

THE POLITICS OF MEXICAN WILDLIFE:  
CONSERVATION, DEVELOPMENT, AND THE INTERNATIONAL SYSTEM

By

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## KEY TO ABBREVIATIONS

ANGADI	Asociación Nacional de Ganaderos Diversificados/National Association of Diversified Livestockers
ATA	American Tunaboat Association
BANPESCA	Banco Nacional de Desarrollo Pesquero y Portuario/National Bank of Fisheries and Ports Development
BANRURAL	Banco Nacional de Crédito Rural/National Bank of Rural Credit
CANAINPES	Cámara Nacional de Industrias Pesqueras/Nacional Congress of Fishing Industries
CAP	Congreso Agrario Permanente/Permanent Agrarian Congress
CCC	Central Campesina Cardenista/Cardenist Peasant Confederation
CI	Conservation International
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species
CIOAC	Central Independiente de Obreros Agrícolas y Campesinas/Independent Confederation of Agricultural Workers and Peasants
CNC	Confederación Nacional Campesina/National Peasant Confederation
CNOP	Confederación Nacional de Organizaciones Populares/National Confederation of Popular Organizations
CNPA	Coordinadora Nacional Plan de Ayala/National Coordinating Committee "Plan de Ayala"
CTM	Confederación de Trabajadores de México/Confederation of Mexican Labor
CWS	Canadian Wildlife Service
DGCERN	Dirección General de Conservación Ecológica de Recursos Naturales/Directorate General of Ecological Conservation of Natural Resources
DUMAC	Ducks Unlimited of Mexico
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ETPO	Eastern Tropical Pacific Ocean
FAD	Fish Aggregating Device

FAOCIMEX	Federación de Organizadores Cinegéticos de México/Federation of Hunting Organizers of Mexico
FONAFE	Fondo Nacional de Fomento Ejidal/National Fund for Ejidal Development
FONATUR	Fondo Nacional para Turismo/National Tourism Fund
FDN	Frente Democrática Nacional/Nacional Democratic Front
GATT	General Agreement on Tariffs and Trade
GEF	Global Environment Facility
GETF	Global Environmental Trust Fund
IATTC	Inter-American Tropical Tuna Commission
IDB	Inter-American Development Bank
INAH	Instituto Nacional de Antropología e Historia
INH	Instituto de Historia Natural/Institute of Natural History
INI	Instituto Nacional Indigenista/National Indigenous Institute
INIREB	Instituto Nacional de Investigaciones Sobre Recursos Naturales/National Institute for Research on Natural Resources
INMECAFE	Instituto Mexicano del Café
IUCN	International Union for the Conservation of Nature
MDB	Multilateral Development Bank
NAFTA	North American Free Trade Agreement
NAWMP	North American Waterfowl Management Plan
NGO	Non-governmental Organization
NMFS	U.S. National Marine Fisheries Service
OLDEPESCA	Organización Latinoamericana para el Desarrollo Pesquero/Latin American Fisheries Organization
PEMEX	Petroleos Mexicanos/Mexican Petroleum
PGE	Pacto de Grupos Ecologistas/Pact of Environmental Groups
PRI	Partido Revolucionario Institucional/Institutional Revolutionary Party
PRD	Partido de la Revolución Democrática/Party of the Democratic Revolution
PROAFT	Programa de Acción Forestal Tropical/Tropical Forestry Action Program
PRONASOL	Programa Nacional de Solidaridad/National Solidarity Program
PROPEMEX	Productos Pesqueros Mexicanos/Mexican Fisheries Products
PROQUIVEMEX	Productos Químicos Vegetales de México/Plant Chemical Products of Mexico
SARH	Secretaría de Agricultura y Recursos Hidráulicos/Secretariat of Agriculture and Water Resources
SECTUR	Secretaría de Turismo/Secretariat of Tourism

SEDESO	Secretaría de Desarrollo Social/Secretariat of Social Development
SEDUE	Secretaría de Desarrollo Urbano y Ecología/Secretariat of Urban Development and Ecology
SEPESCA	Secretaría de Pesca/Secretariat of Fisheries
TABAMEX	Tabacos Mexicanos/Mexican Tobacco Institute
TED	Turtle Excluder Device
TNC	The Nature Conservancy
UGOCM	Unión General de Obreros y Campesinos de México/General Union of Workers and Peasants of Mexico
UNAM	Universidad Nacional Autónoma de México/Nacional Autonomous University of Mexico
UNCED	United Nations Conference on Environment and Development
UNORCA	Unión Nacional de Organizaciones Regionales Campesinas Autónomas/National Union of Regional Peasant Organizations
USAID	United States Agency for International Development
USFWS	United States Fish and Wildlife Service
WHPN	Wildlands and Human Needs Program
WWF	World Wide Fund for Nature
WWF-US	World Wildlife Fund-United States

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Conflicts between wildlife conservation and rural welfare in developing societies are explored from a political and policy perspective. Unsustainable use of wildlife resources is generally described as a "tragedy of the commons" fed by population growth and technological modernization and left unaddressed by developing-country states with small budgets and weak regulatory capacity. Proposed solutions typically include the provision of external financial and technical assistance and the intervention of outside catalysts such as nongovernmental or international organizations. Both problem definitions and policy proposals are reexamined in this study of wildlife use and conservation in Mexico. Available evidence is assembled to explore both the causes of resource degradation and the consequences of domestic and international conservation policies. These assessments are supplemented

by case studies on subsistence and sport hunting, rainforest conservation and ecotourism, and sea turtle and dolphin conservation.

The experience of wildlife management and conservation in Mexico injects a cautionary note against dominant policy prescriptions and methods of implementation. Underlying the destruction of Mexico's wildlife resources are complex political and economic structures generating unequal access to and benefits from wildlife and other natural resources, to the detriment of the rural poor who are most dependent on them. Despite widespread rhetorical commitments to the goals of "sustainable development," domestic and external conservation programs continue to ignore the problems of rural wildlife users. International cooperation thus perpetuates rather than addresses the root causes of resource degradation, while external assistance merely increases state capacity to pursue inappropriate management strategies. Increased international cooperation adds an external dimension to distributional problems by reflecting the needs and goals of economic as well as conservation interests in developed countries. Global environmentalism thus offers uncertain benefits for both wildlife and resource users in Mexico and other developing countries.

PART I  
THE GLOBAL SETTING: CONSERVATION AND DEVELOPMENT IN  
THEORY AND PRACTICE

## CHAPTER 1 INTRODUCTION

Mexico is a nation of some 81 million inhabitants, one third of whom live in rural areas.<sup>1</sup> Despite rapid postwar economic growth, Mexico's population still suffers from illiteracy rates of 12.7%, infant mortality of 41.3 per 1000, and one of the highest levels of income inequality in the world.<sup>2</sup> The debt crisis of the 1980s stalled this growth and further eroded the position of Mexico's poor as rural incomes declined and income inequality increased.

Mexico also possesses enormous biological wealth in the form of wild animal and plant species. Identified as one of the world's "megadiversity" countries, Mexico hosts 961 species of birds, 449 species of mammals, 717 species of reptiles, and 282 species of amphibians, as well as an estimated 25,000 plant species. Some 32% of these vertebrates and 14% of plants are endemic to Mexico.<sup>3</sup> Of these, 123 species of birds, 32 species of mammals, 35 species of reptiles, and 4 species of amphibians are considered threatened or endangered by international laws and organizations.<sup>4</sup> Mexico's own list of threatened, endangered, and specially protected species and subspecies

includes 64 mammals, 101 birds, 65 reptiles, and 19 amphibians.<sup>5</sup>

Mexico's economic crisis corresponded with an upsurge of global interest in conserving this biological wealth in Mexico as well as other developing nations. Efforts were made to strengthen existing international agreements to protect endangered, threatened, and migratory species, and a new Biodiversity Convention was signed at the 1992 United Nations Conference on Environment and Development. The special requirements of developing countries were recognized by greater emphasis on human needs and development and increased flows of financial and technical assistance from bilateral agencies and multilateral institutions such as the World Bank and the new Global Environment Facility it administers. A growing number of nonprofit organizations initiated their own conservation measures and lobbied governments and international institutions for policy changes to enhance natural resource conservation.

