvement are among the least understood and more controversial issues in conservation planning. Planning team members rarely were knowledgeable of topics such as degree of stakeholder involvement, sharing of decision-making power, use of participatory processes and collaborative conservation planning. In particular, conservation planners indicated they could not be proactive when addressing stakeholder-related issues. Stakeholder analyses fundamentally are issue-specific. Ill-defined problems are the primary reason for unsuccessful stakeholder analysis and involvement. Although stakeholder involvement is specific to each planning process, the PMs presented below should help conservation planners become proactive in understanding and involving key stakeholder groups and monitoring existing partnerships.

7. Stakeholder Normative Cores

- 7a Are criteria for stakeholder classification (e.g., legal mandate, resource-based rights and responsibilities, expressed interests) understood and agreed upon by planning team members, and participating stakeholder groups?
- 7b Are stakeholder groups classified (e.g., primary stakeholders, secondary stakeholders)? If so, is this information agreed upon by all involved interested parties?
- 7c Do identified stakeholders understand how they are expected to participate in development of the management plan? If so, are they able to recognize at what planning stages they should be involved?
- 7d Do planning team members and participating stakeholders understand goals and objectives of identified stakeholder groups?
- 7e Do planning team members and participating stakeholders understand expressed interests and needs of identified stakeholder groups?
- 7f Do planning team members and participating stakeholders understand values of identified stakeholder groups?
- 7g Do planning team members and participating stakeholders understand how identified stakeholders are organized and how they interact with other stakeholder groups?
- 7h Is there a defined mechanism for balancing power differences among identified stakeholder groups?
- 7i Do participating stakeholders understand the balance of power and how it is shared? Is this endorsed by all involved stakeholders and planning team members?
- 7j Do identified stakeholders recognize the reasons and potential benefits for participating in conservation planning?
- 7k Are potential threats to collaborative conservation planning identified? If so, are participating stakeholders aware of the threats and their likely impacts on successful plan implementation?
- 7l Is conflict resolution a priority topic among planning team members and participating stakeholders? If so, is adequate expertise available for the development of the management plan?

<u>*Goals and Objectives:*</u> Management plans I evaluated lacked detailed goals and objectives. Objectives often were phrased as goal statements and lacked indicators and specifics for monitoring progress during plan implementation. Goals and objectives from NPA management

plans often were not connected to identified issues. Instead, these goals and objectives often related more to pre-identified performance domains (e.g., sustainable resource use, environmental education) (See discussion in Section 3.8.2) than to local conditions or existing problems. Identification of goals and objectives should integrate identified issues and be the result of negotiated agreements among participating stakeholders. The PMs listed below should facilitate identification of sound conservation goals and objectives.

8. Goals and Objectives

- 8a Is sharing decision-making power for the establishment of goals and objectives a principle endorsed by all planning team members and participating stakeholders? If so, is there a mechanism for establishing goals and objectives in a collaborative way?
- 8b Are performance domains established? If so, are these performance domains understood and supported by all planning team members and participating stakeholders?
- 8c Are identified performance domains rooted in identified problems and needs?
- 8d Are identified performance domains linked to the selected environmental framework?
- 8e Is the relevance of identified performance domains recognized by participating stakeholders and planning team members?
- 8f Can identified goals and objectives be linked specifically to identified issues?
- 8g Are identified goals and objectives agreed upon by all participating stakeholders and planning team members? If so, do stakeholders believe their needs and problems are addressed by suggested goals and objectives?
- 8h Do objectives contain specific indicators of scale?
- 8i Do objectives contain indicators of geographic location?
- 8j Are objectives linked to affected resources?
- 8k Do objectives and goals address causative agents?
- 8l Are suggested objectives time specific?
- 8m Do objectives include indicators for performance measurement?
- 8n Are requirements for successful implementation of identified goals and objectives clearly identified? If so, are participating stakeholders and planning team members aware of such information?

Operational Planning: In general, operational planning in NPA and MDRL management plans centered on developing appropriate strategies and technical recommendations to successfully implement management plans. However, in some MDRL projects, operational components often were implemented while management plans were being developed. These operational projects served as vehicles to address pressing environmental problems and establish communication avenues with regional and local stakeholders. My findings suggest that not all operational components were related to environmental or conservation issues. It appeared that implemented projects resulted from the expertise present in the planning team rather than existing needs. In addition, selected operational components often were new projects rather than activities that involved existing local, working groups. The PMs listed below help resource managers and planners develop more sound and lasting operational strategies and projects. Given the temporary nature of most MDRL projects, these PMs will identify operational projects likely to remain in the area even after the completion of MDRL projects.

9. Operational Planning

- 9a Do all participating parties agree that the expertise needed to develop operational components is readily available? If so, is this a shared understanding among all participating parties?
- 9b Are current disciplines balanced within the planning team? If so, is this supported by all planning team members and participating stakeholders?
- 9c Do stakeholders and planning team members agree on the type of decision-making for the identification of operational strategies and actions?
- 9d Are operational strategies and projects linked to identified goals and objectives?
- 9e Are all goals and objectives addressed by operational strategies and projects? If so, is this a shared agreement among all planning team members and participating stakeholders?
- 9f Is it possible to link suggested operational components with identified issues and needs?
- 9g Are all identified issues and needs addressed by recommended strategies and actions? If so, is this a shared agreement among all participating parties?
- 9h Do participating stakeholders consider that suggested recommendations and strategies address their needs and interests?
- 9i Do all participating parties agree on how to prioritize operational strategies and projects? (e.g., urgency, time constrains, available funding)? If so, is this information shared, understood and supported by planning team members and participating stakeholders?
- 9j Are recommended actions and strategies hierarchically classified? If so, is this process of hierarchical analysis supported by planning team members and participating stakeholders?
- 9k Are responsibilities for implementation of operational components identified? If so, is this information agreed upon by planning team members and participating stakeholders?
- 9l Do stakeholders recognize their responsibilities for implementing operational strategies and projects? If so, how willing are these stakeholders to implement these actions and strategies?

9m Is there a clear schedule for the implementation of operational strategies and projects? If so, is this information a shared agreement among all planning teams and participating stakeholders?
9n Are collaborative partnerships required for implementation of recommended actions and strategies?
9o How willing are stakeholders to engage in collaborative conservation practices?
9p Is there existing expertise in implementing collaborative conservation projects?

The following PMs address projects that are implemented concurrent with development of management plans, particularly in MDRL projects.

9q Are the criteria for the selection of concurrent operational projects defined? If so, is this information understood by planning team members and participating stakeholder groups?
9r Are these criteria agreed upon by all participating parties?
9s Are these projects adding to already identified processes or activities occurring in the area, or are these projects new enterprises?
9t If these are complementary activities, are these projects targeting existing working groups or do they require the integration of new stakeholder groups?
9u If these are new activities, are these projects targeting existing working groups do they require the integration of new stakeholder groups?
9v Are deadlines, schedules, anticipated outcomes, and responsibilities for implementation defined? If so, is this information understood and shared by planning team members, participating stakeholders, and target audiences?
9w Are these projects parallel activities to the planning process (e.g., improving local libraries) or environmental-based projects (e.g., reforestation, wildlife management training?
9x Is it clear for planning team members and collaborating stakeholders that these projects further their chances for accomplishing of conservation goals and mission?

10. Monitoring and Evaluation: Tools for performance measurement found in management plans largely centered around implementation of the plan. I found little evidence of evaluation and monitoring of planning processes. I believe separate PMSs must be established for development of a management plan and for plan implementation. Successful monitoring of planning processes will produce plans a with higher probability for successful implementation.

This section introduces PMs that focus on monitoring the process of developing PMs for plan implementation.

10a At this planning stage, does the current planning team composition include all required disciplines properly? If so, is this a shared understanding among all participating parties?
10b Are current disciplines balanced with in the planning team at this stage? If so, is this supported by all planning team members and participating stakeholders?
10c Do all stakeholders and planning team members agree on the decision-making process for development of performance measurement tools?
10d Are criteria (e.g., relevance for the system, easiness in collecting data) for development of performance measurement defined? (See Section 2.9.6). If so, is this information understood and endorsed by planning team members and participating stakeholders?
10e Are all outcome-related performance measures linked to specific goals?
10f Are all outcome-related performance measures linked to specific operational components?
10g Are these performance measures understood and endorsed by planning team members, and participating stakeholders?
10h Are all outcome-related performance measures linked to specific objectives?
10i Are all goals and objectives addressed by identified performance measures?
10j Are all operational components addressed by identified performance measures?
10k Are responsibilities for the monitoring and evaluation of plan implementation clearly defined? If so, are responsible parties aware and willing to accept such responsibilities?
10l Is there a clear schedule for gathering information and data analysis for performance measurement?

Lack of connection and continuity among different planning stages: The transition between inventory-related activities to strategic to operational planning was disarticulated in all plans I reviewed, but particularly in NPA plans. I believe this lack of connection is detrimental to planning processes in many different ways. First, stated goals and objectives often showed little or no evidence suggesting what problems are being addressed. Thus, goals, objectives and operational components lacked benchmarks and indicators for development of PMs. Suggested goals, objectives, and operational strategies were described in general terms that lacked details necessary for adequate monitoring of plan implementation. Conservation planning was perceived by planning team members as a systematic endeavor that follows a linear approach.

Regardless of how conservation planning is performed, it is important to recognize that management plans are a reflection of how all planning stages are interconnected. The PMs listed below facilitate monitoring the connection among planning stages. Use of these PMs also will help conservation planners detecting unidentified or poorly defined issues, unsupported goals and objectives, and unconnected recommended strategies and other operational components.

A. Is the appropriate environmental reference framework identified in the management plan?
B. Are suggested performance domains for the plan justified in inventory-related sections?
C. Are identified problems relevant and defined within the selected environmental reference framework?
D. Are all identified problems and needs addressed by defined goals and objectives?
E. Do all identified goals and objectives represent identified problems?
F. Are identified goals and objectives congruent with tenets and principles of the selected environmental reference framework?
G. Are goals and objectives addressed by recommended strategies and actions?
H. Are all suggested actions and strategies linked to goals and objectives?
I. Are suggested actions and strategies congruent with the selected environmental reference framework?
J. Are recommended performance measures linked to specific identified issues?
K. Are recommended performance measures linked to identified goals and objectives?
L. Do recommended performance measures reflect indicators and performance domains relevant to the selected environmental reference framework?

5.7 Samples of performance measures for plan implementation

Information listed in Table 5.4, Table 5.5, Table 5.6, and Table 5.7 was developed using 1 problem definition I extracted from the Laguna de Babicora management plan (Facultad de Zootecnia – UACH 1998b). This problem is introduced in the tables under the heading of strategic planning definition. Similar to all the NPA plans and most (n=5) MDRL plans I reviewed, PMs for long- and short-term outcomes were not described in the Babicora plan. Outcome-, output-, and input-related PMs that I described below were developed specifically for this exercise to establish a foundation on how to develop effective PMs. PMs described below were not intended to represent a comprehensive PMS for the Babicora management plan. Instead, these examples of PMs are designed to illustrate the hierarchical and nested nature of an effective PMS. These PMs followed a similar format recommended for the monitoring Comprehensive Wildlife Conservation Strategies (CWCS) (International Association of Fish and Wildlife Agencies 2004).

Operational problem definitions listed below were identified using information gathered through interviews conducted in 1999 with planning team members from Babicora. Planning team members selected and redefined conservation priorities for the watershed (see Appendices D and E for methodological approach and operational problems definitions). Four operational definitions were created for the strategic problem definition used in this section. The examples of PMs illustrate the types of measures that could be used to evaluate implementation of the Babicora management plan. However, these PMs would require more detailed field information for them to be realistic.

Table 5.4. Sample of potential output-, outcome-, and input-related performance measures to evaluate the progress in achieving the short-term goal of 'No illegal dumping in the 5 hydrological systems by 2010' at Laguna de Babicora watershed, Chihuahua, Mexico.

1. Strategic Problem Definition					
Water Pollution of 4 of the 5 hydrological systems (e.g., fat, oil, detergent, nitrogen, suspended solids, turbidity, alkalinity) due to sewage mismanagement and agrochemicals					
	2. Strategic Outcome Performance Measure				
	To have healthy hydrological systems throughout Laguna de Babicora watershed by 2020				
		3. Operational Problem Definition			
		a) Lack of enforcement to control illegal garbage dumping in arroyos			
			4. Operational Outcome Performance Measures		
			a) No illegal dumping in the 5 hydrological systems by 2010		
			Additional Outcome Performance Measures		
			1) Reduce number of documented violations compared to 2004 by 50% (2008)		
			2) Reduce number of illegal dump sites by 50% by 2010, 75% by 2015 and 100% by 2020		
			3) Change behavior about garbage disposal among local people, compared to before the establishment of garbage disposal regulations beginning on 2007		
			4) 100% compliance with existing garbage disposal regulations by all local residents by 2005, including landless people		
				5. Output-related Performance Measures	
				1) Number of contacts with local residents and community authorities to inform about garbage disposal regulations	
				2) Number of violations documented	
				3) Number of citations issued	
				4) Number of landfills created	
				5) Number of violations reported	
				6) Establish negotiated by-laws between local communities and counties for regulating garbage disposal	
				7) Develop at least one law enforcement position for every 3-4 neighboring communities	
				8) Number of educational workshops for landowners and other inhabitants on garbage management	
				9) Assessment of attitudes among local people regarding to garbage management and disposal	
				10) Establishment of clean-up crews for bimonthly clean-ups of critical areas within the 5 hydrological systems in the watershed.	
					6. Input-related Performance Measures
					1) Pay 50% of salary of law enforcement personnel by participating communities by 2007
					2) Pay 100% of salary of law enforcement personnel by participating communities by 2010

Table 5.5. Sample of potential output-, outcome-, and input-related performance measures to evaluate the progress in achieving the short-term goal of 'Establishment of landfills in every local community within the watershed' at Laguna de Babicora watershed, Chihuahua, Mexico.

1. Strategic Problem Definition					
Water Pollution of 4 of the 5 hydrological systems (e.g., fat, oil, detergent, nitrogen, suspended solids, turbidity, alkalinity) due to sewage mismanagement and agrochemicals					
	2. Strategic Outcome Performance Measure				
	To have healthy hydrological systems in Laguna de Babicora watershed by 2020				
		3. Operational Problem Definition			
		b) Absence of legal garbage disposal sites in local communities			
			4. Operational Outcome Performance Measure		
			b) Establish landfills in every local community within Laguna de Babicora watershed by 2010		
			Additional Outcome Performance Measures		
			1) Compliance with garbage disposal regulations by at least 75% of users by 2007		
			2) Compliance with garbage disposal regulations by 100% of local inhabitants by 2010		
			3) Maintain functionality (e.g., access, clean-ups) of already existing landfills by 2005		
				5. Output-related Performance Measures	
				1) Identify at least 2 potential landfill sites within each community besides those already existing	
				2) Presence of at least 1 active landfill for each rural community within the watershed (if feasible)	
				3) Define annual dates for cleaning up and maintenance of active landfills	
				4) Establish guidelines for garbage disposal at landfills by local authorities, i.e., community authorities and county officials.	
				5) Develop garbage disposal mechanisms for local residents unable to transport their garbage to landfills	
				6) Develop at least 1 enforcement position for every 3-4 local communities	
					6. Input-related Performance Measures
					1) Establish garbage collection service once a week for individuals with no transportation means
					2) Establish a community utility fee to support garbage collection services

Table 5.6. Sample of potential output-, outcome-, and input-related performance measures to evaluate the progress in achieving the short-term goal of 'Water quality standards for the 5 hydrological systems are in compliance with guidelines from Mexican Official Norms for physical, chemical, and biological indicators by the year 2015' at Laguna de Babicora watershed, Chihuahua, Mexico.