How does a developing country such as Mexico respond to these events, and what are the implications for conservation and development? For the social scientist, these questions can be posed at several levels of analysis. At the international level, outcomes may be viewed as the result of conflict and bargaining among sovereign nations distinguished by disparate interests, capacities, and influence. Differences among national policies, approaches,

and bargaining positions may be sought in the interplay of domestic interests and policy goals, including potential trade-offs between environment and development. A deeper examination into domestic societies, cultures, economies, and political systems is required in order to understand the formation of these interests and their relative weight in policy-making, as well as the domestic results of national and international environmental policies.

This study seeks to understand developing-country responses to the conservation movement by exploring all three levels of collective decision making and the interactions among them. At the heart of the inquiry are the rural poor whose needs and aspirations are central to contemporary definitions of development and whose livelihoods are increasingly impacted by efforts to conserve biological resources. What relevance do current conservation policies have for the human populations who stand to lose so much if they fail? Answering this question demands an understanding of the meaning of wildlife to its users and its role in economic and survival strategies; the economic and political dynamics underlying patterns of resource use and depletion; and the extent to which the needs of rural resource users are represented in national and international decisions concerning wildlife exploitation and conservation.

### Wildlife and Biological Diversity

Biological diversity (or biodiversity) refers to "all species of plants, animals, and microorganisms and the ecosystems and ecological processes of which they are parts."<sup>6</sup> It has increasingly replaced the term "wildlife," reflecting the recognition that the preservation of individual species is insufficient as well as inefficient. The conservation of biological diversity requires that biologically rich habitats and ecosystems be identified and their various functions and components, big and small, be preserved and maintained.

The present approach takes what some may consider a step backward, to a focus on those species, mostly animal, that are directly exploited by humans and that were formerly referred to by the term "wildlife." The term "wildlife" helps to bring into clearer focus not only the human relationships involved in resource use and conservation, but also the fact that attempts to address biodiversity loss often leave unsolved the conceptually simpler problems of "wildlife" conservation.

Direct human exploitation is second only to habitat degradation as a cause of species loss, but the former has received most of our attention, typically in the form of parks, reserves, and other protected areas. That protecting ecosystems is also insufficient was suggested by a 1985 survey of 98 parks that found that the most frequently

reported threat to protected areas was the illegal removal of animal life, which affected 76% of the parks surveyed.<sup>7</sup> A growing body of research in the neotropics also suggests that the maintenance of intact ecosystems is not necessarily an indication of intact fauna, which may be virtually extinguished by hunting.<sup>8</sup> In Mexico, some 102 of the species internationally recognized as endangered or threatened are currently exploited for subsistence, domestic and foreign markets, and recreational hunting, while 79% of domestically protected species are so exploited.<sup>9</sup>

#### The Goal of Sustainable Development

The problem of species preservation has historically been viewed as a scientific one. Biologists and ecologists have been called upon to define the key habitats and ecosystems deserving of protection, assess offtake levels for stocks of economically useful species, and develop captive breeding programs and other last-ditch rescue efforts for those species on the verge of disappearing. The human dimensions of species conservation have been increasingly recognized, however, due in large part to a growing focus on conservation problems in the developing world, where traditional conservation measures often clash with and founder on the needs and survival strategies of the rural poor.

Recognition of the human dimensions of conservation was forcefully expressed in the 1972 United Nations

Conference on Environment and Development<sup>10</sup> and was boosted to worldwide attention with the Brundtland Commission Report of 1987, which attacked poverty and inequality as the root causes of environmental degradation.<sup>11</sup> Sustainable development, vaguely defined as "development that meets the needs and aspirations of the present without compromising the ability of future generations to meet their own needs,"<sup>12</sup> was offered as an alternative to poverty and ecological destruction.

The concepts of sustainable resource use and sustainable development have increasingly informed the formal policy goals of national governments, nongovernmental environmental organizations, and international funding and lending institutions.<sup>13</sup> In 1992, these goals and strategies were incorporated into the international Convention on Biological Diversity signed at the United Nations Conference on Environment and Development. They have yet, however, to be fully implemented. The problem is a lack of consensus on what sustainability means in practice, how to "do" sustainable development, how to pursue sustainable use and the preservation of species and ecosystems simultaneously, and whether sustainable use is even a realistic aim.<sup>14</sup> Not only do the scientific and economic referents of sustainable development remain to be established, but we have also barely begun to recognize the difficulty of achieving necessary changes in individual and

collective human behavior.<sup>15</sup> It is the latter dimension of resource use and development that concerns us here.

#### A Framework for Analysis

It is now recognized that development failures are often environmental failures as well and that the unequal distribution and allocation of natural resources underlie both. A growing literature on natural resource use in developing countries has begun to trace the causal relationships among government policies that determine ownership and access to natural resources, persistent poverty and income inequality, and unfettered destruction of soils, forests, fisheries, and wildlife.<sup>16</sup> The rural poor repeatedly emerge as the losers and victims of development policy, natural resource exploitation, and resource degradation.

While the policy sciences have contributed significantly to an understanding of the causes of underdevelopment and natural resource degradation, they have been relatively silent on the emergence and consequences of conservation policies in developing countries. This silence is partly explained by the relatively short history of conservation efforts in the developing world, which makes meaningful policy evaluation difficult to achieve. Critical evaluation is also hindered by a tendency to view these efforts as positive first steps rather than examining their relationship to past policies. However, the need for more

critical evaluation is suggested practically and theoretically by the increasing commitment of nongovernmental organizations, national governments, and international institutions to sustainable resource development, and the as yet unclear relationships of these efforts to rural livelihoods and welfare.

The following chapters undertake a broad examination of the social and economic foundations, legal and political context, and consequences of wildlife resource use and conservation. This approach defies easy categorization, because it draws from and is influenced by the academic fields of anthropology, economics, and ecology as well as political science. It incorporates policy analysis, which describes and explains the ways in which policies are formulated and carried out by governments, the performance of the institutions charged with implementation, the degree to which policy goals are achieved, and the consequences for society. But an emphasis on relationships among political institutions, domestic and international social and economic structures, and the natural environment reflects adaptations of the political economy approach within political science and the political ecology approach developed by anthropologists.<sup>17</sup>

The tensions among local survival needs, national development priorities, international constraints, and conservation demands that form the the subject of this study

are best viewed from the perspective of the nation. The country study represents a middle ground between the community-based anthropological research that has contributed the raw material on which our knowledge of local resource use is based and the global studies pursued by students of international conflict and cooperation. It permits analysis of external pressures and domestic policy to be combined with area and species case studies that capture relationships among local needs, policy demands, and international context.

Mexico offers an excellent setting in which to examine these issues. Not only do its position in the neotropical realm and longitudinal extension make it one of the world's ten "megadiversity" countries, but its extreme cultural diversity also generates a wide range of human relationships to these species. Despite its historical commitment to national autonomy, its recent diplomatic and economic opening to the international system has greatly accelerated Mexico's participation in international environmental diplomacy and funding mechanisms. A focus on the local, national, and international dynamics of this process permits an examination of their effects on national policies and local responses. Many of the study's findings and conclusions will be peculiar to Mexico, but many others are likely to be widely applicable.

Plan of the Chapters

The rest of the chapters in Part I establish a broad theoretical and practical context for the examination of wildlife use, management policy, and conservation in Mexico. Chapter 2 draws together and synthesizes several concepts and theories that have informed the study of natural resource management. Because the study attempts to link successive levels of analysis, the issues addressed range from community development to international cooperation. As many readers will be unfamiliar with the specific subject of wildlife use and conservation, Chapter 3 applies these concepts and theories to wildlife exploitation in a variety of ecological and political settings.

Part II begins the country study with an overview of natural resources and development in Mexico. Chapter 4 examines the distributional, ecological, and political implications of Mexico's successive stages of economic growth and development. Chapter 5 introduces the subject of wildlife use in Mexico and reviews its relationship to broader patterns of agricultural, fisheries, and forestry development. These relationships are further explored in Chapters 6 through 8 in regional case studies on subsistence hunting, sport hunting, and wildlife-based tourism.

Part III examines how these relationships affect natural resource decision-making in the public realm. Chapter 9 traces the history of environmental and natural

resource policy in Mexico, the role of domestic interests in policymaking, and the outcomes of public agencies' efforts to balance the demands of resource users and environmentalists. Chapter 10 explores the shifts in interests and policies that result when external interests and funding are added to policy formulation and implementation. In Chapters 11 through 13, the political, economic, and ecological implications of international conservation initiatives are explored further in case studies on the conservation of rainforests, sea turtles, and dolphins. Chapter 14 ends with a brief summary and conclusions.

#### Notes

1. Instituto Nacional de Estadística, Geografía e Informática, Anuario Estadístico de los Estados Unidos Mexicanos, 1988-1989 (Mexico, D.F.: INEGI, 1991), 226.

2. United Nations, Statistical Yearbook for Latin America and the Caribbean, 1991, 26, 45, 54.

3. Conservation International and Instituto Nacional de Investigaciones Sobre Recursos Bióticos, Mexico's Living Endowment: An Overview of Biological Diversity (Mexico, D.F.: Conservation International and Instituto Nacional de Investigaciones Sobre Recursos Bióticos, 1989), 11-12; Jeffrey A. McNeely et al., Conserving the World's Biological Diversity (Washington, D.C.: IUCN, World Resources Institute, Conservation International, WWF-US, and The World Bank, 1990), 88-89.

4. These species have been identified by the International Union for the Conservation of Nature and Natural Resources (IUCN), Convention on International Trade in Endangered Species of Fauna and Flora (CITES), or the U.S. Endangered Species Act. Oscar Flores Villela and Patricia Gerez, Conservación en México: Síntesis Sobre Vertebrados Terrestres, Vegetación y Uso del Suelo (Mexico, D.F.:

Conservation International and Instituto Nacional de Investigaciones Sobre Recursos Bióticos, 1988), 11.

5. Acuerdo por el que se Establecen los Criterios Ecológicos CT-CERN-001-91 que Determinan las Especies Raras, Amenazadas, en Peligro de Extinción o Sujetas a Protección Especial y sus Endemismos, de la Flora y la Fauna Terrestres y Acuáticas en la República Mexicana (Diario Oficial, 17 May 1991).

6. McNeely et al., Conserving the World's Biological Diversity, 17.

7. Gary E. Machlis and David L. Tichnell, The State of the World's Parks (Boulder: Westview Press, 1985), 56.

8. Kent H. Redford, "The Empty Forest," BioScience 42, no. 6 (June 1992): 412-422. The ecological consequences of faunal depletion are considerable. Even the removal of a few top predator species can have an enormous impact on ecosystem structure and functions through the impact on prey species, which in turn affect seed dispersal and plant growth and distribution. The effects of human predation are much more complex, however, because hunting also affects these prey species directly. See John Terborgh, "The Big Things that Run the World--A Sequel to E. O. Wilson," Conservation Biology 2, no. 4 (December 1988): 402-403; Rodolfo Dirzo and Alvaro Miranda, "Contemporary Neotropical Defaunation and Forest Structure, Function, and Diversity--A Sequel to John Terborgh," Conservation Biology 4, no. 4 (December 1990): 444-447.

9. These figures are derived from the author's calculations based on available information, and probably represent only lower thresholds. The 102 exploited species recognized internationally as endangered and threatened include 24 mammals, 53 birds, 23 reptiles, and 2 amphibians. Exploited species and subspecies on Mexico's protected lists include 31 mammals, 35 birds, 38 reptiles, and 5 amphibians.

10. The role of the 1972 conference in the development of the international environmental movement is discussed in Lynton Caldwell, International Environmental Policy (Durham: Duke University Press, 1984).

11. World Commission on Environment and Development, Our Common Future (New York: Oxford University Press, 1987).

12. World Commission on Environment and Development, Our Common Future, 43.

13. See, for example, Jeffrey A. McNeely et al., Conserving the World's Biodiversity: Global Biodiversity Strategy (Washington, D.C.: World Resources Institute, IUCN, and UNEP, 1992).
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CHAPTER 2  
COMMONS AND COMMONERS: THEORIES OF NATURAL RESOURCE USE,  
CONSERVATION, AND DEVELOPMENT

Introduction

Any discussion of wildlife use, management and conservation must recognize that wildlife is, in most cases, a common pool resource for which clear property rights and allocation rules do not exist or have proven difficult to enforce. Wild animal species often move freely across property and jurisdictional boundaries, making management by one individual, group, or nation difficult or impossible. In both developed and developing nations, wildlife may be most important to indigenous or traditional cultures in which communal land tenure still predominates, or most abundant on undeveloped public lands. Competition among subsistence, commercial, and sport hunters contributes to resource depletion and creates or aggravates tensions among user groups. The rise of public interest conservation groups and the declaration of biodiversity as a global commons represent the broadening of the field of concerned interests and management considerations.

Equitable allocation and sustainable exploitation of wildlife resources thus demand rules, agreements,

institutions, or other mechanisms that permit cooperation and collective action among individual resource users, among distinct groups of users, and between users and management authorities. These rules, agreements, and institutions are increasingly provided by the state in the interests of conservation, conflict resolution, or economic development. State intervention is now also mandated by a growing network of international agreements and institutions designed to mediate transboundary conflicts affecting oceans, atmosphere, and biological and mineral resources.

The management of collective resources is, however, a complex and demanding task even among small groups and becomes more so as the area and the numbers of participants and interests increase. As management authority moves from local and regional levels to include national and international agencies, consistency with individual and local needs and limitations also becomes more difficult to achieve. The expansion of the decision-making arena often leads to the declaration of rules that are neither accepted and obeyed by those who exploit the resource nor enforceable by states with limited financial and human resources.

The present chapter explores the factors affecting multi-level cooperation and collective action to allocate and conserve biological resources. Two assumptions underlie the discussion. First, the role of the state in resource management is a persistent and necessary fact that must be

incorporated into any analysis of resource management problems as well as solutions. Second, problems of resource allocation, use, and conservation will only be successfully resolved by rules and institutions that are informed by the requirements of resource users or designed and implemented with their participation. The principal analytical issues to be addressed are therefore the determinants of and relationships among individual, collective, and state decisions regarding natural resource management.