1. Strategic Problem Definition					
Water Pollution of 4 of the 5 hydrological systems (e.g., fat, oil, detergent, nitrogen, suspended solids, turbidity, alkalinity) due to sewage mismanagement and agrochemicals					
	2. Strategic Outcome Performance Measure				
	To have healthy hydrological systems in Laguna de Babicora watershed by 2020				
		3. Operational Problem Definition			
		c) Lack of effective sewage management and treatment in rural communities			
			4. Operational Outcome Performance Measure		
			c) Water quality standards for the 5 hydrological systems are in compliance with guidelines from Mexican Official Norms for physical, chemical and biological indicators by the year 2015		
			Additional Outcome Performance Measures		
			1. Establish a baseline of water quality in the watershed by 2006 including the following characteristics		
			1) Physical attributes		
			1.1) Suspended solids		
			1.2) Turbidity		
			1.3) Conductivity		
			2) Chemical attributes		
			2.1) Nitrogen		
			2.2) Phosphorus		
			2.4) pH		
			2.5) Pesticides		
			3) Biological Attributes		
			3.1) Fecal Coliforms		
			3.2) Chlorophyll-a		
			3.3) Composition of aquatic invertebrate community		
				5. Output-related Performance Measures	
				1) Establish contact with CONAGUA's officer in charge of sewer systems in rural communities	
				2) Develop feasibility studies with local communities to assess establishment of sewer systems	
				3) Number of educational workshops with local people regarding sewage management and treatment	
				4) Establish negotiated guidelines for administration of sewer infrastructure (e.g., maintenance)	
				5) Number of latrines established in each community where sewer systems are impractical	
				6) Develop at least 1 enforcement position for every 3-4 local communities	
					6. Input-related Performance Measures
					1) Establish a monthly fee per household for maintenance of sewer systems

Table 5.7. Sample of potential output-, outcome-, and input-related performance measures for evaluating the progress in achieving the short-term goal of 'All fertilizer uses in agricultural practices must comply with existing agricultural guidelines suggested by SAGARPA and FIRA by 2007' at Laguna de Babicora watershed, Chihuahua, Mexico.

1. Strategic Problem Definition					
Water Pollution of 4 of the 5 hydrological systems (e.g., fat, oil, detergent, nitrogen, suspended solids, turbidity, alkalinity) due to sewage mismanagement and agrochemicals					
	2. Strategic Outcome Performance Measure				
	To have healthy hydrological systems in Laguna de Babicora watershed by 2020				
		3. Operational Problem Definition			
		d) Use of excessive amounts of fertilizers in agriculture			
			4. Operational Outcome Performance Measure		
			d) All fertilizer uses in agricultural practices must comply with existing agricultural guidelines suggested by SAGARPA and FIRA by 2007		
			Additional Outcome Performance Measures		
			1) Farmers are aware of adequate dosages for agrochemicals (including fertilizers) considering the limitations of the watershed by the year 2006		
			2) All sources of agriculture-related run-off have been identified by the year 2010		
				5. Output-related Performance Measures	
				1) Number of workshops for the dissemination of recommended dosages of fertilization according to FIRA and SAGARPA	
				2) Number of workshops for local farmers addressing use of fertilizers (advantages, disadvantages) in a rain-fed system	
				3) Economic and social assessments of existing production systems (e.g., farming, cattle ranching)	
				4) Number of workshops among local farmers about alternative farming technologies (e.g., hydroponics)	
				5) Number of workshops for landless people aimed at providing economic alternatives	
				6) Establishment of a farmer-led technical group for continuous dissemination of sustainable agricultural practices and less invasive economic alternatives based on the ecological conditions of the watershed	
					6. Input-related Performance Measures
					1) One FIRA technician to provide training for testing soil and water samples
					2) SAGARPA office at Gomez Farias County will provide assistance in identifying alternative fertilizers appropriate for the region

5.8 Discussion

Both NPA and MDRL management plans I evaluated for this research lacked specific measures to monitor and evaluate not only the planning process, but also plan implementation. Although there are multiple case-specific reasons why this information was not found in these plans, they all shared 3 common causes. First, the connection between identified issues and needs and suggested goals and objectives was not developed. For example, in NPA plans, the transition from description of area characteristics to recommended management areas usually was fragmented, with only a relatively small list of strategic problem definitions. Even though goals and objectives may have been crafted for selected management areas, these objectives and goals established justification for the presence of management areas rather than addressing specific problems. INE's strict request for compliance with the recommended planning protocol (Figure 3.2) may have limited conservation planners' ability to maintain connections between identified problems and recommended goals and objectives.

Second, often goals and objectives were defined as strategic statements. These definitions at best convey only a general picture of some anticipated outcomes. Because performance measurement essentially is goal-driven (Abbott et al. 1998), appropriate PMSs can be developed only if operational definitions of problems, goals, and objectives are crafted, and goals and objectives specifically lay out anticipated deadlines.

Third, it appears that there is limited expertise in Mexico in establishing and using performance measurement tools, particularly for process-related performance measures. Although resource planners often understand and identify outputs and outcomes related to the process of conservation planning (e.g., successful development of negotiated land use guidelines, development and maintenance of stakeholder groups or coalitions), no formal attempts to analyze and study successful planning processes were found.

Management plans need to include performance measurement tools to monitor and evaluate both planning processes and plan implementation. Process-related PM will provide resource planners with a template to assess progress in developing specific tasks during particular planning stages (e.g., identification and involvement of key stakeholders, definition of problems and needs, development of conservation strategies, establishment of expected goals and objectives), and in understanding and integrating areas where trade-offs will be necessary (e.g., sharing of decision-making power, integration of different levels of knowledge and experiences across multiple stakeholder categories, balancing power struggles).

PMs for plan implementation represent the ultimate tool to assess whether recommended actions and strategies are improving existing conditions. These PMs help conservation planners to better allocate resources, re-prioritize conservation needs, and redefine identified issues. Process-related and plan implementation PMs will help conservation planners maintain the connections across all planning stages. This increases the chances that all identified issues will be addressed by identified goals, objectives and recommended actions and strategies.

A fundamental criterion for developing performance measurement tools is having a hierarchical analysis of recommended PMs (Harbour 1997). My suggested PMs listed above were not hierarchically analyzed given the limited amount of information available to me. However, future efforts should consider hierarchical analysis of PMs based on the following criteria: (1) descriptive power (e.g., how much information is this PM conveying? Is this information relevant to the system?), (2) ability to gather information (e.g., how costly is it to gather information?), and (3) duplicity (e.g., how unique is the information yielded by this PM to the system? How much diagnostic power is this PM adding to already existing information?). In addition, it is important to maintain the nested, hierarchical structure of the system, particularly in plan implementation PMs. Whereas strategic definitions and their PMs provide an insight of the entire system, operational definitions and their PMs, including output-related performance measures, provide insights about specific parts of the system.

If conservation planning and conservation programs in Mexico are to be successful, 2 core elements in conservation planning must be integrated: stakeholder involvement and performance measurement. Although complete stakeholder involvement remains an ideal proposition, stakeholder participation can be tailored and implemented based on current local and regional characteristics. The type and degree of stakeholder involvement (e.g., advisory, participatory conservation planning) must be negotiated among participating parties. My research documented resistance among natural resource managers and planners in Mexico toward stronger stakeholder involvement. Often, resource planners advocated stakeholder involvement exclusively during inventory and strategic planning. Stakeholder involvement during operational planning, and particularly during the development of performance measurement tools, was considered unnecessary and irrelevant. Unless participating stakeholders in both NPA and MDRL projects understand how to monitor and evaluate progress in implementing conservation practices, conservation initiatives likely will not be successful.

As suggested by Wilshusen et al. (2002) and others, conservation and environmental management nowadays will only succeed if framed as human organization questions. My research evaluated conservation planning practices in Mexico and the degree to which conservation planning is carried out by interested parties. Although some conservationists advocate for less people-oriented approaches and more government-led conservation programs

(Terborgh 1999), this approach has proven to be not only impractical, but socially unfair (Brechin et al. 2002). In Mexico, as in many other countries around the world, one promising avenue to establish successful conservation practices is to enhance the cooperation between existing natural protected areas and conservation of resource management processes occurring beyond its boundaries (MDRLs). Collaboration between these 2 different approaches would capitalize on individual experiences. However, this collaboration should occur in an atmosphere of respect for each other's background. Collaboration then would be a voluntary, engaging exercise.

5.9 Conclusions

1. **Process-related performance measures.** Thorough and effective conservation management plans require comprehensive process-related PMSs. Such PMSs allow conservation planners to assess and monitor integration of different planning activities in the development of a management plan, but also to identify areas where trade-offs are likely to occur. Although planning processes will vary with local and regional conditions or selected environmental reference frameworks, all planning tasks are interconnected and interdependent. Process-related PMSs should focus on maintaining clear links among identified problems, established goals and objectives, recommended strategies, operational components, and performance measures for plan implementation.
2. **Selection of relevant environmental frameworks.** Reference frameworks, such as ecosystem management, integrated watershed management, and community-based conservation, should be identified at early stages of the planning process. This allows planners to identify relevant performance domains linked to existing problems, establish more meaningful goals and objectives, design more realistic operational strategies and actions, and ultimately, create proper performance measures for plan implementation. In addition, these frameworks should help resource planners and participating stakeholders balance ecological needs and principles with existing social conditions.
3. **Adequate problem, goal, and objective definitions.** Conservation planning processes are issue-driven, whereas performance measurement is goal and objective-driven. Successful implementation of conservation programs is dependent on developing problem definitions that identify specific activities (operational problem definition) or key stakeholders.

Selection of an appropriate environmental framework and the use of more powerful diagnostic tools (e.g., GIS systems, stakeholder analysis, common property resource model, resource-based rights) should enable planners to better frame problems. Goals and objectives must also evolve from strategic statements to more operational statements. Unless goals and objectives are defined clearly, development of reliable performance measures for plan implementation will be hampered. Performance measures related to strategic planning should be designed to ensure that goals and objectives are linked clearly to identified issues and useful to monitor performance during plan implementation.

4. **Stakeholder analysis and stakeholder participation.** Contrary to the perceptions in the business field where stakeholders are defined in regards to the company or corporation, stakeholders in conservation programs develop their interests from resource-specific issues. Thus, stakeholders fundamentally are issue-specific. Because conservation programs deal with complex landscapes, multiple resources, diverse issues, a varied array of stakeholders with multiple interests is expected . Despite pressure from natural resource agencies and financial donors for more effective stakeholder involvement, as yet there is no roadmap for successful stakeholder involvement. The degree of involvement and type of stakeholder participation should be tailored specifically for each process. However, strong stakeholder involvement does not guarantee successful planning processes. Planners must understand the potential benefits and costs of involving stakeholders, and particularly how stakeholder analysis can assist them throughout different planning stages. Development of process-related PMs will help planners anticipate likely outcomes from stakeholder involvement and monitor progress once stakeholders participate in a planning process.

5. **Strategic vs. Operational definitions.** Although strategic definitions for identified problems and objectives convey a picture of the landscape and resources involved, these definitions can cloud planners' ability to identify potential stakeholders and influence how they develop PMs for plan implementation. Operational definitions of issues and objectives must be a natural transition. This allows planners to have a better understanding of the array of existing stakeholders, their potential roles, and opportunities and limitations for their participation. A thorough, hierarchical analysis of problems and objectives should provide information as to when stakeholders should be involved and their anticipated contribution to the process.
6. **Environmental conservation in Mexico and changes in resource administration.** Interviews with planners and resource users reveal a great deal of uncertainty about how current economic and social reforms will impact conservation practices in Mexico. Thus, federal natural resource agencies, such as SEMARNAT, should provide proactive guidance about potential consequences and opportunities. Administration of NPAs could facilitate communication between federal agencies and regional and local stakeholders, as well as the process of establishing local and regional environmental governance. Such environmental governance urgently is needed in Mexico to deal with pressing issues I encountered in my research (e.g., high rates of rural migration, fragmentation of rural communities, difficulties in administration and management of common lands), particularly for the administration and management of commonly owned resource systems. Resource planners and stakeholders with environmental interests should pay close attention to the functioning and structural stability of rural communities. External stakeholders, such as federal agencies and state officials, have relied upon community authorities in prior experiences for negotiations and

other transactions. However, under neo-liberal reforms currently taking place in Mexico, community authorities are losing legitimacy and credibility with landowners. Conservation and resource planners must recognize the internal dynamics within targeted communities (e.g., access to commonly owned resources, representativeness of current authorities, attitudes towards collective projects) if they hope to increase the chances of establishing successful conservation and environmental programs.

Chapter 6. Conclusions and Future Research

6.1 Overall Conclusions

Current literature on environmental and conservation management recognizes the need to promote environmental programs that are ecologically sound and socially fair. My dissertation integrates experiences and models from a variety of fields and disciplines in an attempt to operationalize development and implementation of socially fair conservation programs. Thus, findings in this dissertation contribute to natural resource conservation primarily in 2 ways (1) it offers a comprehensive, integrated conservation planning system, and (2) it advances stakeholder analysis as a tool in promoting environmental management.

The planning system developed here (see Appendix B) recognizes that successful conservation programs in Mexico need to have, first and foremost, strong ecological foundations. Although some current models claim to incorporate this notion specifically (i.e., ecosystem management), most available models treated it only vaguely (e.g., community-based conservation, integrated resource and development projects). Unless ecological boundaries and principles are recognized and endorsed in planning, successful will remain unfulfilled.

Development and social needs must be framed within recognized ecological boundaries. This approach would require conservation planners in Mexico to adopt interdisciplinary approaches. Based on my findings and my professional experiences in Mexico, conservation planners approach planning in a pseudo-interdisciplinary or multidisciplinary manner (Klein 1990). That is, concepts, models, and methods are borrowed and added to existing disciplines without synthesizing or integrating them. For example, resource managers in Mexico frequently required social science specialists to lend their expertise in diagnosing relevant social issues. Once this information was added, natural resource managers retained control of the process, weighting individual pieces based on their perceptions of how ‘social’ conservation should be. Such multidisciplinary approaches often fail because disciplinary elements are not integrated throughout the process (e.g., social needs such as rural development are likely to remain a social problem rather than an environmental management issue).

The planning protocol I introduce in this dissertation represents an initial step into truly interdisciplinary conservation in Mexico because (1) individual, disciplinary concepts and principles have value in this protocol only as a part of a system, (2) planning is introduced as a negotiated process, that is, stakeholder participation is anticipated in all 4 major planning stages (i.e., inventory, strategic planning, operational planning, monitoring and evaluation), and (3) it is designed to address complex environmental and social problems (e.g., biodiversity conservation, sustainable resource use). Particularly, my protocol recognizes the importance of addressing environmental and social problems as a matter of social organization rather than technical questions.

This protocol invites conservation planners and resource managers to redefine their role in promoting socially fair conservation programs. Conservation and resource planners must understand the limitations of their own disciplines, to share decision-making power with other specialists and stakeholders, and to recognize the relevance and contribution of other disciplines. In particular, resource planners should incorporate disciplines and specialists from social and economic fields.

Stakeholder theory from the management and business field (Freeman 1984) first introduced the concepts of stakeholder and stakeholder analysis as a way to understand and classify stakeholders for management purposes. In this setting, stakeholders were classified primarily following the mutuality concept (i.e., ability to being influenced or influence, or benefit or being affected by recommended actions). Thus, stakeholder theory approached stakeholders as groups to be managed rather than as collaborators. Although the stakeholder and stakeholder analysis concepts are widely recognized in other fields, such as environmental and conservation management, stakeholder theory still has some limitations when applied to other fields. First, stakeholder theory vaguely addresses the issue of stakeholder identification. Instead, it begins by classifying stakeholders based on expressed interests stakeholders have about specific businesses or corporations. My findings presented in Chapter 4 suggest there are 2 steps prior to stakeholder analysis: stakeholder identification and stakeholder classification. For stakeholder identification, my findings indicate that stakeholders are fundamentally issue-specific. Unless issues and stakeholders are properly identified, stakeholder classification is likely to yield vague results. For example, conservation programs often represent a matrix of multiple resources (e.g., water, forest) with multiple issues and needs associated with them. Thus, the primary task for resource planners and other interested parties is to first identify and define relevant issues, second, to identify what stakeholders are related to identified issues, and third, to classify how relevant are these groups for successful development and implementation of conservation plans.

Second, stakeholder theory carries a hegemonistic approach with limited space for open negotiations and establishment of truly participatory processes. Managers ultimately are responsible for addressing stakeholders' interests and concerns without compromising the stability of the corporation. This approach appears to be restrictive, particularly for fields such as natural resource conservation, where design and implementation of successful programs require shared decision-making among key stakeholders. This is true particularly in countries such as Mexico, where increasing conservation demands coupled with a limited institutional capacity, require involvement of a diverse array of stakeholders (e.g., NGOs, landowners, resource users).

6.2 Future Research:

I believe research in the 7 areas described below is most likely to contribute to improved conservation planning practices in general. This is particularly true for countries where institutional capacity is limited, and conservation programs are faced with profound social demands.

1. Monitoring, evaluation and functioning of stakeholder coalitions. Planners must understand how 'self-selected' stakeholder coalitions work. This should include topics such as strategies for stakeholder collaboration, establishment of collective agreements, internal accountability, and establishment of conservation priorities.

2. Management and administration of common property resource systems. This research area is particularly important for Mexico because nearly 70% of the national territory is being administered under this model. Important areas include resource-based rights (e.g., management, administration, enforcement) of key resources such as water, aquatic species, and commercially valuable wild species (e.g., shrimp, timber).

3. Qualitative process-related performance measures. I found no information in natural resource management that addressed qualitative process-related performance measures.