Unfortunately, disciplinary and theoretical specialization within the field of natural resource management has produced distinct concepts and theories at each level of analysis, preventing communication across levels. Interaction among processes at the local, state, and international levels has often been ignored or merely assumed. The present chapter therefore undertakes to draw from several bodies of literature to construct a coherent approach to the problems of multi-level management of common resources. The analysis also attempts to relate social science theory to the growing literature on biodiversity conservation, and particular attention is paid to those contextual factors likely to influence attempts at natural resource management in developing countries.

#### The Tragedy of the Commons

For more than two decades, the "tragedy of the commons" has served as the dominant paradigm in social

science explanations for resource conflict and degradation. The tragedy of the commons scenario posits that in a world of finite resources and growing population, the absence of well-defined property and use rights to shared resources such as grazing lands or fisheries leads to a "use it or lose it" mentality in which the resource must be exploited rapidly before it is appropriated by others.<sup>1</sup> The result is competitive exploitation, resource degradation, and consequent welfare losses for all resource users.<sup>2</sup>

The tragedy of the commons scenario represents an extension of the economic metaphor of the market, in which collective outcomes are determined by the independent decisions of rational, self-interested individuals pursuing private value maximization. Individual self-restraint in the exploitation of collective resources is considered inconsistent with this metaphor because while the individual pays the entire cost of her self-restraint, the benefits of her actions are distributed among all resource users. Nor are agreements for collective self-constraint likely to be undertaken, since resource users are aware of the incentive to cheat and fear being made a "sucker" by noncooperating individuals. This inexorable dynamic of the commons is reinforced by a number of additional assumptions, namely that communication to assess the trustworthiness of other individuals does not occur and that resource users are unfettered by cultural, social, institutional, or political

constraints. The tragedy scenario thus posits only two potential solutions to the tragedy of the commons: privatization or government intervention.<sup>3</sup>

The assumptions of the tragedy of the commons have been effectively challenged on a number of grounds, however. A growing literature on common property resource (CPR) management suggests that the tragedy scenario is based on confused terminology and inadequate understandings of human behavior. It ignores both the empirical reality of collective resource management and the cultural, social, and political underpinnings of property rights.

To begin with, the CPR literature distinguishes property owned in common from property owned by no one.<sup>4</sup> The former may be subject to the definition of access and use rights as well as user responsibility, while the latter may suffer from the open access described by the tragedy of the commons. The importance of this distinction becomes clearer when it is remembered that what is termed "private property" is frequently owned by more than one individual (e.g., a family or a corporation).

Common property theorists have provided extensive empirical as well as theoretical justification for recognizing possibilities for collective resource management.<sup>5</sup> Anthropologists, political scientists, and even economists have provided numerous case studies in which communities and societies have developed, enforced, and

obeyed mutually agreed upon rules of behavior for the sustained and equitable use of shared natural resources and the avoidance of conflict.<sup>6</sup> Cases of successful collective management are not confined to "primitive" production systems in areas with low population and high resource density, but are drawn from a broad spectrum of resources and contexts in both developed and developing countries.<sup>7</sup>

The debate over common versus private property also obscures the fact that alternatives to collective resource management may not be readily available. Privatization of water resources or migratory animals, for example, may be difficult or impossible due to the characteristics of the resource itself. In other cases, resources may be owned and managed in common because their low yields or unit values do not generate the economic surplus needed to maintain private property rights. Indeed, common property is often associated with low-income rural areas, not because it is a cause of poverty, but because it is an appropriate adaptation to the low rates of return characteristic of those resources available to the rural poor.<sup>8</sup>

Although successful common property regimes abound, the perception that they are less able than private property to balance resource demands and availability is not entirely unfounded. The explanation, however, lies less in the type of property regime than in the economic, social, and political context in which it operates. As one writer

notes, "Private-property regimes appear to be stable and adaptive because they have the social and legal sanction to exclude people--to slough off excess population."<sup>9</sup> The commons are often the domain of the disadvantaged, the excluded, the "sloughed-off." The latter must not only accommodate internal population growth and socioeconomic change on the shrinking commons, but also face the arrival of those displaced from other areas. One might expect that their ability to adapt to and withstand these changes is negatively affected by the economic and political marginality that determines their status as commoners.

The link between common property and rural poverty has led a number of theorists to argue the need to maintain, develop, or restore common property arrangements on the grounds of equitable economic development and social justice. Case studies have repeatedly identified the desirability of common management for resources characterized by low and variable productivity, low possibilities for improving or intensifying yield, or high geographic dispersion or mobility, which are often divided only with great difficulty and can be utilized more efficiently and equitably under communal management.<sup>10</sup> Even when the creation of private fishing grounds, grazing lands, or forest plots is physically feasible, the uneven spatial or temporal distribution of resources is likely to lead to their uneven allocation to resource users.<sup>11</sup> This

is precisely the situation avoided by collective rules and agreements that, for example, evenly distribute access to areas of resource concentration or permit rotating access to different locations at different times.<sup>12</sup>

The CPR literature suggests that the tragedy of the commons is not inevitable, is not the direct consequence of communal ownership, and is not necessarily resolved either by privatization or government intervention. Possibilities for successful resource management under any property regime--whether private, collective, or public--are determined by a variety of economic, social, political, and institutional factors that determine access and decision-making rules and the distribution of costs and benefits. If successful resource management is defined to include improving the welfare of the poorest, the maintenance, restoration, or improvement of collective management merit particular attention. The following sections review contemporary threats to the commons and possibilities for appropriate social intervention for their protection.

#### Sustaining the Commons

Perhaps the most fundamental requirement for the successful management of common pool resources is that agreements and institutions for their allocation and use achieve a close fit with both local environmental conditions and the social and economic constraints facing users. One of the most important contributions of the common property

literature is in fact its illustration of the enormous variety of rules, institutions, and enforcement mechanisms adopted to fit different ecological and human environments. This condition provides one of the most important arguments for local participation in collective resource management. In reality, however, government agencies unfamiliar with such local variations tend to declare uniform regulations which undermine local authority but prove ineffective against local constraints.<sup>13</sup>

Two factors of particular relevance to rural resource management are the degree of dispersion, reliability, and predictability of the resource and its role in household or community economies. Rules for allocation and use tend to be more rigid when a single resource is stationary, is confined to a relatively manageable area, and provides consistently high yields.<sup>14</sup> For example, the spatial dispersion of many tropical resources increases the difficulty of allocation and monitoring, while the low resource yields available to the rural poor may render any limits on exploitation unfeasible, a condition frequently reinforced by the low market values obtained for extractive resources. Collective management arrangements are also more likely to emerge when the resource is of central importance than when it is only one of a large number of goods that, taken individually, contribute little to economic well-being. The latter affects rural economies in many

biologically rich areas of the developing world that are based on diversified extraction.<sup>15</sup> Extraction of wild plant and animal species may also complement more central agricultural, forestry, or fishery activities that, although insufficient to meet all household needs, place greater demands on time and effort, thus limiting ability and willingness to actively manage wild resources.<sup>16</sup>

Common property theorists also point to the importance of social capital in resource management. Many of the empirical studies of common property resources have focused on small, isolated communities in which long-term coexistence has allowed the development of high levels of interpersonal communication and trust that facilitate collective arrangements for resource use. Similar considerations have led environmentalists to emphasize the potential role of indigenous communities in natural resource conservation. Most observers, however, have been forced to acknowledge that rapid socioeconomic change, population movement, and ethnic, political, or socioeconomic conflicts threaten many existing common property regimes. In developing countries in particular, rural areas are increasingly characterized by new settlement, population growth, and land conversion, leading to increased demand on a reduced resource base. Existing communities may be unable to respond effectively to the simultaneous emergence of several new threats to their resource base, especially when

doing so means bargaining and resource allocation by new and hostile user groups in the absence of established forums.

If more primordial forms of social capital are weakening, a growing literature on institutional development has pointed to the susceptibility of social relations to intentional manipulation. Interpersonal trust, reliable communication, and effective monitoring and enforcement can be strengthened through collective management regimes that involve full participation in the creation and modification of agreements, provisions for continual monitoring, and the establishment of mechanisms for dispute resolution. Sanctions ranging from social disapproval to denial of access to the resource help to ensure that collective rules are obeyed, if not universally, then at least with sufficient regularity to maintain collective benefits.<sup>17</sup>

Existing institutions also represent a form of social capital that lowers the barriers to collective management. Existing forums for decision-making and conflict resolution may either be exploited for new purposes, serve as models, or otherwise provide experience for the creation of new mechanisms. The incremental demands of rule-making and institution-building thus tend to decrease over time. Furthermore, progressively easier tasks of modifying or adding to existing institutions may also permit collective self-management on a larger scale if existing forums for decision-making or conflict resolution can be incorporated

into layers of institutions at increasingly higher levels. For example, local and regional governmental or judicial bodies can be used as forums for communication and decision-making or these and other institutions can be used to establish allocation and decision rules among competing user groups of a shared resource.<sup>18</sup>

### The Question of the State

The social capital accumulated in institutions of the state raises another set of important questions about the survival of the commons. In theory, this stock of social capital may provide critical support to the management and conflict-avoidance tasks of resource users. In practice, state institutions have been extensively criticized by CPR theorists. Indeed, if CPR theorists have resisted privatization of the commons, they have also accused the state of being a critical agent in their destruction. Specifically, the state is charged with failing to recognize collective property and use rights and management institutions, encouraging private appropriation of communal resources, and declaring management authority over resources traditionally managed collectively, and thereby encouraging overexploitation of what becomes an open access resource.<sup>19</sup>

Efforts to create and maintain effective mechanisms for natural resource management are generally hindered by selective bias in state allocation of access, use rights, and rights of participation in resource use decisions

against those already disadvantaged in a variety of other ways. One persistent source of bias is introduced by real or perceived differences in management capacity of underprivileged and especially collective resource users relative to private and more highly capitalized owners of land or other resources. In developing countries in particular, it is likely that resource users will have to deal with highly centralized, often inefficient, and sometimes corrupt governments. In these situations, attempts to modify centralized rules and to create or maintain CPR arrangements are frequently undermined by the difficulty or cost of persuading authorities to permit collective action or rule changes, which again acts selectively against the underprivileged. Privileged or elite resource users, on the other hand, may use bribery or influence to gain special use rights, to persuade authorities to alter existing rules or institutions, or even to block similar requests by competing user groups.<sup>20</sup>

Furthermore, modification of existing rules is a lengthy and difficult process that introduces a further source of distributional bias. User groups may pressure for regulatory flexibility in order to allow space for effective self-management, but such activities are by nature more likely to be undertaken by those with above-average access to economic resources, education, and political skills. In developing countries, and particularly in rural areas, the

state also typically fails to provide alternate forums or institutions for dispute resolution, or the cost of using them (i.e., travelling to the capital) may be prohibitive. Such forums may also be highly biased in favor of user groups represented by dominant social classes and thus fail to provide a means of equitable allocation and adjudication. This selective basis for participation has contributed mightily to the fact that collective management institutions have been most effective either among isolated and marginalized resource users or among large, highly capitalized individuals and entities.

The critique of the state has focused on developing countries, where state-led development efforts allow state incursions on the commons to be witnessed firsthand. Many examples, from developed as well as developing countries, have been provided from the area of fisheries management, where government license and permit systems are often biased in favor of large-scale commercial operations and result in the exclusion of traditional resource users. Even in access systems designed to favor traditional users, both local institutions and government regulations are frequently undermined by the ability of more powerful interests to obtain selective government benefits.<sup>21</sup>

State intervention may also discourage local initiative by creating expectations that problems will be resolved by someone else. Rapid policy changes in response

to political rather than resource or user needs may add to this problem if users fear that local management efforts may soon be overridden. Resource users may respond with what they perceive as competitive exploitation not against each other, but against the state.<sup>22</sup>

Another problematic dimension of state management is the tendency to adopt uniform rules for allocation, extraction, and decision-making with which compliance by users in highly varied surroundings may be difficult or impossible. This is in part the result of the low information availability and weak regulatory capacity facing developing countries in particular. Even where far-sighted and flexible legislation and regulation exist, lack of budgetary and personnel resources for implementation may prevent their being carried out. When the resulting management vacuum leads to evident resource crises, the simplest solution is often to prohibit exploitation absolutely, but again with little likelihood either of voluntary compliance or of adequate state enforcement.

Yet the state is also increasingly called upon to correct the resulting problem of competitive resource overexploitation. At a minimum, state involvement is expected to be helpful or even necessary to the provision of technical assessments and standards beyond the capacity of local residents, forums for communication and negotiation among hostile or geographically dispersed groups of resource

users, and assistance in enforcement among such distinct user groups. The technical capacity and wider institutional authority of local or other government agencies may be particularly useful in managing rangelands, wildlife, and other resources that are unpredictable and that tend to be exploited by ill-defined user groups.<sup>23</sup>

Government court systems, enforcement mechanisms, and technical information may even support the creation of local management systems without undercutting the decision-making and management authority of user groups. One analyst concludes that

individuals who are not able to supply new rules in an indifferent setting may succeed in adopting new rules under a political regime that allows substantial local autonomy, invests in enforcement agencies, and provides generalized institutional-choice and conflict-resolution arenas. In other words, regional and national governments can play a positive role in providing facilities to enhance the ability of local appropriators to engage in effective institutional design.<sup>24</sup>

When properly designed and implemented, government intervention to control access may prove effective, especially if resource users are free to design their own informal, supplementary systems of regulation and conflict-avoidance. For example, the state may establish overall quotas for the exploitation of fisheries, wildlife, or plant species, but allow these quotas to be distributed and enforced by regional and local organizations according to local rules.<sup>25</sup> Institution-building may even be encouraged

by selectively granting access rights and management authority according to the institutional capacity and management effectiveness of individual user groups, although in the absence of efforts to equalize management capacity such policy may simply reinforce existing distributional biases. State intervention may also inadvertently stimulate more effective resource management if resource users fear the imposition of government regulations that are less likely to conform to user needs and interests.<sup>26</sup>

Designing effective modes of state intervention thus adds another layer of complexity, and another space for design failure, in the development of rules and institutions for the management of common resources. It also raises the question of when, why, and how the state may act to facilitate the participation of resource users in management and conservation. In many settings, this question poses a practical and theoretical dilemma, for decentralized, efficient, and equitable management is being demanded of a political system characterized by centralization, inequitable representation and distribution, and limited budgetary and personnel capacity for resource management.<sup>27</sup>

#### The Role of External Catalysts

In the field of environmental protection and natural resource conservation, the answer to the dilemma of state intervention is assumed to be provided by a number of external catalysts operating at the local, national, and

international levels. These catalysts may take the form of private organizations concerned with environment and development, individuals and institutions involved in scientific and policy research, foreign governments or United Nations agencies providing external technical assistance and community development programs, or associations formed of or by these actors. Their activities may include working directly with resource users to encourage sustainable management; providing information, funding, personnel, or policy models to government agencies; and sponsoring the creation of local, national, and international institutions for the environment, natural resources, and development.