Development of qualitative process-related performance measures should complement quantitative elements in conservation planning. The protocol developed here could be used to guide and monitor planning processes. In addition, planners could tailor this protocol so that planning processes respond to existing local and regional conditions.

4. Research in collaborative natural resource management in Mexico. Collaborative natural resource management is becoming a widely recognized approach in natural resource conservation. I believe it is necessary to assess and understand how 'ready' are natural resource agencies to promote natural resource co-management (e.g., attitudes among agency personnel, national policies, state and regional programs).

5. Evaluation of higher education opportunities in natural resource management. Education in natural resource management and conservation is interdisciplinary in nature. I believe it is necessary to assess how conservation-related educational programs in Mexico are educating future resource managers. In particular, I am interested on providing faculty in mexico an opportunity to analyze how practical and realistic are current educational choices given present socio-economic conditions in the country.

6. Monitoring and evaluation of existing MDRL projects. Natural resource agencies must gain better understanding of MDRL projects as they occur in Mexico. This should provide greater opportunities for cooperation and increase the possibilities for such projects to deliver long-lasting benefits.

7. Impacts from neo-liberal reforms on conservation projects in Mexico. Finally, resource managers in Mexico must gain better understanding of potential consequences of neo-liberal reforms. This is particularly true for existing communities under land tenure types such as ejidos and colonias. Areas for further research include community stability, status of existing authorities, and understanding of non-landowner inhabitants, among others.

References

Abbott, E.E., J. Cantalupo, and L.B Dixon. 1998. Performance measures: Linking outputs and outcomes to achieve goals. Transportation Research Record 1617: 90-95.

Ack, B.L. 1991. Success in Integrated Conservation and Development. WHN technical paper series # . Washington, D.C. Wildland and Human Needs Program, WWF, May 1991. 12pages.

Agrawal, A. 2000. Adaptive management in transboundary protected areas: The Bialowieza national park and biosphere reserve as a case study. Environmental Conservation 27(4): 326-333

Agrawal, A. 2001. Common property institutions and sustainable governance of resources. World Development 29(10): 1649-1672

Alcorn, J.B., and V.M. Toledo. 1998. Resilient resource management in Mexico's forest ecosystems: The contribution of property rights. Pages 216-249 *in* F. Berkes, and C. Folke, eds. Linking social and ecological systems, management practices, and social mechanism for building resilience. New York Cambridge University Press.

Alix, J.C. 1989. Community-based management: The experience of the Central Visayas Regional Project-I. pp. 185-190 In T.E. Chua, and D. Pauly (eds). Coastal Area Management in Southeast Asia: Policies, Management Studies and Case Studies. ICLARM Conference Proceedings 19. Ministry of Science, Technology and Environment, Kuala Lumpur, Johor State Economic Planning Unit, Johore Bahru, Malaysia, and International Center for Living Aquatic Resources Management , Manila, Philippines.

Anderson, P.N. 2001. Community-based conservation and social change amongst South Indian honey-hunters: An anthropological perspective. Oryx 35(1): 81-83

Asian Development Bank. 2003. Guidelines for the economic analysis of projects: XVI Appendices. Appendix 2: Project Economic Rationale: Market and Nonmarket Failures. Retrieved on December 9th from the Asian Development Bank web site on the world wide web at http://www.adb.org/Documents/Guidelines/Eco_Analysis/appendix2.asp

Association of Colleges and Research Libraries (ACRL). 2003. Suggestions for writing SMART objectives. Retrieved on November 2003 from the American Library Association on the world wide web at http://www.ala.org/Content/ContentGroups/ACRL1/IS/Organization9/Planning4/SMART_Objectives/Suggestions_for_Writing_SMART__Objectives.htm

Ayieko, J.O. 1986. Wildlife conservation and rural development in Kenya today. Egerton University College, Njoro, Kenya.

Bailey C., A. Dwiponggo, and F. Marahudin. 1987. Indonesian marine capture fisheries. ICLARM studies and reviews No. 10.

Beierle, T.C., and D.M. Konisky. 2001. What are we gaining from stakeholder involvement? Observations from environmental planning in The Great Lakes. Environment and Planning C: Government and Policy 19: 515-527.

Belsky, J.M. 1999. Misrepresenting communities: The politics of community-based rural ecotourism in Gales Point Manatee, Belize. Rural Sociology 64(4): 641-666

Bentrup. G. 2001. Evaluation of a collaborative model: A case study analysis of watershed planning in the intermountain West. Environmental Management 27(5): 739-748

Berkes, F., and M. Kislalioglu. 1991. Community-based management and sustainable development. pp. 2: 567-574 In Durand, J.P., J. Lemoalle, and J. Weber (eds). Research and small-scale fisheries: Symposium International ORSTOM-IFREMER.

Brandon, K.E., and M. Wells. 1992. Planning for people and parks: Design dilemmas. World Development, 20(4): 557-570.

Brandon, K. 1997. Policy and practical considerations in land-use strategies for biodiversity conservation. *In*: Last Stand: Protected Areas and the defense of tropical biodiversity, eds. R.A. KRAMER, C.P van SHAICK, and J. JOHNSON, 90-114. New York, Oxford University Press.

Brechin, S.R., and P.C. West. 1990. Protected areas, resident peoples and sustainable conservation: The need to link Top-Down with Bottom-Up. Society and Natural Resources, 3(1):77-79.

Brechin, S.R., P.R. Wilshusen, C.L. Fortwangler, and P.C. West. 2002. Beyond the square wheel: Toward a more comprehensive understanding of biodiversity conservation as a social and political process. Society and Natural Resources 15: 41-64.

Briassoulis, H. 1989. Theoretical orientations in environmental planning: An inquiry into alternative approaches. Environmental Management 13(4): 381-392

Brooks, L. 1994. Essay presented at The Toronto Conference: Reflections on Stakeholder Theory. Business and Society 33(1):82-131

Bromley, D.W. 1994. Economic dimensions of Community-based conservation. *In* Western, D., and R.M. Wright, eds.:S.C. Strum, ass. ed. Perspectives in Community-based Conservation. Island Press, Washington, D.C. 581pp

Brosius, J.P., A.L. Tsing, and C. Zerner. 1998. Representing communities: Histories and politics of community-based natural resource management. Society and Natural Resources 11: 157-168

Brown, B. 1986. Conservation for developing countries. Habitat (Australia) 14(4): 14-15

Brown, B.S., W.R. Munns Jr, and J.F. Paul. 2002. An approach to integrated ecological of resource condition: The Mid-Atlantic estuaries as a case study.

Brown, M., and B. Wyckoff-Braid. 1992. Designing integrated Conservation and Development Projects. Wshington, D.C. Biodiversity Support Program of the WWF, The Nature Conservancy and The World Resources Institute

Brown, P. 1997. Institutions, inequalities and the impact of agrarian reform on rural Mexican communities. Human Organization 56(1): 102-110

Bryson, J.M., and S.R. Anderson. 2000. Applying large group interaction methods in the planning and implementation of major change efforts. Public Administration Review 60(2): 143-162

Cardskadden, H., and D.J. Lober. 1998. Environmental stakeholder management as business strategy: the case of the corporate wildlife habitat enhancement programme. Journal of Environmental Management 52: 183-202

Carr, D.S., S.W. Selin, and M.A. Schuett. 1998. Managing public forests: Understanding the role of collaborative planning. Environmental Management 22(5): 767-776

Carroll, A.B. 1993. Business and society: Ethics and stakeholder management. Cincinnati; South-Western

Cartwright, T.J. 1973. Problems, solutions and strategies: A contribution to the theory and practice of planning. Journal of the American Institute of Planners 39(3): 179-187

Castilla, J.C., O. Defeo. 2001. Latin America benthic shellfisheries: emphasis on co-management and experimental practices. Reviews in Fish Biology and Fisheries 11: 1-30.

Caughley, G. 1994. Directions in conservation biology. J. Animal Ecology 63: 215-244

___________, and A. Gunn. 1996. Conservation biology in theory and practice. Cambridge, Massachusetts. USA. Blackwell Publications.

Cernea, M. 1992. The building blocks of participation: Testing a social methodology. Workshop of participatory development. The World Bank. Washington D.C.

Child, G. 1996a. The role of community-based wild resource management in Zimbabwe. Biodiversity and Conservation, 5: 355-367

Child, G. 1996b. The practice and principles of community-based wildlife management in Zimbabwe: The CAMPFIRE programme. Biodiversity and Conservation 5:369-398.

Chimbuya, S., and E. Ersdal. 1994. Developing community-based management of fishery resources in small water bodies: A case study of Mwenje Dam. ALCOM Field Document (Aquaculture for local community development). 26: 1-48

Chitere, O., and R. Mutiso (eds). 1991. Working with rural communities: A participatory action research in Kenya. Nairobi University Press. 190pp.

Christie, P., A.T. White, and D. Buhat. 1994. Community-based coral reef management on San Salvador Island, the Philippines. Society and Natural Resources, 7:103-117

Christy, Jr., F.T. 1982. Territorial use rights in marine fisheries: Definitions and conditions . FAO Fisheries Technical Paper 227, Rome. 10pp.

Ciriacy-Wantrup, S.V., and R.C. Bishop. 1975. Common property as a concept in Natural Resources. Natural Resources Journal. 15(4): 713-727

Coase, R.H. 1960. The problem of social cost. Journal of Law and Economics 3:1-44

Cochran, P. 1994. Essay presented at The Toronto Conference: Reflections on Stakeholder Theory. Business and Society 33(1):82-131

Cohn, J.P. 1988. Culture and Conservation. BioScience 38(7):450-453

Colby, M.E. 1991. Environmental management in development: The evolution of paradigms. Ecological Economics 3: 193-213

CONABIO. 2000. Estrategia nacional sobre biodiversidad en Mexico. Retrieved on April 4, 2003 from CONABIO on the world wide website at http://www.conabio.gob.mx/institucion/cooperacion_internacional

CONANP. 2001. Programa de trabajo de la comisión de áreas naturales protegidas 2001-2006. Retrieved April 24, 2003 from CONANP on the world wide web: http://conanp.gob.mx/programa/index.shtml

______. 2004. ¿Qué son las ANP?. Retrieved June 19th, 2004 from CONANP on the world wide web: http://conanp.gob.mx/anp/anp.php

Cordell, J.C., and M.A. Mckean. 1986. Sea tenure in bahia, Brazil. pp 85-113 In National Research Council, Proceedings of the conference on common property resource management. National Academy Press. Washington, D.C.

Cornelius, W.A., and D. Myhre. 1998. Introduction. Pages 1-20 *in* W.A. Cornelius and D. Myhre, eds. The transformation of rural Mexico: Reforming the ejido sector. U.S.-Mexico Contemporary Perspective Series, 12. Center for U.S.-Mexican Studies, University of California at San Diego. 437pp.

Cortner, H.J., and M.A. Moote. 1994. Trends and issues in land and water rescues management: Setting the agenda for change. Environmental Management 18(2): 167-173.

Coutts, L.C., and J.C. Rogers. 2000. Humanism: Is its evaluation captured in commonly used performance measures? Teaching and Learning in Medicine 12(1): 28-32

Crawford, J., H. Pickering, and D. McLelland. 1998. The stakeholder approach to the construction of performance measures. J. Librarianship and Information Science 30(2): 87-112

Dalal-Clayton, B. 1991. Wildlife working for sustainable development: Lessons from Zambia's Luangua Valley. Gatekeeper Series No. SA9, Sustainable Agriculture Programme, International Institute for Environment and Development. London. 15pp

Darling, F.F., and R.F. Dasmann. 1969. The ecosystem view of human society. Impact of Science on Society 19(2):109-121

De Alba, E., and M.E. Reyes. 1998. Contexto físico. Pp: 2-22 *in* CONABIO. La diversidad biológica de México: Estudio de pais, 1998. Comision Nacional para el Uso y Conocimiento de la Biodiversidad. México.

De Lopez, T.T. 2001. Stakeholder management for conservation projects: A case study of Ream National Park, Cambodia. Environmental Management 28(1): 47-60.

Decker, D.J., C.C. Krueger, R.A. Baer, Jr., B.A. Knuth, and M.E. Richmond. 1996. From clients to stakeholders: A philosophical shift for fish and wildlife management. Human Dimensions of Wildlife 1(1): 70-82

Defeo, O., and R. Perez-Castañeda. 2003. Misuse of marine protected areas for fisheries management: The case of Mexico. Fisheries 8(7): 35-36

DeWalt, B.R. 1998. The ejido reforms and Mexican coastal communities: Fomenting a Blue Revolution? Pages 357-379 *in* W.A. Cornelius and D. Myhre, eds. The transformation of rural Mexico: Reforming the ejido sector. U.S.-Mexico Contemporary Perspective Series, 12. Center for U.S.-Mexican Studies, University of California at San Diego. 437pp.

Diego-Quintana, R., L. Concheiro-Borquez, and R. Perez-Aviles. 1998. Peasant logic, agrarian policy and land mobility and land markets in Mexico. Working paper No. 21, North America Series. Land Tenure Center, University of Wisconsin Madison.

Diemer, J.A., and R.C. Alvarez. 1995. Sustainable community, sustainable forestry: A participatory model. J. of Forestry 93(11): 10-14.

Donaldson, T., and L.E. Preston. 1997. The stakeholder theory of the corporation: Concepts, evidence and implications. Academy of Management Review 20(1): 65-91

Esquivel-Solís, R.M. 1999. Terms of Reference for Natural Protected Areas. Direction of Monitoring and Evaluation, National Commission of Natural Protected Areas, Mexico City. Contact information: http://conanp.gob.mx/dcei/directo/dir7.php

Facultad de Zootecnia – UACH 1998a. Reporte final del proceso de planinficacion del plan de manejo de la cuenca de la Alta Babicora, Chihuahua, Mexico.

Facultad de Zootecnia – UACH. 1998b. Propuesta de plan de manejo y conservacion de la cuenca de la Babicora, Chihuahua. Chihuahua, Chihuahua, Mexico. 65pps.

FAO. (2000). Forestry: Statistics per country. Retrieved from the FAO world wide website at December 7, 2002 http://www.fao.org

Finlayson, C.M., and I. Eliot. 2001. Ecological assessment and monitoring of coastal wetlands in Australia's wet-dry tropics: A paradigm for elsewhere? Coastal Management 29 (2): 105-115.

Freeman, R.E. 1984. Strategic management: A stakeholder approach. Boston, Pitman.

Galindo-Jaramillo, J.M., and E. Loa-Loza. 1998. Marco juridico e institucional para el uso y la conservacion de la biodiversidad. Pages 238-283 *in* CONABIO. La diversidad biológica de México: Estudio de pais, 1998. Comision Nacional para el Uso y Conocimiento de la Biodiversidad. México D.F.

Galvin, R.S. 1998. Are performance measures relevant? Health Affairs 17(4): 29-31

García-Barrios, R., H. Robles, N. McCarthy, and E. Erickson. 1998. Vulnerabilidad y recursos institucionales autóctonos de los campesinos pobres en el medio rural reformado: El caso del manejo colectivo de pastizales. Pages 255-290 *in* S. Zendejas, and De Vries P., eds. Las disputas por el México rural: Transformaciones de prácticas, identidades y proyectos. El Colegio de Michoacán, Zamora, Michoacán, México.

Gentile, J.H., M.A. Harwell, W. Cropper Jr., C.C. Harwell, D. DeANGELIS, S. DAVIS, J.C. OGDEN, and D. LIRMAN. 2001. Ecological conceptual models: a framework and case study on ecosystem management for South Florida sustainability. The Science of the Total Environment 274: 231-253

Goodpaster, K.E. 1991. Business ethics and stakeholder analysis. Business Ethics Quarterly 1(1): 53-71

Grimble, R., and M-K. Chan. 1995. Stakeholder analysis for natural resource management in developing countries. Natural Resources Forum 19(2): 113-124.

Grimble, R., and K. Wellard. 1997. Stakeholder methodologies in natural resource management: A review of principles, contexts, experiences and opportunities. Agricultural Systems 55(2): 173-193

Grol, R. 2001. Improving the quality of Medical care: Building bridges among professional pride, payer profit, and patient satisfaction. J. of American Medical Association 286(20): 2578-2585

Grumbine, R.E. 1994. What is ecosystem management? Conservation Biology 8: 27-24

Guerrero, M.T., C. Reed, and B Vegter. 2000. La industria forestal y los recursos naturales en la Sierra Madre de Chihuahua: impactos sociales, economicos y ecologicos. Texas Center for Policy Studies, Austin, Texas. 64pp.