Analysis of the role of external catalysts is typically conducted within the field of development administration, which has recently undergone a profound shift as a result of the past inability of technical assistance and community development programs to achieve lasting results in Third World countrysides.<sup>28</sup> Indeed, it is increasingly recognized that the shortcomings of external assistance stem in part from neglect and weakening of existing institutions for common property management.<sup>29</sup> The growing emphasis of development studies on local participation in planning, implementation, and evaluation; incorporation of existing local institutions in project design and implementation; and long term, incremental

development of goals and strategies, is in many ways consonant with the findings of CPR analysis.<sup>30</sup>

The field's shift to "people-centered development" is relevant not only to community resource management, but also to broader issues of collective institution building and national development. For example, local institutions may include not only arrangements for the allocation of shared resources or to pressure government agencies for needed rule changes, but also organizations such as associations of private producers to aggregate market power and leverage for increased producer prices, or revolving credit mechanisms or community storage systems to help reduce producer risks. Such mechanisms, if successful, may contribute in turn to sustainable resource management by increasing local revenues and reducing the likelihood that periods of crisis or of economic stress will lead to widespread cheating against existing rules. They also form part of a cumulative process of learning, confidence building, and institutional refinement that reduces the incremental costs of adding or modifying rules and institutions.<sup>31</sup>

Another important potential contribution of external intervention is the improvement of relationships between communities and government authorities in cases where collective management has not developed or has already broken down. In this context, the catalyst may be able to serve as an arbitrator, persuading officials to undertake

and maintain necessary rule changes; provide or attract necessary capital; or demonstrate the effectiveness of community management to skeptical officials.<sup>32</sup>

Increased emphasis on small-scale projects, local participation, and flexibility has also led to increased interest in the potential role of nongovernmental organizations as catalysts for community development. Nongovernmental organizations (NGOs) may be limited by fewer bureaucratic constraints than their governmental counterparts, and often espouse local autonomy and self help as an organizational philosophy.<sup>33</sup> They also represent a significant source of development funding, in part due to their growing role as distributors of government aid. Developed-country NGOs now channel some \$6.4 billion annually to the developing world, and have been increasingly important actors in implementing community development programs, providing public education, funding social and scientific research, lobbying decisionmakers, and even collaborating in the design, funding, and implementation of national and international programs.<sup>34</sup>

Environmental NGOs have also become important actors in funding research, training, and public education; designing policy models; and lobbying for governmental and intergovernmental action on behalf of natural resources and the environment. Increased awareness of the linkage between human needs and resource degradation has also encouraged

them to assume a direct role in community development and institution building and to act as intermediaries between resource users and government agencies.<sup>35</sup> These organizations also frequently attempt to enhance state regulatory capacity by providing information and funding for governmental policies and assisting in implementation.

Little systematic effort has been made, however, to assess whether NGOs or other external catalysts in fact perform better than their governmental counterparts. General criticisms of NGO performance have included weak technical, professional, planning, and managerial skills; failure to reach the very poor; top-down and nonparticipatory implementation of local projects; and lack of accountability to target populations, governments, or external evaluators.<sup>36</sup> Growing collaboration with official assistance agencies has also raised charges that NGO programs increasingly reflect the country and strategy orientations of their funding sources.<sup>37</sup> The impact of increasing NGO activity at the community and state levels therefore deserves more careful examination.

#### International Cooperation

As concern mounts over the status of global ecological processes, states have been called upon to provide various mechanisms--increased financial and technical transfers, international agreements and institutions, and ecological education--needed to assure that national and local

conditions are conducive to sustainable resource use. International agreements and institutions such as the Biodiversity Convention, the International Tropical Timber Organization, and the Global Environment Facility have been supported by policy and procedural reforms within the World Bank and bilateral assistance agencies, and by increased information flows facilitated primarily by a number of United Nations networks. Because no international mechanism exists to enforce environmental standards, agreements, and treaties, the environmental community has also pressured for bilateral and multilateral sanctions, often trade-related, against nations that fail to comply with norms and standards of environmental and natural resource protection. These institutions, agreements, and enforcement mechanisms have in turn become catalysts in their own right. Increased reliance on international cooperation as a catalyst to appropriate state and local policy has not, however, been accompanied by careful analysis of the relationship between international mechanisms and individual and collective resource use.<sup>38</sup>

The concepts of international regimes and epistemic communities are of particular relevance to the analysis of international cooperation for environment and natural resources and suggest conclusions similar to analyses of collective action and institution building at local and national levels. Both also allow the incorporation of

actors other than nations--including both domestic interest groups and international institutions--into explanations of cooperation.

International regimes are defined as sets of "principles, norms, rules, and decision-making procedures around which actors' expectations converge in a given area of international relations."<sup>39</sup> The term is usually applied to a particular agreement or institution, but refers not only to the agreement or institution but also to the shared concepts and common commitment to negotiation and collective action that underlie it. As with subnational institutions, regimes may facilitate cooperation among nations by improving information flows, both on substantive issues and on compliance or defection by other actors, especially when the institution itself undertakes monitoring and other informational tasks. Regimes and institutions also provide forums for communication and negotiation, and generally provide a stock of social capital that reduces the costs of new agreements.<sup>40</sup> The existence of one regime may therefore facilitate cooperation on related issues not included in the existing regime.<sup>41</sup> As for subnational institutions, the ability of international institutions to provide these functions depends in large part on particular issues of institutional design, which are increasingly the subject of analyses of international cooperation.<sup>42</sup>

The related concept of epistemic communities developed as part of a wider movement to incorporate ideas, shared knowledge, and perceptions of interdependence into explanations of international cooperation.<sup>43</sup> In the realm of environment and natural resources in particular, epistemic communities may influence the creation, strength, and survival of international regimes.<sup>44</sup> Epistemic communities are defined as groups of professionals and experts that "share a common understanding of a problem and its solution."<sup>45</sup> Because of its control of expert knowledge, such a community may be extremely influential in calling attention to a problem, suggesting the probable consequences of inaction or of alternative solutions, and defining the policies to be pursued. If members are able to assume positions within national or international agencies, they may participate directly in policy, implementation, and international coordination.<sup>46</sup> Case studies have documented the influence of epistemic communities in a variety of environmental issue areas, such as protection of the Mediterranean Sea and efforts to address ozone depletion.<sup>47</sup>

Past analysis of regimes and epistemic communities has generally offered a benign scenario of international interaction. Regimes, institutions, epistemic communities, and other instances of international cooperation act as catalysts to foster government interest in environmental and natural resource problems, bind nations into agreements and

patterns of cooperation to sustain national action, and improve the ability of governments to achieve real gains. Analyses of existing agreements describe a relatively coherent group of experts who agree on a problem and its solution and persuade policy makers to adopt a constructive course of action. The resulting agreement encourages the assumption of members of this expert group to positions of influence within national governments and international bureaucracies. Cooperation in turn generates the information and policy consensus needed for further joint action. Even conflicts between developed and developing countries are addressed when policy coordination raises environmental issues on national policy agendas and increases flows of information, policy models, funding, and technology. These developments foster a "virtuous cycle" in which continuing collaboration is facilitated by past institutional development.

This "virtuous cycle" may, however, be questionable on both logical and empirical grounds, for it tends to ignore the role of competing interest groups, the effects of interaction on national agendas and priorities, and the consequences for subnational resource distribution. One obvious problem is the evident lack of a coherent epistemic community on many critical issues. Such fragmentation allows greater room for interaction, alliance building, and conflict among diverse expert groups, nonauthoritative

interest groups, and policymakers. This fragmentation makes it difficult to predict what kinds of policy coordination may occur, and whose interests will be served.