Haenn, N. 1999a. Community formation in frontier Mexico: Accepting and rejecting new migrants. Human Organization 58(1): 36-43

Haenn, N. 1999b. The power of environmental knowledge: Ethnoecology and environmental conflicts in Mexican conservation. Human Ecology 27(3): 477-491

Hackel, J.D. 1999. Community conservation and the future of Africa's wildlife. Conservation Biology 13(4): 726-734

Hammond, A., A. Adriaanse, E. Rodenburg, D. Bryant, AND R. Woodward. 1995. Environmental indicators: A systematic approach to measuring and reporting on environmental policy performance in the context of sustainable development. World Resources Institute.

Harbour, J.L. 1997. Performance measurement. Quality Resources, New York, New York. 71pages.

Hardin, G. 1968. The Tragedy of the commons. Science 162: 1243-1248.

Haufler, J.B., R.K., Baydack, H. III. Campa, B.J. Kernoham, C. Miller, L.J. O'Neil, and L. Waits. 2002. Performance measures for ecosystem management and ecological sustainability. The Wildlife Society, Technical Review 02-1, 33p.

Haynes, R., S. McCool, A. Horne and J. Birchfield. 1996. Natural resource management and community well-being. Wildlife Society Bulletin 24(2): 222-226.

Ho, P. 2000. China's rangelands under stress: A comparative study of pasture commons in the Ningxia Hui autonomous region. Development and Change 31: 385-412

Hoelzer, S., W. Waechter, A. Stewart, R. Liu, R. Schweiger, and J. Dudeck. 2001. Towards case-based performance measures: Uncovering deficiencies in applied medical care. Journal of Evaluation in Clinical Practice 7(4): 355-363

Hudson, B.M. 1979. Comparison of current planning theories: Counterparts and contradictions. Journal of the American Planning Association 45(4): 387-398

INE. 2002. Areas Naturales Protegidas: Programas de manejo de Areas Naturales Protegidas. Retrieved January 14, 2003 from National Institute of Ecology on the world wide web: http://www.ine.gob.mx/ueajei/publicaciones

INEGI (1995). Anuario estadístico de los estados unidos Mexicanos, 1995. Aguascalientes, Aguascaliente, México. 790 pps.

International Association of Fish and Wildlife Agencies (IAFWA). 2003. Memorandum from Duane L. Shroufe to State Directors: Monitoring Success of Comprehensive Wildlife Conservation Planning Efforts. Retrieved May 21st, 2004 from the world wide web at http://www.teaming.com/pdf/6%20Monitoring%20Success.pdf

_____ (2001). Maps of Mexico, Census 2000. Retrieved October 8, 2002 from the world wide web at http://www.inegi.gob.mx

INSO [Instituto de la Naturaleza y la Sociedad de Oaxaca]. 2001. Informe de la evaluación rural participativa de Santa Maria Temaxcaltepec, Cuenca de Manialtepec, Oaxaca: Comité de Representantes para la protección de la cuenca de Maniatepec. Oaxaca, Mexico.

____. 2002a. Reglas de uso de la Laguna de Manialtepec acordadas por El Comite de Representantes para la proteccion de La Cuenca de Manialtepec. Oaxaca, Mexico. 6 pages.

____. 2002b. Ordenamiento territirial de la comunidad de Santos Reyes Nopala: Proyecto de Conservation y Manejo Sustentable de Recursos Forestales en México - PROCYMAF. Oaxaca, Mexico.

IUCN [INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES]. 1980. World conservation strategy: living resource conservation for sustainable development. IUCN, Gland Switzerland. 55pp.

Jiang, J.J., M.G. Sobol, and G. Klein. 2000. Performance ratings and importance of performance measures for IS staff: The different perceptions of IS users and IS staff. IEEE Transactions on Engineering Management 47(4): 424-434

Jentoft, S. 2000. The community: A missing link of fisheries management. Marine Policy 24: 53-59

Johnson, C. 2001. Community formation and fisheries conservation in Southern Thailand. Development and Change 32: 951-974

Jones, G.A., and P.M. Ward. 1998. Privatizing the commons: Reforming the ejido and urban development in Mexico. International Journal of Urban and Regional Research 22(1): 76-93

Kates, J., K. Macroni, and T.E. Mannle Jr. 2001. Developing a performance measurement system for a Federal public health system: the Ryan White CARE ACT titles I and II. Evaluation and Program Planning 24(2): 145-155

Kelly, J.M., and D. Swildell. 2002. A multiple-indicator approach to municipal service evaluation: Correlating performance measurement and citizen satisfaction across jurisdictions. Public Administration Review 62(5): 610-621

Kelly, T.J. 2001. Neoliberal reforms and rural poverty. Latin American Perspectives 118 (28)(3): 84-103

Kencairn, B. 1995. A community-based approach to forest management in the Pacific Northwest: A profile of the Applegate partnership. Natural Resources and Environmental Issues 5:43-52

Klein, J.T. 1990. Interdisciplinarity: history, theory and practice. Wayne State University Press, Detroit, Michigan. 331 pps.

Klooster, D. 2000. Institutional choice, community and struggle: A case study of forest co-management in Mexico. World Development 28(1): 1-20

Korten, F. F., and R.Y. Siy, Jr. (eds). 1988. Transforming a Bureaucracy: The Experience of the Philippine National Irrigation Administration, West Hartford, Connecticut: Kumarian

Leelapatra, W., N. Tongpan, J. Sollows, and G. Chapman. 1992. Participatory research and extension in Thailand. World Aquaculture 23(1):58-60

Leopold, A. 1949. A sand county almanac. Oxford University Press, New York.

Lied, T.R., and V.A. Kazandjian. 1999. Performance: A multi-disciplinary and conceptual model. Journal of Evaluation in Clinical Performance 5(4): 393-400

Little, P.D. 1994. The link between local participation and improved conservation: A review of issues and experiences. *In* Western, D., and R.M. Wright, eds.:S.C. Strum, ass. ed. Perspectives in Community-based Conservation. Island Press, Washington, D.C. 581pp

Luttinger, N. 1997. Community-based coral reef conservation in the Bay Islands of Honduras. Ocean and Coastal Management 36(1-3): 11-22

Luzadis, V.A., K.M. Goslee, E.J. Greenfield, and T.D. Schaeffer. 2002. Toward a more integrated ecosystem model. Society and Natural Resources 15: 89-94

Mackenzie, S.H. 1997. Toward integrated resource management: Lessons about the ecosystem approach from the Laurentian Great Lakes. Environmental Management 21(2):173-183

Mahanty, S., and D. Russell. 2002. High stakes: Lessons from stakeholder groups in the biodiversity conservation network. Society and Natural Resources 15: 179-188.

Martin, W.E., H.W. Bender, and D.J. Shields. 2000. Stakeholder objectives for public lands: Rankings of forest management alternatives. Journal of Environmental Management 58: 21-32.

McBride, G. 2000. History of the environmental secretary and legislation in Mexico. Retrieved January 14, 2003 from Mexican Laws on the world wide web: http://www.mexicanlaws.com/environmental_law.htm

McDonald, J. 1998. New performance measures strategy will change how EPA assesses enforcement effectiveness. The Hazardous Waste Management 16(2): 3.9-3.11

McGoodwin, J.R. 1987. Mexico's conflictual inshore Pacific islands: Problem analysis and policy recommendations. Human Organization 46: 221-232

McMullin, S.L. 1996. Natural resource management and leadership in public arena decision making: a prescriptive framework. Pages 54-63 in: L. E. Miranda and D. R. DeVries (ed.) Multidimensional approaches to reservoir management. American Fisheries Society Symposium 16. Bethesda, MD.

Metcalfe, S. 1990. Empowerment versus participation in natural Resources Management in the Masoka Community. *In* The CAMPFIRE Programme in Zimbabwe. Queen Elizabeth Park, Uganda. 5-11 October, 1990.

Mitchell, R.K., B.R. Agle, and D.J. Wood. 1997. Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. Academy of Management Review 22 (4): 853-886

Moseley, J., K. Thelen, and K Miller. 1976. National parks planning: A manual with annotated examples. FAO forestry paper no. 6, Rome, Italy.

Naredo, J.M. 1992. El oscurantismo territorial de las especialidades cientificas. Pages 104-144 *in* GONZALEZ, A.J., and M. GONZALEZ DE MOLINA. (eds). La tierra: mitos y realidades. Anthropos Editorial.

Nelson, R. H. 1995. The federal land management agencies. Pages 37-60 in: R. L. Knight and S. F. Bates (ed.). A new century for natural resources management. Island Press. Washington, D.C.

Neyra-Gonzales, L., and L. Durand-Smith. 1998. Biodiversidad. Pages 62-102 *in* CONABIO. La diversidad biológica de México: Estudio de pais, 1998. Comision Nacional para el Uso y Conocimiento de la Biodiversidad. México D.F.

Nikijuluw, V.P.H., and N. Naamin. 1994. Current and future community-based fishery management in Indonesia. Indonesia Agricultural Research and Development Journal 16(2):19-23

O'Neill, J., and M. Walsh. 2000. Landscape conflicts: preferences, identities and rights. Landscape Ecology 15: 281-289.

Oestereich, J. 2000. Land and property rights: Some remarks on basic concepts and general perspectives. Habitat International 24: 221-230

Olomola, A.S. 1998. Sources and resolution of conflicts in Nigerian Artisanal Fisheries. Society and Natural Resources 11: 121-135

Olson, P., and C. Folke. 2001. Local ecological knowledge and institutional dynamics for ecosystem management: A study of Lake Racken Watershed, Sweden. Ecosystems 4: 85-104

Oreszczyn, S., and A. Lane. 2000. The meaning of hedgerows in the English landscape: Different stakeholder perspectives and the implications for future hedge management. Journal of Environmental Management 60: 101-118.

Ostrom, E. 1996. Governing the commons: The evolution of institutions for collective action. Cambridge University Press. New York, NY. 280 pages.

Pauly, D. 1987. On reason, mythologies and natural resource conservation. Naga (oct. 1987):6-7

Peña-Jimenez, A. and L. Neyra-Gonzales. 1998. Amenazas a la Biodiversidad. Pages 158-180 *in* CONABIO. La diversidad biológica de México: Estudio de pais, 1998. Comision Nacional para el Uso y Conocimiento de la Biodiversidad. México D.F.

Peuhkuri, T., and P. Jokinen. 1999. The role of knowledge and spatial contexts in biodiversity policies: A sociological perspective. Biodiversity and Conservation 8: 133-147

Preston, L.E., and H.J. Sapienza. 1990. Stakeholder management and corporate performance. The Journal of Behavioral Economics 19(4): 361-375

QSR. 1998. N4 (Non-numerical Unstructured Data Indexing Searching & Theorizing) qualitative data analysis program. Melbourne, Australia; QSR International Pty Ltd. Version 4, 1998.

Sakthivadivel, R., J.D. Brewer, and C.M. Wijayaratna. 1992. Participatory action research in irrigation management: An example from Kirindi Oya. Pages 189-208 in Advancements in IIMI's research 1992. International Irrigation Management Institute, Colombo, Sri Lanka.

Salafsky, N. 1994. Ecological limits and opportunities for community-based conservation *in* Western, D., and R.M. Wright, eds.:S.C. Strum, ass. ed. Perspectives in Community-based Conservation. Island Press, Washington, D.C. 581pp

Shams, N., and M. Ahmed. 2000. Common and private property linkages in the low-land forest-fishery-farming systems of Cambodia. Journal of Sustainable Agriculture 15(4): 59-87

Sanchez, R.A. 2002. Governance, trade and the environment in the context of NAFTA. American behavioral Scientist 45(9): 1369-1393

Sanjay, K.N., and K.E. Weber. 1995. The quandary of local people-park relations in Nepal's Royal Chitwan National Park. Environmental Management 19(6): 853-866

Selin, S.W., M.A. Schuett, and D. Carr. 2000. Modeling stakeholder perceptions of collaborative initiative effectiveness. Society and Natural Resources 13: 735-745

SEMARNAP. 1997. Programa de conservación de la vida silvestre y diversificación productiva en el sector rural 1997-2000. SEMARNAP, México D.F. 207pp

SEMARNAT. 2001a. Ley General de Proteccion al Ambiente. Mexico, City. 87pp.

SEMARNAT. 2002b. Programa Nacional de Medio Ambiente y Recursos Naturales: Programa Estratégico para Conservar los Ecosistemas y su Biodiversidad. Retrieved April 23, 2003 from SEMARNAT on the world wide website http://www.semarnat.gob.mx/programas/documentos/index.shtml

Siar, S.V., R.F. Agbayani, and J.B. Valera. 1992. Acceptability of territorial use rights in fisheries: Towards community-based management of small-scale fisheries in the Philippines. Fisheries Research, 14:295-304

Simenstad, C.A., and J.R. Cordell. 2000. Ecological assessment criteria for restoring anadromous salmonid habitat in Pacific Northwest estuaries. Ecological Engineering 15: 283-302

Slocombe, D.S. 1993. Environmental planning, ecosystem science, and ecosystem approaches for integrating environment and development. Environmental Management 17(3): 289-303

Sonnenfeld, D.A., and A.P.J. Mol. 2002a. Ecological modernization, governance, and globalization. American Behavioral Scientist 45(9): 1456-1461

Sonnenfeld, D.A., and A.P.J. Mol. 2002b. Globalization and the transformation of environmental governance. American Behavioral Scientist 45(9): 1318-1339

SPSS. 2001. Statistical Package for Social Sciences for Windows Release 11.1. Chicago: SPSS Inc.

Starik, M. 1994. Essay presented at The Toronto Conference: Reflections on Stakeholder Theory. Business and Society 33(1):82-131

Stræde, S., and F. Helles. 2000. Park-people conflict resolution in Royal Chitwan national park, Nepal: Buying time at a high cost? Environmental Conservation 27(4): 368-381

Taylor, P.L. 2000. Producing more with less? Community forestry in Durango, Mexico in an era of trade liberalization. Rural Sociology 65(2): 253-274

Terborgh, J. 1999. Requiem for nature. Washington, D.C. Island Press/Shearwater Books.

Theobald, D.M., N.T. Hobbs, T. Bearly, J.A. Zack, T. Shenk, and W.E. Riebsame. 2000. Incorporating biological information in local land-use decision making: designing a system for conservation planning. Landscape Ecology 15: 35-45

Thompson, B.I., and J.R. Harris. 2001. Performance Measures: Are we measuring what matters? American Journal of Preventive Medicine 20(4): 291-293

Thompson, G.D., and P.N. Wilson. 1994. Ejido reforms in Mexico: Conceptual issues and potential outcomes. Land Economics 70(4): 448-465

Thoms, C.A., and D.R. Betters. 1998. The potential for ecosystem management in Mexico's forest ejidos. Forest Ecology and Management 103: 149-157

Thrupp, L.A., B. Cabarie, and A. Zazueta. 1994. Participatory methods in planning and political processes: Linking the grassroots and policies for sustainable development. Agric. Human Values 11(2/3):77-84

Toledo, V., P. Alarcón-Cháires, and L. Barón. 2002. La modernización rural de México: Un análisis socioecologico. SEMARNAT, INE-SEMARNAT and UNAM, Mexico, D.F., Mexico. 130pp.

Trader-Leigh, K.E. 2002. Case study: Identifying resistance in managing change. Journal of Organizational Change and Management 15(2): 138-155

Turner, M.D. 1999. Conflict, environmental change and social institutions in dryland Africa: Limitations of the community resource management approach. Society and Natural Resources 12: 643-657

Turner, R.K., S. Georgiou, R. Brouwer, I.J. Bateman, and I.J., Langford. 2003. Towards an integrated environmental assessment and wetland and catchment management. The Geographical Journal 169 (2): 99-116

UNESCO-MAB. 2002. Biosphere Reserves in Latin America and the Caribbean. Retrieved May 1, 2003 from UNESCO-MAB on the world web site: http://www.unesco.org/mab/brlistlatin.htm

Wainwright, C., and W. Wehrmeyer. 1998. Success in integrating conservation and development? A study from Zambia. World Development 26(6): 933-944

Walls, M., P. Jokinen, M. Kamppinen, and M. Oksanen. 1999. Management of biodiversity: natural resources and social institutions. Biodiversity and Conservation 8: 1-6

Wartick, S. 1994. Essay presented at The Toronto Conference: Reflections on Stakeholder Theory. Business and Society 33(1):82-131

Western, D., M.R. Wright, and S.C. Strum., eds. 1994. Natural Connections: Perspectives in community-based conservation. Island Press, Washington, D.C. 581pp.

White. A.T. and G. Savina. 1987. Community-based marine reserves: A Philippine first. Pages 2022-2036 *in* Proceedings of Coastal Zone '87, 26-30 May, 1987.

White, A.T. 1988. The effect of community-managed marine reserves in the Philippines on their associated coral reef fish populations. Asian Fisheries Science: 2: 27-41.

White, A.T. 1989. Two community-based marine reserves: lessons for coastal management. Pages 85-96 *in* T.E. Chua, and D. Pauly (eds). Coastal Area Management in Southeast Asia: Policies, Management Studies and Case Studies. ICLARM Conference Proceedings 19. Ministry of Science, Technology and Environment, Kuala Lumpur, Johor State Economic Planning Unit, Johore Bahru, Malaysia, and International Center for Living Aquatic Resources Management , Manila, Philippines.

Whiteford, S., F.A. Bernal, H. Diaz-Cisneros, and E. Valtierra-Pacheco. 1998. Arid-land ejidos: Bound by the past, marginalized by the future. Pages 381-399 *in* W.A. Cornelius and D. Myhre, eds. The transformation of rural Mexico: Reforming the ejido sector. U.S.-Mexico Contemporary Perspective Series, 12. Center for U.S.-Mexican Studies, University of California at San Diego. 437pp.

Wicks, A.C., D.R. Gilbert, Jr., and R.E. Eman. 1994. A feminist reinterpretation of the stakeholder concept. Business Ethics Quarterly 4(4):475-497

Wilshusen, P.R. S.R. Brechin, C.L. Fortwangler, and P.C. West. 2002. Reinventing a square wheel: Critique to a resurgent "Protection Paradigm" in international biodiversity conservation. Society and Natural Resources 15:17-40

Wood, DJ 1994. Essay presented at The Toronto Conference: Reflections on Stakeholder Theory. Business and Society 33(1):82-131

Yetman, D., and A. Burquez. 1998. Twenty-seven: A case study in ejido privatization in Mexico. Journal of Anthropological Research 54: 73-95

Young, E. 1999. Local people and conservation in Mexico's El Vizcaino Biosphere Reserve. The Geographical Review 89(3): 364-390

Zabin, C. 1998. Free markets and forests: Community-based forestry in the era of Neo-liberal reforms. Pages 401-425 *in* W.A. Cornelius and D. Myhre, eds. The transformation of rural Mexico: Reforming the ejido sector. U.S.-Mexico Contemporary Perspective Series, 12. Center for U.S.-Mexican Studies, University of California at San Diego. 437pp.

Zazueta, A.E. 1995. Policy hits the ground: Participation and equity in environmental policy-making. World Resources Institute. Washington, D.C. 58pp.

Appendices

Appendix A: Questionnaire for planning teams

1. Was there any model(s) that you used for the development of your management plan? If so, tell me more about it (e.g., model already known or not, decision-making)
2. How did you start or what were the steps you followed during the inventory-diagnosis stage?
   - How the members of the planning teams were identified?
   - Were social conditions relevant to the plan assessed? If so, how did you do it? (e.g., interviews, surveys)
   - What information was already available? What was the level of detail of this information? How reliable was this information?
   - Did you have any contact with local communities at this stage? If so, how did you do it? (e.g., workshops, environmental education, meetings)
3. What was your role in the development of the management plan?
4. Did the planning team have the appropriate expertise at the moment of developing the plan? Or do you feel that some disciplines were not included?
5. What elements or characteristics should include an adequate problem identification? (e.g., clarity, causative agents, geographic location, prioritization)
6. How realistic are the goals and objectives of the plan?
7. What do you think of wildlife use rights (UMAs)? Does it have any affect on the conservation process of the conservation of the <u>NAP</u> or <u>MDRL</u> project? If so, how would that be?
8. How would you identify stakeholders with some relevance to conservation of natural resources?
   - For the NPA / MDRL project you are working with who are the stakeholders?
   - Does it modify or not the presence of these group your conservation goals? If so, how?
   - What do you think of possible relationships among and with them?
9. Would these groups be more involved in the development of the management plan? If so, at what stages?
10. Did you involve any stakeholder(s) in the process? At what stages? If not, what were some of the reasons or obstacles for not involving them?
11. What do you think of the privatization of ejidos and colonias? Would it have any effect on the processes for planning and conservation in Mexico? Would that affect the NPA you work with? If so, how?
12. In your opinion, what would be the effect (if any)of ejido privatization over common property resources such as forests, grasslands, etc?
13. Is it clear in the management plan who has the responsibility for implementing the strategies? How is this responsibility defined/established?
    - With whom do you need to work for the implementation of the plan?
    - Would you expect to find this type of information on a management plan?
14. What would be the biggest accomplishment of the planning process, or for the stage of the planning process you participated in? If you had to do this all over again, what would you do differently?

Appendix B: Conservation Evaluation Matrix

A. SCOPING AND EVALUATIVE FACTORS (Inventory)	
1. Description of the Area	
1a	An overview of important past background of the area (e.g., ecology of native ecosystems, ethnic demographics, ecological processes)
1b	A description of current physical (e.g., soil, water), biological (e.g., flora, fauna, ecosystems, vegetation types) and socio-economic (e.g., demographics, current resource uses, production systems, education, health) characteristics of the area
1c	Appropriate indicators of: (1) scale and boundaries (e.g., regional, local, international), (2) geographic location (e.g., SW, NW), and (3) aerial coverage (i.e., quantify the amount or proportion) for the characteristics of the area
1d	A summary description of major trends likely to result from current area characteristics (e.g., overgrazing, pollution, poaching, shift of land uses, migration, public health issues, shifts in land tenure, opening of land for agriculture, increase of female-led households)
1e	A description of current or anticipated management efforts (e.g., zoning, conservation, restoration, sustainable use, research, monitoring, administration, current legal framework)
1f	A concise statement of the conservation mission for this plan (e.g., why is the management plan being written?)
1g	Identification of needed disciplines (e.g., conservation biology, social psychology, wildlife management)
2. Resource Base Tenure System	
2a	Description (e.g., presence, amount, location) of existing land tenure system types (e.g., private, communal, public)
2b	Description of ongoing projects (e.g., type of project, involved resource) involving the sharing of resource-based rights or responsibilities (e.g., ownership, use, management, protection)
2c	Description of threats (e.g., overexploitation) and opportunities (e.g., biodiversity conservation, local involvement) for ongoing projects involving shared-based resource rights and responsibilities
2d	Assessment of current or potential impacts of land tenure changes (e.g., privatization) on local people (e.g., rural migration, increase numbers landless people, disappearance of local structures or communities)
2e	Assessment of current or potential impacts of land tenure changes (e.g., privatization) on the area and its resources (e.g., poaching, pollution, shift on use rights (e.g., free riding, large estates), loss of habitat, threats to threatened and endangered species)
3. Participatory Processes	
3a	Description (e.g., type, expected use, experience) of suggested participatory process frameworks (e.g., search conferences, surveys)
3b	Identification of limitations (e.g., bad experiences, lack of expertise, funding or time) and opportunities (e.g., past experience, available funding and time, legal mandates) for the use of PPs
3c	Initial assessment of where participation is expected (e.g., inventory, strategic planning, operational planning, and monitoring and evaluation), and potential participants (i.e., potential stakeholders and/or potential partnerships)
4. Scoping for Evaluative Factors for Stakeholder Analysis	
4a	Is interagency cooperation required in this plan? (i.e., interdependence (need of others in order to accomplish a conservation goal)
4b	Identification of potential threats (e.g., lack of funding or political will, personal differences, lack of experience, unclear goals) and opportunities for collaboration (e.g., mission statements, expressed interest in collaborative work, ongoing processes)
4c	Description of criteria for stakeholder identification (e.g., mutuality concept (i.e., affect or benefit [distribution of costs and benefits[2]], or influence or being influenced [project effectiveness[2]]), economic dependency, use and ownership rights, legal mandates, decision-making power, self-claimed stakeholders)
4d	Preliminary identification of stakeholders and planning team members
4e	Initial assessment of the interest and/or willingness to collaborate in the project (i.e., initial contact with potential stakeholders)

5. Definition and Effects upon Common Property Resource Systems (CPRs)
5a Description of the type (i.e., indigenous, institutionally created) of existing CPR systems 5b Description of the characteristics of CPR systems (e.g., boundaries, management guidelines, exclusion of non-users, enforcement of collective agreements, access to resources and distribution systems, decision-making, mechanisms for internal accountability) 5c Threats for indigenous CPR systems (e.g., incompatibility between community values and market integration, shift from internal to external means for enforcing collective agreements, non-autonomous government of resource use and management, non-recognition of indigenous institutions, reduced capacity for self-governance, population increase) 5d Threats for institutionally created CPR systems (e.g., shift from internal to external means for enforcement of collective agreements, unrealistic economic expectations, poor organization and leadership, inadequate marketing strategies, inability to exclude non-users, presence of weak local institutions, high migration pressures, power struggles, non-participatory decision-making, lack of interest)
B. STRATEGIC PLANNING
6. Problem Identification
6a Identification of facilitating institutions or organizations (e.g., type of organization, goals, expected role, experience) 6b Confirmation of planning team members (e.g., disciplines, number of members, opportunities and limitations, needs, balance among disciplines)Identification of the issues and problems based on the characteristics of the area (i.e., physical, biological, socio-economic) 6c Description of issues and problems (e.g., scale, location, affected resource, causative agents, indicators for performance measurement, and time-related characteristics) 6d Hierarchical analysis and prioritization of problems and issues (e.g., urgency, importance, feasibility, ecological relevance, time needs) 6e Decision-making in problem identification (e.g., top-down, passive, semi-participatory, active, participatory) 6f Identification of information needs (e.g., inventories, habitat and population data, resource use rates, environmental indicators)
7. Stakeholder Normative Cores
7a Classification of the type of stakeholders (e.g., primary, secondary, tertiary) and expected role (e.g., decision-making, provide information, funding, normative) 7b Definition the planning stage where their participation is expected (e.g., inventory, strategic planning, operational planning, monitoring & evaluation) 7c Assessment of stakeholders normative cores (e.g., goals and objectives, interests, values, organizational structure) 7d Assessment of power sources (e.g., money, political power, knowledge, monopoly of a specific resource) and personal agenda for each stakeholder (e.g., further personal goals, influence policies or other stakeholders, sabotage a project) 7e Identification of reasons for collaboration (e.g., expected economic benefits, control of problems, legal mandates, personal interest) or no collaboration (e.g., negative experiences, lack of money, no incentives or benefits) 7f Assessment of interdependence (i.e., inability for unilateral action) among stakeholders
8. Goals and Objectives
8a Decision-making in objective and goal definition (e.g., top-down, passive, semi-participatory, active, participatory) 8b Identification of domain areas 8c Coverage of goals and objectives given the characteristics of the area (i.e., physical, biological, socio-economic)(as in 1b) 8d Links between identified problems and goals/objectives (i.e., overall plan connectivity) 8e Description of the plan objectives (i.e., scale, location, affected resource, causative agents, indicators for performance measurement, and time-related characteristics) 8f Likelihood of accomplishing goals/objectives (e.g., funding, time needs, limitations and opportunities, needed collaboration or potential partnerships)

C. OPERATIONAL PLANNING
9. Planning Framework
9a Confirmation of planning team members (e.g., disciplines, number of members, opportunities and limitations, needs, balance among disciplines) 9b Decision-making in the development of strategies and actions (e.g., top-down, passive, semi-participatory, active, participatory) 9c Links among identified problems, goals, objectives, strategies and actions (i.e., overall plan connectivity) 9d Hierarchical analysis and prioritization of strategies and actions (e.g., impact assessment, urgency, importance, feasibility, time needs) 9e Identification of responsibilities for plan implementation (e.g., roles, duties, time frameworks, mechanisms for accountability, funding) 9f Identification of potential partnerships for the implementation of the plan (e.g., areas of interest, previous experiences, needs)
D. MONITORING AND EVALUATION
10. Monitoring and Evaluation
10a Decision-making (e.g., top-down, passive, semi-participatory, active, participatory) in the definition of the performance measurement system (e.g., selection of domain areas, performance indicators, development of performance measures, hierarchical analysis) 10b Development of performance measures related to the planning stages (i.e., inventory, strategic planning, operational planning, monitoring and evaluation) (i.e., how can we tell that we accomplished what we wanted to do on each planning stage?) 10c Identification of performance measures for goals and performance domains (e.g., sustainable use, conservation, administration) 10d Identification of potential output-related performance indicators (e.g., white-tailed deer population numbers in a county, survival rate of trees in reforested areas, year-based soil erosion rates throughout the area) 10e Links among identified problems, goals, objectives, strategies, actions and outcome/output performance measures 10f Hierarchical analysis and selection of meaningful performance measures (i.e., are we measuring what we need to measure?) 10g Definition of responsibility (if applicable) for monitoring and evaluation of the plan (e.g., time framework, data collection, deliverance, progress evaluation, personnel)

SCALES (1)	
1b	(A) if a description is present, and (B) if description is vague or absent
1c	(1) Physical characteristics: (A) if they are described in the plan and (B) if vague or absent; (2) biological characteristics: (A) if they are described in the plan and (B) if vague or absent; and (3) socio-economic characteristics: (A) if they are described in the plan and (B) if vague or absent
1d	(1) Physical characteristics: (1.1) scale and boundaries (A) if they are described in the plan and (B) if unclear or absent, (1.2) geographic location (A) if they are described in the plan and (B) if unclear or absent, and (1.3) aerial coverage (A) if they are quantify areas in the plan and (B) if unclear or absent; (2) biological characteristics: (2.1) scale and boundaries (A) if they are described in the plan and (B) if unclear or absent, (2.2) geographic location (A) if they are described in the plan and (B) if unclear or absent, and (2.3) quantity (A) if they are described in the plan and (B) if unclear or absent; (3) socio-economic characteristics: (3.1) scale and boundaries (A) if they are described in the plan and (B) if unclear or absent, (3.2) geographic location (A) if they are described in the plan and (B) if unclear or absent, and (3.3) quantity (A) if they are described in the plan and (B) if unclear or absent
1e	(A) if overall, the plan describes human impacts on the area, (B) if description of impacts only for some resources, and (C) vague in general or absent
1f	(A) if the domain areas are identified and described, (B) if description of domain areas is vague or not described at all
1g	(A) if the plan has a conservation mission, (B) if vague or absent
1h	(A) if the plan provides information about potential disciplines (B) if vague or absent
SCALES (2)	
2a	(A) if land tenure types are described and quantified, (B) if description of land tenure types is vague or not described at all
2b	(1) description of the projects: (A) if type of project and involved resource are described, (B) if description of the projects is vague or absent, and (C) if irrelevant or unlikely; (2) type of resource-based right of responsibility (A) if the describes the type of rights, (B) if the information is vague or absent, and (C) if irrelevant or unlikely
2c	(1) threats: (A) if the potential threats are described, and (B) if description of potential threats is vague or absent, and (C) if irrelevant; (2) opportunities: (A) if potential opportunities are described and (B) if description of opportunities is vague or absent, and (C) if irrelevant
2d	(A) if impacts are described, (B) if impacts are acknowledged but not described, or absent, and (C) if this is irrelevant to the area
2e	(A) if impacts are described, (B) if impacts are acknowledged but not described, or absent, and (C) if this is irrelevant to the area
SCALES (3)	
3a	(A) if frameworks for potential PPs are described in the plan, and (B) if description of frameworks is vague or absent
3b	(1) limitations (A) if limitations are described in the plan, and (B) if description of limitations is vague or absent; (2) opportunities (A) if opportunities are described in the plan, and (B) if description of opportunities is vague or absent
3c	(1) where participation is expected (A) if the plan discusses this, and (B) if acknowledged but not described, or absent; (2) potential participants (A) if potential partners are pre-identified and possible participation is described, and (B) if this information is acknowledged but not described or absent
SCALES (4)	
4a	(A) if interdependence is addressed in the plan, (B) if this is acknowledged but vague or absent, and (C) if irrelevant
4b	(1) threats (A) if threats are described in the plan, and (B) if description of threats is vague or absent; (2) opportunities (A) if opportunities are described in the plan, and (B) if description of opportunities is vague or absent
4c	(A) if the criteria for the selection of stakeholder are described in the plan, and (B) if description for stakeholder selection are vague or absent
4d	(A) if stakeholders are clearly identified, (B) if stakeholder are vaguely identified, or absent, (C) if irrelevant at current time
4e	(A) if willingness to participate is addressed and described in the plan, (B) if willingness is vaguely described, or absent, and (C) if irrelevant