Most importantly in the present context, the preceding discussion has argued that equitable and effective resource management depends on the allocation of access and participatory rights at the subnational level. The concepts and theories developed for the analysis of international institutions for resources and environment have, however, abstracted these considerations out of the analysis. States either continue to be viewed as single, unitary actors, or the role of subnational actors is only considered to insofar as these are involved in the shaping and negotiation of policy directions. The distribution of costs and benefits within nations may be entirely ignored both during negotiations among nations and in evaluations of the success or failure of policy coordination, particularly if the interests of those negatively affected are not represented either nationally or internationally.

These considerations are best addressed by an alternative paradigm of interaction among nations posed by dependency theorists.<sup>48</sup> Based specifically on the experience of Latin America, dependency theory views economic underdevelopment as a result of unequal north-south relationships, in which economic activity in developing countries is both determined by developed-country needs and

constrained by the appropriation of profits by the developed world. Dependent underdevelopment is maintained by a an alliance between domestic and developed-country capitalists that neglects wider national development and generates extreme inequalities domestically. Underdevelopment and inequality are reinforced by the technological dependency of the underdeveloped economy, which relies on capital goods and production techniques imported from, controlled by, and benefitting the developed nations.

Viewed from this perspective, international cooperation for environment and natural resources may be expected to generate uneven costs and benefits both among and within nations. Not only do the interests of north and south differ, but the outcomes of international negotiation may primarily reflect the greater information, bargaining power, capabilities of developed countries. Developed-country bargaining influence, funding assistance, and technology transfers are likely to reflect the economic as well as environmental interests and policy priorities of developed countries, while the participation of developing countries may be determined by the external supply of these factors. Furthermore, if limited budgets require a choice between implementation of several policy areas, cooperation with international policy goals may mean that domestic priorities are ignored. Policy agendas in developing

countries are therefore likely to reflect external rather than domestic needs and constraints.

The dependency of developing countries on information and technology may be reinforced rather than reduced by the presence of transnational linkages among expert groups and environmental interests. Specialists in the natural and social sciences in the developing countries form part of a domestic elite shaped more by its links with international specialists than by communication with the domestic non-elite. These specialists often depend heavily on training, information, and technology from the developed countries due to the lack of domestic infrastructure. They may therefore adopt goals, strategies, and policy preferences generated by developed-country experiences and inappropriate or less critical domestically. This problem may be particularly acute when the issue at stake is resource management by disadvantaged economic sectors, and may serve to further skew the costs and benefits of international cooperation.

#### Conclusion

The preceding discussion suggests the possibility of, and some requirements for, a mixture of local, national, and international policies that allow and even encourage patterns of resource use consistent with both conservation and human needs. Its conclusions lend support to the policy goals and strategies that have increasingly informed the practice of resource conservation: local participation in

decision making and implementation, development programs aimed at increasing the value captured from available natural resources, efforts by NGOs and other outside actors to alter state policy and employ their influence in support of the disadvantaged, and the achievement of international agreements and other forms of cooperation.

The analysis also points, however, to a number of limiting factors that have not been adequately addressed either in theory or policy. These include problems of access, allocation, and conflict resolution among competing user groups, the problematic role of the state as both destroyer and protector of natural resources and those that depend on them, and the intergovernmental and subnational relationships underpinning international conflict and cooperation. At the heart of these problems are fundamental issues of distribution and participation, the stuff of politics. The following chapter examines more closely the equity and representational issues involved in wildlife politics, and the ability of existing institutions to resolve them in favor of conservation and development.

#### Notes

1. Garrett Hardin, "The Tragedy of the Commons," Science 162, no. 3859 (1968): 1243-1248. See also Garrett Hardin and John Baden, eds., Managing the Commons (San Francisco: W. H. Freeman and Company, 1977); Harold Demsetz, "Toward a Theory of Property Rights," The American Economic Review 57, no. 2 (1967): 347-359; H. S. Gordon, "The Economic Theory of a Common Property Resource: The Fisher," Journal of Political Economy (1954): 124-142.

2. The tragedy of the commons scenario is supported by two closely related bodies of theory, game theory and the theory of collective goods. The hypothetical incentive structure of the "tragedy of the commons" is formalized by game theory approaches to individual and collective action, particularly by the game of "prisoners' dilemma," or PD. In PD, two prisoners are held in separate cells and unable to communicate with one another. Each is given the choice of confessing to the crime they are believed to have committed. If neither confesses, they will be charged with a lesser crime, and both will receive light sentences. If both confess, they will both be charged for the more serious crime. If only one confesses, the confessor will go free, but his partner will receive the maximum sentence possible. The incentive/punishment structure is such that mutual cooperation (mutual refusal to confess) represents the best option for both prisoners, while mutual defection (confessing) represents the worst. However, both prisoners confess in order to avoid being the 'sucker,' and end up worse off than if they had cooperated.

Both the "tragedy of the commons" and the prisoners' dilemma game assume that no communication or cooperation will take place among actors, even though all actors suffer the consequences of their individual strategies. Theories of collective action allow for communication and interaction, but still emphasize the difficulty of cooperation to achieve collective goods such as clean air and water, healthy grazing lands, species preservation, or the institutions through which these goals could be achieved. Pure collective goods are characterized by non-excludability (once provided, it is impossible to prevent their consumption by any individual) and non-divisibility (consumption by one individual does not reduce the amount of the good available for others), although many natural resource and environmental goods deviate somewhat from the theoretical ideal. Theories of collective action thus reiterate the centrality of the free-rider problem in discouraging collective action to improve common welfare. See Mancur Olson, The Logic of Collective Action: Public Goods and the Theory of Groups (Cambridge: Harvard University Press, 1965).

Because collective goods by definition cannot be privatized, and because theories of collective action allow a greater degree of communication among actors, the solutions proposed differ from the tragedy of the commons scenario. Cooperation may be possible among groups small enough to permit high visibility of individual actions, and therefore reduce the likelihood of undetected cheating. Collective action is also facilitated by the presence of a dominant actor, which is willing to pay a disproportionate amount of the costs of providing a collective good or of creating, maintaining, and enforcing a collective agreement

or institution. These conditions are viewed as infrequently met, however, and the state is usually required to provide a collective good or to employ coercion to achieve cooperation.

3. Private ownership of land or resources has long been the favored option of the discipline of economics. Generally, private ownership is considered to allow the owner to benefit directly from any effort to protect, conserve, or invest in his property, and therefore create an incentive to manage for the long-term sustainability of the resource and thus continued benefits for the owner. Whether he in fact does so, however, is determined by the relative profitability of different investments, and it is often more profitable to rapidly exhaust a given resource in order to invest the proceeds elsewhere, or to replace it with another.

The frequent inability of private ownership to strike a happy balance between profit-maximization and natural resource conservation is often attributed to a series of "market failures." These include the failure of market prices to take into account non-marketed goods and services such as the ecological functions provided by forests and wetlands or the aesthetic values of landscape and of individual plant and animal species. Market failure also occurs when prices and rents fail to incorporate externalities, or the social costs imposed by individual resource exploitation, as in the contribution of individual forest clearing to global climate change or loss of genetic diversity.