SCALES (5)	
5a	(A) if CPRs apply and are described in management plan, (B) if CPRs apply but description vague or absent, and (C) if irrelevant to the area
5b	(1) boundaries (A) if described, and (B) if vague or absent, (2) management guidelines (A) if described, and (B) if vague or absent, (3) exclusion of non-users (A) if described, and (B) if vague or absent, (4) enforcement of collective agreements (A) if described, and (B) if vague or absent, (5) access to resources and distribution systems (A) if described, and (B) if vague or absent, (6) decision-making (A) if described, and (B) if vague or absent, (7) mechanisms for internal accountability(A) if described, and (B) if vague or absent
5c	(A) if threats are acknowledged and discussed in the plan, (B) if description of threats is vague or absent, and (C) if irrelevant to the area
5d	(A) if threats are acknowledged and discussed in the plan, (B) if description of threats is vague or absent, and (C) if irrelevant to the area
SCALES (6)	
6a	(A) if facilitating institutions are described, (B) if description of facilitating institutions is vague or absent, and (C) if irrelevant
6b	(A) if appropriateness of current planning team members is determined, (B) if this information is vaguely described or missing
6c	Identification of problems (1) physical (A) if problems are identified, (B) if description of problems is vague or absent, and (C) if irrelevant; (2) biological (A) if problems are identified, (B) if description of problems is vague or absent, and (C) if irrelevant; (3) socio-economic (A) if problems are identified, (B) if description is vague or absent, and (C) if irrelevant.
6d	(1) scale (A) if problems are scaled, and (B) if vaguely scaled or absent, (2) location (A) if location is provided, and (B) if vaguely located or absent, (3) affected resource (A) if affected resource is described, and (B) if affected resource vaguely described or absent, (4) causative agents (A) if agents are described, and (B) if causative agents vaguely described or absent, (5) indicators for performance measurement (A) if indicators are described, and (B) if indicators are vaguely described or absent, and (6) time-related characteristics (A) if problems are time-bounded, and (B) if vaguely time-bounded or absent
6e	(A) if problems are prioritized, (B) if prioritization is present but vague (i.e., unclear process) or absent, and (C) if irrelevant
6f	(A) if approach for decision-making for identification of problems is described, (B) if approach for decision-making is vague or absent, and (C) if irrelevant
6g	(A) if information needs are described and prioritized, (B) if description for information needs are vague and not prioritized, or absent, and (C) if irrelevant
SCALES (7)	
7a	(1) classification of stakeholders (A) if stakeholders are classified, and (B) if classification of stakeholders is vague, or absent, and (C) if irrelevant; (2) expected role (A) if expected role for stakeholders is defined, (B) if description of stakeholders' expected role is vague or absent, and (C) if irrelevant
7b	(A) if participation per planning stages is defined, and (B) if participation per planning stage is vague or absent, and (C) if irrelevant
7c	(1) goals and objectives (A) if these are defined in the plan, and (B) if description of goals and objectives is vague or absent, (2) interests (A) if defined in the plan, and (B) if description of interests is vague or absent, (3) values (A) if defined in the plan, and (B) if description of values is vague or absent, and (4) organizational structure (A) if defined in the plan, and (B) if description of organizational structure is vague or absent
7d	(1) power sources (A) if power sources are described for stakeholders, and (B) if description of power sources is vague or absent, and (C) if irrelevant; (2) personal agenda (A) if personal agenda for stakeholders is described, (B) if description of personal agenda is vague or absent, and (C) if irrelevant
7e	(1) reasons for collaboration (A) if the plan identifies these reasons, (B) if these data are vague or absent , (C) if irrelevant; (2) reasons for no collaboration (A) if the plan identifies these reasons, (B) if these data are vague or absent , (C) if irrelevant
7f	(A) if this concept is approached and assessed in the plan, (B) if the information is vague or absent, (C) if irrelevant

SCALES (8)	
8a	(A) if the approach for decision-making for identification of goals and objectives is described, (B) if description of decision-making for goals and objectives is vague or absent, and (C) if irrelevant
8b	(A) If domain areas are identified and described, (B) if description of domain areas is vague or absent, and (C) if relevant
8c	(1) Physical characteristics: (A) if goals and objectives are described in the plan for this section, and (B) if goals and objectives are vague or absent; (2) biological characteristics: (A) if goals and objectives are described in the plan for this section, and (B) if goals and objectives are vague or absent; and (3) socio-economic characteristics: (A) if goals and objectives are described in the plan for this section and (B) if goals and objectives are vague or absent
8d	(A) If problems, goals and objectives (overall) seem to follow a clear logical model and links are clear, (B) if somewhat 75% of problems, goals and objectives follow a clear logical model and links are clear, (C) if somewhat 50% of problems, goals and objectives follow a clear logical model and links are clear, (D) if somewhat only 25% of problems, goals and objectives follow a clear logical model and links are clear
8e	(1) scale (A) if goals and objectives are scaled, and (B) if vaguely scaled or absent, (2) location (A) if location is provided, and (B) if vaguely located or absent, (3) affected resource (A) if affected resource is described, and (B) if affected resource vaguely described or absent, (4) causative agents (A) if agents are described, and (B) if causative agents vaguely described or absent, (5) indicators for performance measurement (A) if indicators are described, and (B) if indicators are vaguely described or absent, and (6) time-related characteristics (A) if goals and objectives are time-bounded, and (B) if vaguely time-bounded or absent
8f	(A) if the plan presents a feasibility assessment of objectives and goals, (B) if this information is vague or absent, and (C) if irrelevant
SCALES (9)	
9a	(A) if appropriateness of current planning team members is determined, (B) if this information is vaguely described or missing
9b	(A) if the decision-making approach for identification of strategies/actions is described, (B) if description of decision-making approach is vague or absent, and (C) if irrelevant
9c	(A) if problems, goals, objectives, strategies and actions (overall) seem to follow a clear logical model, and links are clear, (B) if somewhat 75% of problems, goals, objectives, strategies and actions follow a clear logical model and links are clear, (C) if somewhat 50% of problems, goals, objectives, strategies and actions follow a clear logical model and links are clear, and (D) if somewhat only 25% of problems, goals, objectives, strategies and actions follow a clear logical model and links are clear. (NOTE: Identify at what of these stages is the link missing if b, c or d)
9d	(A) if strategies and actions are prioritized, (B) if prioritization is vague or absent, and (C) if irrelevant
9e	(A) if definition of responsibilities is described in the plan, (B) if the description is vague or absent, and (C) if irrelevant
9f	(A) if either already existing partnerships or strategies for developing are described, (B) if the for this information is vague or absent, and (C) if irrelevant

SCALES (10)	
10a	(A) if the decision-making approach for identification of a performance measurement system is described, (B) if description of decision-making approach is vague or absent, and (C) if irrelevant
10b	(1) Inventory: (A) if the plan described performance measures for monitoring activities during the inventory, and (B) if performance measures for the inventory stage are vague or absent; (2) strategic planning: (A) if the plan described performance measures for monitoring activities during strategic planning, and (B) if performance measures for strategic planning are vague or absent; (3) operational planning: (A) if the plan described performance measures for monitoring activities during operational planning, and (B) if performance measures for operational planning are vague or absent; and (4) monitoring and evaluation: (A) if the plan described performance measures for monitoring/evaluation of the plan, and (B) if performance measures for monitoring and evaluation are vague or absent
10c	(A) if the plan identifies performance domains and measures that address measurement in achieving goals, and (B) if description of performance domains is vague or absent
10d	(A) if the plan (overall) identifies performance indicators aimed at monitoring the implementation of strategies, actions and successful achievement of objectives, (B) if the description of performance indicators is vague or absent, and (C) if irrelevant
10e	(A) if identified problems, goals, objectives, strategies, actions and outcome/output performance measures (overall) present a clear link, (B) if somewhat 75% of identified problems, goals, objectives, actions and outcome/output performance measures present a clear links, (C) if somewhat 50% of identified problems, goals, objectives, actions and outcome/output performance measures present a clear link, and (D) if somewhat only 25% of identified problems, goals, objectives, actions and outcome/output performance measures a clear link
10f	(A) if performance measures in general are prioritized, (B) if prioritization is vague or absent, and (C) if irrelevant
10g	(A) if the plan addresses who is responsible monitoring and evaluation tasks, (B) if this information is vague or absent, and (C) if irrelevant

Appendix C. Modified Rural Landscapes Case Studies

Characteristics

Modified Rural Landscapes projects represent non-traditional attempts to protect areas of high biodiversity while promoting sustainable use of multiple resources. These projects occur outside protected areas, and in spite of being methodologically unique, all projects share some characteristics within specific performance domains such as scale, structure, and nature. In regards to scale, MDRL projects tend to be smaller, less comprehensive than NPAs; their focus is mostly on small-scale rather than regional or national resource systems, and have a strong community-based orientation.

Structurally speaking, MDRLs lack federal decrees for the conservation of targeted landscapes; conservation and sustainable use remain uncertain and conditioned to the will of all involved parties; there is a strong, continuous stakeholder involvement aimed at negotiating guidelines for land use planning; strategic and operational planning occur simultaneously; MDRL projects are generally lead by non-federal organizations (e.g., NGOs, universities, research centers).

In regards to their nature, these projects often introduce alternative approaches for both sustainable resource use and environmental conservation (e.g., global vs. local); MDRL projects either emerge in response to a specific problem (e.g., deforestation), need (e.g., community-based forestry) or public policies (e.g., integrated forest management); these are areas of high biodiversity areas (e.g., threatened, endangered or migratory species); these projects are generally short-lived (e.g., lack of funding, personnel), thus, there is a sense of urgency in (1) legitimizing negotiated agreements regarding land use, and (2) accomplishment of conservation goals, and (3) presence of mixed land tenure systems (e.g., private, communal). Planning approaches are unique for each case study.

Case Study # 1: Conservation of Manialtepec's Watershed, Oaxaca, Mexico.

I. Characteristics of the area. The Manialtepec watershed is located in the coastal region of Oaxaca with an estimated size of 700 km^2. The area ranges in altitude from sea level to 2, 445 meters, and contains 11 different vegetation types. It shelters an important number of migratory birds and multiple T&E species. The watershed and its wetlands home a large population of indigenous people who practice traditional agro-ecological systems. Due to human activities and environmental disasters (e.g., hurricanes) the area is facing serious degradation. In 1996 the INSO (The Institute for Nature and Society of Oaxaca) launched in collaboration with other stakeholders a grass-rooted initiative aimed at watershed conservation and welfare of local communities.

II. Planning Process. There are several underlying principles guiding this project: (1) ecological protection and social justice have to occur simultaneously, (2) protection of the watershed is about ecological regulation rather than "sustainable development" and/or "natural resource conservation", (3) use of water as unifying element among all stakeholders, (4) any social welfare or conservation project need to contribute to capacity building among local stakeholders, and (5) collaboration and public involvement is required at any planning stage, including all interested parties. The project has 5 major lines of action: (a) a shared-picture of the watershed (i.e., agreed inventory/assessment of the area characteristics), (b) development of a negotiation and coordination platform (i.e., committee of representatives), (c) watershed's management plan (i.e., based on a harmonious and agreed ecological watershed regulations), (d) the tools (i.e., training and technical support as needed), and (e) the voice (i.e., dissemination of the project and its lessons). The expected outcomes from this project include: (a) acknowledgment of alternative conservation processes (e.g., global vs. local conservation, top-down vs. bottom-up conservation); (b) introduction of alternative technologies (e.g., water-soil conservation); (c) the integration of indigenous knowledge and practices with scientific data through an agreed, harmonious consensus among all stakeholders. Land use guidelines for the watershed has been approved by all stakeholders (2001), and detailed management plans for two counties (i.e., Nopala, Temaxcaltepec) are under way.

Case Study # 2: Community-based Wetland Conservation at La Mancha-El Llano, Veracruz, Mexico

I. Characteristics of the area. La Mancha-El Llano is a wetland system located in a closed watershed of 600 km^2 in central-east Veracruz, Mexico. The system contains inland and coastal wetlands, and contains at least 8 major ecosystems (e.g., coastal sand dunes, mangroves, tropical sub perennial forests). The wetlands provide refuge to numerous migratory and resident species, including endangered species such as the Jabiru stork (*Jabiru mycteria*). Land tenure is complex, and involves both estuarine and riparian habitats. Agriculture (e.g., grazing, farming, fishing) and other development activities (e.g., highways, thermonuclear activities) have been degrading the wetland. In 1997 INECOL (National Institute of Ecology) launched a project aimed both to protect/restore the wetlands, and to provide alternatives for sustainable resource use.

II Planning Process. The process started at a local level (i.e., 80 has) with the intention of eventually reach the entire watershed. Starting elements of this project are (a) local complains for the illegal clearing of mangroves, (b) expressed interest from different agencies including INECOL to develop a management plan. Key elements of the process are: (1) establishment of a planning stakeholder committee (i.e., negotiation and agreement on land use guidelines, management plan)(long-term), (2) immediate creation of resource use-conservation pilot projects (i.e., trust-building with locals, environmental awareness)(short-medium term), and support projects (e.g., environmental legislation, law enforcement). Currently there are 7 projects (operational) (e.g., ecotourism, aquaculture, reforestation) with 15 conservation-related projects attached to them (e.g., mangrove restoration, environmental legislation). No management plan is available; participatory ecological ordering are still under way.

Case Study # 3: Development of an Integrated Management Plan for Babicora's Watershed, Chihuahua, Mexico.

I. Characteristics of the area. Laguna de Babicora watershed encompasses one of the most important wetlands in north-west Chihuahua, Mexico. The area is crucial habitat for a large number of migratory birds, including the largest concentration of wintering sandhill cranes (*Grus canadensis*) in Mexico. It also attracts large number of snow geese (*Chen caerulescens*) and greater white-fronted geese (*Anser albifrons*). The 275,000 ha watershed is 80% communal property (i.e., 12 communities). Activities such as crop farming, cattle raising and timber production have negatively impacted the area (e.g., soil erosion, overgrazing, water pollution). The University of Chihuahua started this project in 1994 as an attempt to prevent the draining of the wetland for agricultural purposes.

II Planning Process. The project had three yearly-based planning stages: (a) basic studies based on 4 performance domains: natural resources, socioeconomic characteristics, farming systems, and environmental education (first year); (b) implementation of pilot research projects (adaptive planning)(second year); (c) integration of information and development of management plan (third year). The management plan is presented following the 4 pre-identified performance domains. Surveys and focus groups were performed throughout the first two years with multiple stakeholders to characterize farming systems, to identify watershed problems (i.e., social, economic, environmental), and to assess peasants' conservation attitudes and needs. A total of 48 activities (i.e., operational planning) were conducted in the area during the first two years (e.g., range and cattle management workshops, negotiations for sewage treatment, drilling of wells for tap water, environmental education workshops). The management plan was published in September in 1998. No information regarding the plan implementation is available as of May 2004.

Case Study # 4: Management Plan for the Conservation and Development of Santa Maria Bay, Sinaloa, Mexico.

I. Characteristics of the area. Santa Maria Bay is a highly productive estuarine in the coast of Sinaloa, Mexico with an estimated size of 50,000 ha. The bay and oceanic islands provide refuge for numerous species terrestrial and marine flora and fauna, including the brown pelican (*Pelecanus occidentalis*) and blue-footed booby (*Sula neuboxii*). The area contains 5 major ecosystem types (e.g., coastal sand dunes, mangroves), and provides abundant opportunities for coastal fisheries (e.g., shrimp, lobster). Due to human activities such as unregulated fishing, water pollution, aquaculture (e.g., shrimp farming), and, the bay started to experience severe environmental degradation. In 1998, a coalition of interested parties including International Conservation designed a project to develop a management plan for the area.

II Planning Process. The management plan was the result of two specific events, the need to evaluate the impacts of 7,000 ha of shrimp farming, and the lack of ecological regulations for the bay. A committee, lead by the Conservation International and the University of Sinaloa, was created with a total of 17 members including national and international NGOs, research centers, county officials and outfitters. The inventory was consisted of four major work areas: (a) technical support, (b) public involvement, (c) agreements and stakeholders, and (d) evaluation and monitoring. The mission and 5 management areas for the plan were jointly identified, namely: (1) hydrodynamics of the bay, (2) water quality and pollution, (3) mangrove areas, (4) coastal fisheries, and (5) oceanic islands. Five different stakeholder groups were created to address each management area. The plan is the result of the integration of the results from these groups. The plan identifies outcome indicators for successful implementation.

Appendix D. Methodology for problems' hierarchical analysis

STAKEHOLDER ANALYSIS OF INTERESTED PARTIES RELATED WITH THE CONSERVATION OF LAGUNA DE BABICORA'S WATERSHED
Responsible: Juan C. Guzman-Aranda, M.Sc.
Participating Institutions: NAWCC, Virginia Tech, UACH

Introduction.
The stakeholder analysis will be based on identified problems from Laguna de Babicora's management plan. With the purpose of centering the research, only those problems recognized as immediate threats to the conservation of the wetland will be considered. Thus, we will be considering direct threats to the wetland (e.g., water and soil pollution), and those which represent an indirect obstacle for the solving of the environmental crisis in the watershed (e.g., lack of orga nization among farmers). This research does not include problems related to social justice, life quality, economic development, and public health among others. These other problems will likely to be handled in the near future as this methodology has been tested and approved.

Protocol.
You have received a list of problems that represent the some of problems identified at Laguna de Babícora's Watershed. As mentioned previously, this list includes only those problems that are either a direct threat, or obstacles in the management of the watershed and its wetland. In order to develop a methodology suitable for stakeholder analysis, and consequently, for the development of operational and implementation strategies, we are suggesting the use of 'identified problems' as a starting point. However, in order to use these problems for this research project it is important to redefine the problems to a point that a discussion about these problems is possible (Cordova 1997). That is, a discussion that could allow not only negotiations, but ultimately, the establishment of agreed commitments from all interested parties. This is why we are asking for your support in redefining these problems, whenever you deemed it appropriate. This problem redefinition covers 5 major areas: (a) redefinition of causative agents, (b) hierarchical analysis of suggested problems, (c) stakeholders that should be involved in solving these problems, (d) hierarchical analysis of potential stakeholders per problem, and (e) reasons as to why these stakeholders should be involved.

a. **Redefinition and identification of causative agents.** In this column you should define the problems with as much detail as you can, providing any relevant detail (e.g., specific locations, causes, impacts, affected parties, magnitude of the problem). For example, instead of describing the problem as *"negative attitudes among some farmers in regards to crop damage by sandhill cranes"* you could redefine it as *"negative attitudes among farmers from Nicolas Bravo and Gomez Farías due to occasional crop damage by sandhill cranes. Crop damage tends to be higher on years with fall rains because this slows harvesting before migration. Acceptance of crop damages is positively correlated with economic status and income. At least 20% of farmers suffer some type of crop damage every year.* It is clear that due to the areas of expertise from each respondent you would be unlikely to redefine some of these problems. This is acceptable. However, it is advisable that while doing the hierarchical analysis of these problems (second column) this task should be performed with the understanding of what is the ultimate purpose of the management plan for the area. That is, the protection of the wetland and associated migratory waterfowl.

b. **Hierarchical analysis of suggested problems.** Hierarchical analysis of suggested problems will be based on your perceptions about how important it is to address in order to achieve the conservation of the wetland. For this, you will assign a value ranging from 1 (not important) to 10 (very important).
c. **Stakeholders that need to be involved.** In this section you will identify, based on your experience and understanding of the subject, the interested parties that you consider should be involved in solving these problems. You are asked in this section to take a step forward and identify these potential partners with much detail as you can. For example, instead of listing “SEMARNAP” or “Babicora’s local communities”, you are encouraged to go to a level of detail as “Mr. Carlos Martinez from the state office for pest and wildlife damage from SEMARNAP” or “Committee for the Farmer Association from the Babicora’s Watershed”. The more detail you provide in this matter, the better.
d. **Hierarchical analysis of potential interested parties.** Once potential parties have been identified, you will be asked to provide information as to how essential is the involvement of this/ese party(ies) for the tackling of each problem. You will provide a number ranging from 1 (not important) to 10 (very important). Criteria for the hierarchical analysis of potential stakeholders should include concepts such as potential roles, ability to operate in the region, capacity to threaten the project, or any other criteria you provide as to why this/ese group(s) should be involved.
e. **Reasons for ranking stakeholder groups.** Briefly list the reasons your reasons for ranking these potential stakeholders the way you did. For example, “this is a strong, political group and previously they’ve boycotted similar projects”” or “this is a group who has legal mandate for the management of these resources”.

Bibliography

Cordova, A. 1997. Collaborative Natural Resource and Land-Use Planning in the Copper Canyon Region, Chihuahua, Mexico: Prerequisites, Incentives and Challenges. Master Thesis, Cornell University. Ithaca, NY. 145pp.

Appendix E. Methodology for stakeholder analysis

Problems and questionnaires for stakeholder analysis related to the conservation of Laguna de Babicora's Watershed, Chihuahua, Mexico.

List of pre-identified conservation priorities for Laguna de Babicora as identified by the planning team from Animal Science School at the Autonomous University of Chihuahua during July 1999, Chihuahua, Mexico.

Resource	ID	PROBLEM
Water	Water 1	Inefficient or non-existent sewage disposal system
	Water 2	No dumping grounds nor garbage disposal service
	Water 3	Lack of law enforcement to control garbage dumping at arroyos
	Water 4	No sewage treatment
	Water 5	Excessive use of fertilizers in agriculture
Soil	Soil 1	Drain the lagoons and open this land for agriculture
	Soil 2	Use of wells for agriculture
	Soil 3	Extraction of sand and pebbles from arroyos banks
	Soil 4	Soil erosion
	Soil 5	Salinization of some lagoon areas
Forest	Forest 1	Opening of forest lands for agriculture
	Forest 2	Immoderate timber harvesting in lands of your community
	Forest 3	Excessive cutting of fuel wood (i.e., pines and oaks) and juniper for fencing
	Forest 4	Higher densities of juniper around your community
Grassland	Grass 1	Lack of interest in getting organized for grazing and protecting common grasslands
	Grass 2	Opening of grasslands for agriculture
	Grass 3	Overgrazing in lagoon areas
	Grass 4	Disappearance of high foraging value plants and appearance of weeds in the lagoon
Wildlife	Wildlife 1	Crop damage (i.e., corn, oats) by cranes
	Wildlife 2	Lack of interest for new projects such as hunting
	Wildlife 3	Low interest for protecting the lagoons for cranes
Others	Other 1	Total lack of law enforcement by the authorities in regards to NR conservation
	Other 2	Flooding
	Other 3	Lack of training in agriculture (i.e., crop production)
	Other 4	Lack of training in cattle ranching
	Other 5	Lack of training for the use and protection of forested areas

QUESTIONNAIRE FOR THE STAKEHOLDER ANALYSIS
(Community Authorities)

1. Please, explain to me why it is important for your community to solve this problem.
2. Do you think the community should be involved in the resolution of this problem? Why?
3. Let's suppose that the general assembly decides to solve this problem, what would be the major obstacles that you would have to overcome in order to accomplish your goal (i.e., solve the problem)
4. Who else do you think should help you in the resolution of this problem?
5. Would you be willing to work in the resolution of this(ese) problem(s) with these other stakeholders?
6. What do you think would be your contribution?
7. Very often, when there are several stakeholders together it is necessary to negotiate with them. Almost never we get away with 100% of what we want. Let's suppose that SEMARNAP and PROFEPA are willing to help you out with the control of Juniper in your lands, but they ask you to reduce the number of cows because of the overgrazing in your lands. Do you think the community would be willing to participate in this process of trading off?
8. Whenever you have meetings, what are the most common problems that you talk about or would be interested on solving?
9. Let's suppose there is a meeting with the groups you mentioned before (question 4), and that you all are talking about how to solve this problem. What would you need to see or hear in this meeting in order for you to make a commitment to this project? (e.g., signature of a written agreement, clear definition of responsibilities and time frame).
10. Have you ever worked together with other stakeholders in the resolution of a problem/project? (e.g., institutions, universities, farmer organizations)
11. What type of project? Please describe the experience.
12. Ejidos and Colonias are organized pretty much in the same way: The general meeting (highest authority), and the officers (3). Based on what you have seen and lived, does this form of organization work or not? Why? I am not talking about the current authorities, but in general.
13. Do you have any idea of how the ejidos and colonias could be organized so they can be more efficient/effective?
14. What do you think about the privatization of the ejido? Advantages? Disadvantages? How does this process affect the current organization of the ejido? What does the commissariat would do?

QUESTIONNAIRE FOR THE STAKEHOLDER ANALYSIS

(Agencies)

From the following problem list, how much is your responsibility to participate on its resolution and which of them would be a priority for your institution?

1. Please provide a short description of the profile and activities of this agency.
2. Please explain how much of a priority is this problem for your institution?
3. How does the agency define its own agenda/priorities? (e.g., legal mandates, national programs, people's demands). What other priorities do you have in regards to conservation problems or does this agency have any conservation priority?
4. Do you think you should be involved in the resolution of this problem? Why?
5. What would be the obstacles that you would find while trying to solve this problem?
6. Who else do you think should be involved in the resolution of this problem (e.g., agencies, NGOs)?
7. Would you be willing to collaborate with these other stakeholders in solving this problem?
8. What do you see your participation encompassing?. Would you be willing to change or modify your priorities (i.e., negotiate with other stakeholders), if needed (e.g., allocation of resources to new priorities)? Under what criteria would you be willing to change or modify your priorities?
9. Let's suppose that negotiations had taken place, and that there is an agreement that your participation is needed, as well as that from other groups, under what circumstances would you make a formal commitment to participate (e.g., seriousness of the project, matching funds)?
10. Have you ever worked with any other stakeholders (e.g., agencies, universities, farmer organizations) in the past? In what kind of proje cts?
11. Please describe how was your previous experience (e.g., good, bad, tired, no results)
12. Ejidos and colonias are organized pretty much in the same way (general assembly - higher authority, and councils - representatives of the general assembly). Based on what you have seen in the field, does it or doesn't work this form of organization? Advantages, disadvantages?
13. Have you thought about an alternative or parallel way of organization for colonias and ejidos?
14. What do you think about the privatization of the ejido? Advantages, disadvantages? How would this affect the structure of the ejido? Would this affect your performance or activities? If yes/no, why?

Appendix F. Problem rating data from communities, RSTKs and natural resource agencies

Local Communities (Table 1)

		Conservation priorities at Laguna de Babicora watershed																									
ID	**Community**	**Wa1***	**Wa2**	**Wa3**	**Wa4**	**Wa5**	**So1**	**So2**	**So3**	**So4**	**So5**	**Fo1**	**Fo2**	**Fo3**	**Fo4**	**Gr1**	**Gr2**	**Gr3**	**Gr4**	**Wl1**	**Wl2**	**Wl3**	**Ot1**	**Ot2**	**Ot3**	**Ot4**	**Ot5**
003	Gomez Farías	5	1	5	8	1	1	10	8	8	10	1	10	10	5	10	1	10	10	1	1	10	10	1	10	10	10
004	Gomez Farías	10	2	10	5	2	1	10	5	5	5	1	1	10	2	1	1	2	10	10	1	3	1	1	10	10	7
005	Gomez Farías	4	4	10	10	4	3	3	3	10	2	4	8	7	4	5	5	NS	5	4	3	4	5	1	9	1	10
007	Gomez Farías	9	3	9	9	3	3	9	2	10	2	1	10	10	1	2	1	9	10	9	9	6	10	1	8	8	8
	TOTAL	**28**	**10**	**34**	**32**	**10**	**8**	**32**	**18**	**33**	**19**	**7**	**29**	**37**	**12**	**18**	**8**	**21**	**35**	**24**	**14**	**23**	**26**	**4**	**37**	**29**	**35**
008	Peña Blanca	9	8	8	8	8	3	9	8	9	7	2	10	10	6	5	5	8	9	8	1	8	8	1	8	8	8
009	Peña Blanca	10	7	8	9	5	1	10	8	10	4	4	10	9	6	5	1	8	10	5	7	6	10	5	6	7	8
010	Peña Blanca	8	10	10	8	6	8	10	10	10	8	4	10	10	6	10	3	8	10	10	9	8	10	4	10	10	10
011	Peña Blanca	8	5	8	8	2	1	10	5	8	2	2	8	8	4	8	2	1	3	8	1	2	8	1	9	9	9
	TOTAL	**35**	**30**	**34**	**33**	**21**	**13**	**39**	**31**	**37**	**21**	**12**	**38**	**37**	**22**	**28**	**11**	**25**	**32**	**31**	**18**	**24**	**36**	**11**	**33**	**34**	**35**
012	P. Campesino	2	6	2	6	5	2	7	5	7	3	4	5	4	3	7	4	8	3	7	2	7	8	2	7	7	8
013	P. Campesino	1	1	5	5	8	1	6	5	10	1	1	10	10	1	10	2	3	5	5	6	2	8	10	10	10	8
014	P. Campesino	2	5	7	2	5	ND	10	1	3	1	2	1	2	1	10	1	6	3	2	6	ND	4	3	4	6	3
015	P. Campesino	5	6	6	6	6	1	4	3	7	3	2	10	9	2	1	2	8	8	4	5	6	8	3	7	9	10
	TOTAL	**10**	**18**	**20**	**19**	**24**	**4**	**17**	**14**	**27**	**8**	**9**	**26**	**25**	**7**	**28**	**9**	**25**	**19**	**18**	**19**	**15**	**28**	**18**	**28**	**32**	**29**
016	Nuevo Ser	3	9	9	5	9	7	1	8	9	10	9	2	3	8	8	7	9	5	4	1	9	8	8	9	8	10
017	Nuevo Ser	10	7	5	6	4	NA	10	2	1	NA	1	8	8	2	7	1	9	8	1	2	NA	9	1	8	8	10
018	Nuevo Ser	9	10	9	9	4	NA	9	1	3	NA	1	3	5	2	8	1	10	8	1	1	NA	5	1	9	9	8
019	Nuevo Ser	3	6	6	2	1	NA	10	1	1	NA	1	1	1	1	5	1	6	2	1	2	10	8	1	5	5	7
	TOTAL	**25**	**32**	**29**	**22**	**18**	**7**	**30**	**12**	**14**	**10**	**12**	**14**	**17**	**13**	**28**	**10**	**34**	**23**	**7**	**6**	**19**	**30**	**12**	**31**	**30**	**35**
020	A. Chávez	8	4	9	7	5	NA	10	3	1	NA	2	4	3	8	9	NA	10	5	1	9	NA	7	1	5	7	5
021	A. Chávez	2	7	10	4	9	NA	10	9	9	NA	NS	NS	10	NS	9	NA	NS	NS	3	2	NA	10	5	9	NS	NS
022	A. Chávez	6	8	10	7	2	NA	10	2	1	NA	1	2	4	3	5	NA	2	3	2	1	NA	9	1	2	2	4
023	A. Chávez	9	8	9	10	3	NA	10	7	7	NA	1	2	8	9	10	NA	9	2	8	10	NA	8	1	9	9	9
	TOTAL	**25**	**27**	**38**	**28**	**19**	**0**	**40**	**21**	**18**	**0**	**4**	**8**	**25**	**20**	**33**	**2**	**21**	**10**	**14**	**22**	**0**	**34**	**8**	**25**	**18**	**18**
024	Alamillo	7	10	10	10	5	1	10	1	10	1	1	1	1	8	6	2	7	8	4	2	4	6	7	5	3	4
025	Alamillo	9	10	8	10	4	2	10	10	10	5	5	10	8	10	4	3	10	8	8	5	2	10	2	10	10	10
026	Alamillo	10	10	8	10	4	1	10	5	10	10	1	1	9	10	10	1	10	4	9	1	1	10	10	10	10	10
027	Alamillo	8	8	7	8	5	6	5	4	9	10	4	4	5	3	8	4	10	8	7	4	4	8	2	8	7	7
	TOTAL	**34**	**38**	**33**	**38**	**18**	**10**	**35**	**20**	**39**	**26**	**11**	**16**	**23**	**31**	**28**	**10**	**37**	**28**	**28**	**12**	**11**	**34**	**21**	**33**	**30**	**31**

* Wa – Water-related problems; So – Soil related problems; Fo – Forest-related problems; Gr – Grassland-related problems; Wl – Wildlife-related problems; Ot – Problems in “other” category

Local Communities (Table 2)

ID	Community	Wa1*	Wa2	Wa3	Wa4	Wa5	So1	So2	So3	So4	So5	Fo1	Fo2	Fo3	Fo4	Gr1	Gr2	Gr3	Gr4	Wl1	Wl2	Wl3	Ot1	Ot2	Ot3	Ot4	Ot5
028	A. de Hidalgo	9	7	8	7	5	NA	10	NA	3	NA	1	4	5	9	8	NA	10	5	5	6	NA	10	8	10	10	10
029	A. de Hidalgo	7	10	3	5	6	NA	10	NA	10	NA	1	4	4	9	5	NA	8	7	3	3	NA	4	8	9	9	5
030	A. de Hidalgo	10	1	10	8	6	NA	10	NA	6	NA	1	8	6	10	8	NA	8	8	6	1	NA	10	8	8	10	8
031	A. de Hidalgo	10	5	10	10	3	NA	10	NA	3	NA	1	1	3	8	5	NA	5	2	7	2	NA	9	5	10	10	10
	TOTAL	**36**	**23**	**31**	**30**	**20**	**0**	**40**	**0**	**22**	**0**	**4**	**17**	**18**	**36**	**26**	**0**	**31**	**22**	**21**	**12**	**0**	**33**	**29**	**37**	**39**	**33**
032	Gpe. Victoria	8	5	6	7	2	NA	2	1	1	NA	2	2	3	3	4	NA	7	2	1	2	NA	2	1	5	5	2
033	Gpe. Victoria	10	8	8	10	2	NA	10	1	8	NA	1	2	1	1	2	NA	1	1	1	8	NA	8	1	8	8	8
034	Gpe. Victoria	10	2	8	9	3	NA	10	1	10	NA	1	3	3	2	4	NA	5	2	1	4	NA	4	1	10	10	10
035	Gpe. Victoria	10	7	10	10	7	NA	7	1	6	NA	4	9	5	6	7	NA	8	5	1	5	NA	10	1	5	1	6
	TOTAL	**38**	**22**	**32**	**36**	**14**	**0**	**29**	**4**	**25**	**0**	**8**	**16**	**12**	**12**	**17**	**0**	**21**	**10**	**4**	**19**	**0**	**24**	**4**	**28**	**24**	**26**
037	SJosé Babícora	10	2	3	10	10	2	10	5	1	5	1	3	10	7	1	1	1	5	7	7	9	2	2	2	2	6
039	SJosé Babícora	10	1	1	10	5	1	10	5	6	2	1	8	10	5	6	1	8	6	6	2	6	10	1	1	10	10
040	SJosé Babícora	10	3	7	7	5	2	10	4	4	1	1	3	4	1	1	1	4	5	6	7	1	2	2	5	NA	1
041	SJosé Babícora	10	2	8	8	9	1	8	8	8	8	1	3	8	8	4	1	4	3	8	8	9	8	8	8	8	8
	TOTAL	**40**	**8**	**19**	**35**	**29**	**6**	**38**	**22**	**19**	**16**	**4**	**17**	**32**	**21**	**12**	**4**	**17**	**19**	**27**	**24**	**25**	**22**	**13**	**16**	**20**	**25**
038	Col. Libertad	3	1	6	2	5	1	9	1	1	3	1	2	3	4	1	2	3	7	6	2	5	3	1	7	6	8
042	Col. Libertad	8	7	10	8	5	4	10	4	3	4	1	1	10	5	10	1	9	9	8	1	10	10	9	10	8	9
043	Col. Libertad	8	7	9	8	2	1	8	7	2	1	1	3	6	5	4	1	4	1	5	2	2	7	1	2	2	6
044	Col. Libertad	8	10	8	6	1	10	10	2	5	8	1	1	5	2	2	1	9	10	8	2	1	8	4	2	2	6
	TOTAL	**27**	**25**	**33**	**24**	**13**	**16**	**37**	**14**	**11**	**16**	**4**	**7**	**24**	**16**	**17**	**5**	**25**	**27**	**27**	**7**	**18**	**28**	**15**	**21**	**18**	**29**
045	N. Bravo	7	8	7	6	5	6	9	5	8	4	1	5	6	7	3	1	10	7	5	4	7	8	2	7	8	9
046	N. Bravo	8	8	8	9	7	3	9	8	9	3	1	1	3	1	3	1	9	5	8	8	7	5	1	8	8	7
047	N. Bravo	8	7	7	10	6	2	9	7	6	9	1	8	8	1	6	1	7	8	3	1	8	8	1	7	7	9
048	N. Bravo	3	3	9	8	8	1	10	1	3	1	1	5	1	2	2	1	8	9	7	8	8	8	4	8	5	8
049	N. Bravo	10	8	7	10	1	1	8	1	6	3	1	2	5	8	4	1	7	8	4	2	8	6	2	8	8	8
	TOTAL	**36**	**34**	**38**	**43**	**27**	**13**	**45**	**22**	**32**	**20**	**5**	**21**	**23**	**19**	**18**	**5**	**41**	**37**	**27**	**23**	**38**	**35**	**10**	**38**	**36**	**39**
055	Las Varas	10	10	5	10	1	NA	10	5	4	NA	1	1	1	10	3	1	9	2	1	1	NA	4	1	7	10	8
055.1	Las Varas	10	10	10	1	1	NA	8	7	3	NA	1	1	1	10	4	3	10	1	1	1	NA	6	8	4	8	8
055.2	Las Varas	7	8	7	1	1	NA	9	3	3	NA	1	1	1	10	9	4	8	1	1	1	NA	7	3	9	7	9
	TOTAL	27	28	22	12	3	NA	27	15	10	NA	3	3	3	30	16	8	27	4	3	3	NA	17	12	20	25	25

* Wa – Water-related problems; So – Soil related problems; Fo – Forest-related problems; Gr – Grassland-related problems; Wl – Wildlife-related problems; Ot – Problems in “other” category

Natural Resource Agencies: SEMARNAT (aka SEMARNAP)

	Water-related Problems					**Soil-related Problems**					**Forest-related Problems**				**Grass-related Problems**				**Wildlife-related Problems**			**Problems in "Other" category**				
Name	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**5**
Gmo. Dguez.	9	3	1	1	9	1	1	9	10	10	10	10	8	10	9	8	9	10	9	10	10	10	5	9	9	10
Raul Mercado	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8
Jaime Baray	1	1	1	1	1	1	1	1	1	1	10	10	10	8	1	1	1	1	1	1	1	1	1	1	1	9
Maur. Anchondo	1	1	1	1	5	10	1	10	10	1	10	10	10	2	1	10	10	1	1	10	10	1	1	1	1	10

Natural Resource Agencies: CONAGUA

	Water-related Problems					**Soil-related Problems**					**Forest-related Problems**				**Grass-related Problems**				**Wildlife-related Problems**			**Problems in "Other" category**				
Name	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**5**
Rafael Villanueva	8	4	10	10	10	DK	10	10	8	5	10	10	5	5	5	10	10	5	5	2	8	10	10	5	5	10
Cynthia Novelo	10	8	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5	5	5	3	3	10	10	5	5	5
Arturo Cepeda	10	10	10	10	1	1	8	8	1	1	1	10	1	1	1	1	1	1	1	1	1	10	10	1	1	1
Armando Daza	10	10	10	10	10	5	10	10	10	10	10	10	10	10	5	10	10	10	10	5	5	10	10	10	10	10
Melchor Lopez	9	9	9	10	10	8	10	10	8	8	9	10	10	8	8	10	10	10	10	10	10	9	10	10	8	10
Santos Blancarte	1	1	5	1	1	1	10	10	1	1	1	1	1	1	1	1	1	1	1	1	1	5	1	1	1	1
Octavio Martinez	5	2	4	7	7	3	8	6	2	2	2	2	2	2	2	2	2	2	2	2	4	5	5	2	2	2

Natural Resource Agencies: PROFEPA

	Water-related Problems					**Soil-related Problems**					**Forest-related Problems**				**Grass-related Problems**				**Wildlife-related Problems**			**Problems in "Other" category**				
Name	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**5**
Ma. Pilar Leal	8	10	10	10	10	10	5	10	10	7	10	10	10	5	10	8	10	7	5	7	10	10	8	10	10	10
Jorge Garcia	8	10	10	10	10	10	5	10	10	7	10	10	10	5	10	8	10	7	5	7	10	10	8	10	10	10
Carlos Palma Q.	1	1	1	1	1	1	1	1	10	1	10	10	10	10	1	1	1	1	1	10	10	10	1	1	1	10
Javier Altamirano	7	2	4	5	5	2	4	6	10	1	9	10	9	8	4	4	4	4	5	2	6	8	3	1	3	1

Appendix G. Acronyms

ACH – Alfredo Chávez
ADH – Año de Hidalgo
BANAMEX – National Bank of Mexico
BANRURAL – Rural Development Bank
BR – Biosphere Reserve
CA – Cattlemen Association
CAL – Colonia Alamillo
CAMPFIRE – Zimbabwe Communal Areas Management Program for Indigenous Resources
CBC – Community-based Conservation
CBD – Convention on Biological Diversity
CITES – Convention for the International Trade in Endangered Species of Wild Fauna and Flora
CLB – Colonia Libertad
CONABIO – National Commission for the Study and Protection of Biodiversity (Mexico)
CONAGUA – National Water Commission (Mexico)
CONANP – National Commission of Natural Protected Areas in Mexico (Mexico)
CONAZA – National Commission of Arid Zones
CPRs – Common Property Resource Systems
CWCS – Comprehensive Wildlife Conservation Strategies
DU – Ducks Unlimited
EM – Ecosystem Management
EPA – Environmental Protection Agency (USA)
FAO – Food and Agriculture Organization of the United Nations
FC – Forestry Consultants
FFPA – Flora and Fauna Protection Area
FIRA – Fiduciaries for Agriculture
FPA – Forest Protection Area
GF – Gomez Farias
GIS – Geographic Information Systems
GNP – Gross National Product
GPRA – Government Performance and Review Act
GV – Guadalupe Victoria
HEM – Human Ecosystem Model
ICDPs – Integrated Conservation and Development Projects
INE – National Institute of Ecology (Mexico)
INEGI – National Institute of Statistics, Geography and Informatics (Mexico)
INIFAP – National Institute for Forestry and Agriculture Research
INSO – Institute for Nature and Society of Oaxaca
ISI – Import-substitution Industrialization Approach
IUCN – The World Conservation Union
LBCP – Laguna de Babicora Conservation Plan
LC – Local Communities
LGEEPA – The General Law of Ecological Equilibrium and Protection of the Environment (Mexico)
LVS – Las Varas

MAB-UNESCO – Man and the Biosphere Program from the United Nations Educational, Scientific and Cultural Organization
MDRL – Modified Rural Landscape
MDRLs – Modified Rural Landscapes
NAFTA – North American Free Trade Agreement
NACEC – North American Commission for Environmental Cooperation
NAWCC – North American Wetland Conservation Council
NB – Nicolas Bravo
NGOs – Non Governmental Organizations
NOMs – Official Mexican Norms
NP – National Park
NPA – Natural Protected Area
NPAs – Natural Protected Areas
NRI – Natural Resource Institute
NS – Nuevo Ser
NUD*IST – Non-numerical Unstructured Data Indexing Searching & Theorizing
OFIT – Outfitters
PA – Protection Area
PB – Peña Blanca
PC – Porvenir del Campesino
PMs – Performance Measures
PMS – Performance Measurement System
PMSs – Performance Measurement Systems
PROCEDE – Program for the Certification of Ejido Land Rights and the Titling of Urban House Plots
PRODERs – Regional Programs for Sustainable Development
PROFAUNA – Proteccion of Mexican Wildlife
PROFEPA – Federal Prosecutor Office of the Protection of the Environment (Mexico)
PPs – Participatory Processes
PRT – Property Rights Theory
RAMSAR – Also known as RAMSAR Wetland Convention; named after the Iranian city of Ramseur
RSTKs – Regional Stakeholders
SAGARPA – Secretariat of Food, Agriculture, Animal Husbandry, Rural Development, and Fisheries
SARH – Secretariat of Agriculture and Hydraulic Resources
SEDESOL – Secretary for Social Development (Mexico)
SEMARNAP – Secretary of the Environment, Natural Resources and Fisheries (Mexico)
SEMARNAT – Secretary of the Environment and Natural Resources (Mexico)
SEDUE – Secretary of Urban Development and Ecology (Mexico)
SG – SAGARPA local offices
SGORD – State Government Rural Development Office
SJB – San José Babícora
SMART – Specific, Measurable, Achievable, Relevant, Time-based Objectives
SPSS – Statistical Package for Social Sciences
SRA – Secretariat of Agrarian Reform

SSA – S Secretary of Health and Assistance (SSA)
ST – Stakeholder Theory
STA – Stakeholder Analysis
TQM – Total Quality Management
TURFs – Territorial Use Rights in Fisheries
UACH – Autonomous University of Chihuahua
UMAs – Management Units for Wildlife Conservation

Vitae

JUAN C. GUZMAN-ARANDA
jguzmana2001@yahoo.com
Phone: (52) (614) 414-03-06 (Chihuahua, Mexico)

SUMMARY

- Training and work experience in: planning for conservation/resource management; design and development of biological inventories; identification and implementation of rural development projects, stakeholder management in biodiversity conservation, common property resource systems.

WORK EXPERIENCE

1. **At Virginia Tech (Since Spring 2001)**
   - Teaching assistant (i.e., wildlife field biology, wildlife habitat ecology and management, wildlife biology)
   - Research associate
   - Instructor (i.e., Introduction to Renewable Natural Resources)
2. **Research**
   - (April 2000 – January 2001) North America Wetlands Conservation Council, University of Chihuahua. Collaborator for the project development of performance measurement system for the evaluation of Babicora management plan.
   - (August 1995 – July 1997). Colegio de Postgraduados Campus San Luis Potosi. Research associate responsible for college-wide seminar series, and development of protocols for assessment of cultural values in rural communities.
   - (January 1992 – August 1993) Colegio de Postgraduados Campus San Luis Potosi Research assistant responsible for research projects on population ecology of lagomorphs (*Lepus spp* and *Sylvilagus spp*), and reproductive characterization of white-throated woodrat (*Neotoma albigula*).
3. **Steering committee member (voluntary)**
   - (May 2003 -) The Wild lands Project (US) and Naturalia (Mexico). At this stage I am currently drafting a proposal for human dimension study for the reintroduction of the Mexican wolf (*Canis lupus baileyi*) in Northern Mexico. Expected starting date July 2004.
   - (February 2002; September 2002) Commission for Environmental Cooperation, Montreal, Quebec. Participated in the development of the North American Grasslands Conservation Strategy released in June 2003
4. **Extension agent**
   - (July 1988 – January 1990; June 1991 – January 1992) Bank of Mexico. Extension agent for low income farmers and Mennonite colonies in Chiapas and Chihuahua, Mexico, respectively.

5. **Ecologist**

- (January – February, 1992; January – February 1993; March, 1994; February –March 1995). Colegio de Postgraduados Campus San Luis Potosi. Field assistant for the reintroduction of wild turkey (*Meleagris gallopavo* mexicana) into the natural protected area "Sierra Fría" in Aguascalientes, Mexico.

ACADEMIC RECORDS

1. **Doctoral Candidate in the Department of Fisheries and Wildlife Sciences at Virginia Tech** (expected graduation May 2004). Dissertation involves evaluation of conservation planning in Mexico, stakeholder management, analysis and involvement, and development of performance measures systems for collaborative conservation planning.
2. (August 1993 – July 1995) **Master of Science** Department of Fisheries and Wildlife Sciences at New Mexico State University. Thesis: Landowner wildlife conservation attitudes at Laguna de Babicora, Chihuahua, Mexico.
3. (August 1982 – June 1986) **Bachelor of Science in Animal Science,** University of Chihuahua, Mexico. Thesis: Effect of meat and bone meal on meat yield on broiler chickens.

HONORS/TRAININGS/WORKSHOPS (selected)

1. (April 2002) Certified instructor on the environmental education projects PLT (Project Learning Tree) and project WILD. Blacksburg, Virginia, USA.
2. (August 1997 – December 2000) Fulbright – CONACYT (National Council for Science and Technology – Mexico) scholarship for doctoral studies at Virginia Tech.
3. (August – November 1996) Trainee in the program *Rural Development with Environmental Conservation* offered by Japan International Cooperation Agency (JICA) in Tokyo, Japan.
4. (August 1993 – July 1995) Scholarship from CONACYT for graduate studies at New Mexico State University in Las Cruces, NM.
5. (January 1995) Trainee in the Planning for Natural Protected Areas workshop. Sponsored by the National Park Service, USA.
6. (August 1994) Training in leadership sponsored by the Leadership Center of the Americas, Latin American and Caribbean Center, Florida International University. Denver, Colorado, USA.

CONTRIBUTIONS

1. Co-editor of the Spanish summaries *in* Bissonette, J.A., and P.R. Krausman, eds. 1995. Integrating people and wildlife for a sustainable future. Proceedings of the first International Wildlife Management Congress. The Wildlife Society, Bethesda, Md. 697pp.
2. (June 1999) Liaison, translator and teaching assistant for the wildlife and habitat data analysis workshop taught by Dr. Dean Stauffer at the School of Animal Science of the Autonomous University of Chihuahua.

CONFERENCES/SYMPOSIUMS (selected)

1. (September 24-28th, 2002). The Wildlife Society Meeting: Bismarck, ND. Evaluation of conservation planning in Mexico: A stakeholder analysis approach.
2. (April 1997) Keynote speaker at the commemorative conferences for the XXV anniversary of the agriculture sciences school at the Autonomous University of San Luis Potosi. “Agriculture, rural development and water and soil conservation in Japan”

SKILLS

Bilingual (Spanish, English), writing of grant proposals for teaching and research, work experience with rural communities and stakeholder groups, trapping of small mammals and upland game birds, experience in the development and implementation of interviews and census, knowledge of computer software (World Wide Web, Word, Excel, NUD*IST, Power Point, basic knowledge of SPSS and SAS), and skills on flora and fauna inventories