The alternative of increased government intervention has been received ambivalently by practitioners and students of natural resource management. Generally, government intervention is considered a less effective and less efficient means of achieving sustainable resource management, and a substantial literature has accumulated on policy failures attributed to governmental centralization, bureaucratization, corruption, and ineptness. The inability of the market to encourage sustainable resource management is also frequently attributed to distortions in market prices caused by government subsidies for natural resources or for production systems which would otherwise be economically as well as ecologically inefficient. Nonetheless, the state is often relied upon for the correction of the market failures just described, for example by ensuring that an attempt be made to quantify the value of environmental goods and services to ensure their inclusion in cost-benefit analyses of different productive and land-use options. In the case of goods and resources which are not amenable to private ownership, such as clean air and water, government intervention may also be needed to

establish systems which approximate private ownership, as in the creation of markets for pollution emission permits.

4.S. V. Ciriacy-Wantrup and Richard C. Bishop, "'Common Property' as a Concept in Natural Resources Policy," Natural Resources Journal 15, no. 4 (1975): 713-727.

5.For example, more optimal outcomes are possible when communication is introduced into prisoner's dilemma, particularly when the assumption of repeated interaction (reiteration) is introduced to allow players to develop mutual trust. See Robert Axelrod and William Hamilton, "The Evolution of Cooperation," Science 211: 1390-1396; Carlisle Ford Runge, "Common Property Externalities: Isolation, Assurance, and Resource Depletion in a Traditional Grazing Context," American Journal of Agricultural Economics 63, no. 4 (1981): 595-606; and Carlisle Ford Runge, "The Innovation of Rules and the Structure of Incentives in Open Access Resources," American Journal of Agricultural Economics 67, no. 2 (1985): 368-372.

6.See, for example, the cases in Proceedings of the Conference on Common Property Resource Management (Washington, D.C.: National Research Council, 1986); Bonnie J. McCay and James M. Acheson, eds., The Question of the Commons: The Culture and Ecology of Communal Resources (Tucson: University of Arizona Press, 1987); Fikret Berkes, ed., Common Property Resources: Ecology and Community-Based Sustainable Development (London: Belhaven Press, 1989); and Daniel W. Bromley, ed., Making the Commons Work: Theory, Practice, and Policy (San Francisco: ICS Press, 1992).

7.See, for example, the discussion of water management in the western United States in Elinor Ostrom, Governing the Commons: The Evolution of Institutions for Collective Action (Cambridge: Cambridge University Press, 1990).

8.Daniel W. Bromley, "The Commons, Property, and Common-Property Regimes," in Making the Commons Work: Theory, Practice, and Policy, ed. Daniel W. Bromley (San Francisco: ICS Press, 1992); C. Ford Runge, "Common Property and Collective Action in Economic Development," in Daniel W. Bromley, ed., Making the Commons Work.

9.Daniel W. Bromley, "The Commons, Property, and Common-Property Regimes," in Daniel W. Bromley, ed., Making the Commons Work, 13.

10.Elinor Ostrom, "Institutional Arrangements for Resolving the Commons Dilemma," in The Question of the Commons, ed. Bonnie J. McCay and James M. Acheson; Carlisle Ford Runge, "Common Property and Collective Action in Economic

Development," in Proceedings of the Conference on Common Property Resource Management; Christopher J. N. Gibbs and Daniel W. Bromley, "Institutional Arrangements for Management of Rural Resources: Common-Property Regimes," in Fikret Berkes, ed., Common Property Resources: Ecology and Community-Based Sustainable Development.

11. See, for example, Pauline E. Peters, "Embedded Systems and Rooted Models: The Grazing Lands of Botswana and the Commons Debate," in Bonnie J. McCay and James M. Acheson, eds., The Question of the Commons.

12. John C. Cordell and Margaret A. McKean, "Sea Tenure in Bahia, Brazil," in Proceedings of the Conference on Common Property Resource Management; Fikret Berkes, "Marine Inshore Fishery Management in Turkey," in Proceedings of the Conference on Common Property Resource Management.

13. Elinor Ostrom, Governing the Commons, 94-100. Ostrom also points out that not only must access and use rules be adapted to local conditions, but some flexibility in compliance with these rules may also need to be allowed, and sanctions levied in accordance with the past behavior of an individual who cheats or the contexts leading to isolated instances of noncooperation. These contexts are likely to be much better known to the community of resource users than to outside monitoring and enforcement institutions, and to be taken into consideration by them in order to prevent the levying of disproportionate sanctions which may lead to future resentment and noncooperation.

14. Fikret Berkes, "Common Property Resource Management and Cree Indian Fisheries in Subarctic Canada," in Bonnie J. McCay and James M. Acheson, eds., The Question of the Commons; Dominique P. Leveil and Benjamin Orlove, "Local Control of Aquatic Resources: Community and Ecology in Lake Titicaca, Peru," American Anthropologist 92 (1990): 362-382.

15. See, for example, James D. Nations, "Xateros, Chicleros, and Pimenteros: Harvesting Renewable Tropical Forest Resources in the Guatemalan Peten," in Conservation of Neotropical Forests: Working from Traditional Resource Use, ed. Kent H. Redford and Christine Padoch (New York: Columbia University Press, 1992).

16. See, for example, S. B. Hecht, A. B. Anderson, and P. May, "The Subsidy from Nature: Shifting Cultivation, Successional Palm Forests, and Rural Development," Human Organization 47, no. 1 (Spring 1988): 25-35.

Questions of resource value have been addressed by economists in a growing literature on 'economic incentives,'

which involve the relative costs and benefits of alternative actions which determine the decisions of self-interested resource users. Economic incentives bear on problems of collective action in a number of ways. The subsistence or market value of a given resource influences the likelihood that individuals and groups will invest time, energy, and other inputs in the creation of rules and institutions for its allocation and management. Likewise, the costs of such rules and institutions include the short-term sacrifices involved in self-restraint. The concept of the discount rate, or the relative valuation of future versus present returns from the resource, is also relevant. Short-term use may be valued more highly than long-term sustainability if it guarantees the immediate survival of an individual or household. Conversely, investments in long-term sustainability are unlikely to occur if disruptive changes in land tenure or government regulations are anticipated. These considerations have led to a number of recommendations for increasing the market value of extractive resources, proposals which offer uncertain results in the absence of other social, economic, and institutional requirements for sustainable management. For a discussion of economic incentives, see Jeffrey A. McNeely, Economics and Biological Diversity: Developing and Using Economic Incentives to Conserve Biological Diversity (Gland: IUCN, 1988); Timothy M. Swanson and Edward B. Barbier, eds., Economics for the Wilds: Wildlife, Diversity, and Development (Washington, D.C.: Island Press, 1992).

17. Elinor Ostrom, Governing the Commons, 90.

18. Elinor Ostrom, Governing the Commons, Chapters 3 and 4.

19. Douglas Southgate and Peter May, "The Suppression of Common Property in Latin America," Paper presented at the First Annual Meeting of the International Association for the Study of Common Property, Durham, N.C., 27-30 September 1990; Emizet Kisangami, "A Social Dilemma in a Less Developed Country: The Massacre of the African Elephant in Zaire," in Proceedings of the Conference on Common Property Management.

20. Elinor Ostrom, Governing the Commons, Chapters 5 and 6.

21. E. N. Anderson, "A Malaysian Tragedy of the Commons," in Bonnie J. McCay and James M. Acheson, eds., The Question of the Commons; J. Anthony Koslow, "Limited Entry Policy and Impacts on Bristol Bay Fishermen," in Contemporary Alaskan Native Economies, ed. Steven J. Langdon (Lanham: University Press of America, 1986); and the case studies provided in Elinor Ostrom, Governing the Commons.

22. Lawrence Taylor, "The River Would Run Red with Blood," in Bonnie J. McCay and James M. Acheson, eds., The Question of the Commons; R. P. Neumann, "Political Ecology of Wildlife Conservation in the Mt. Meru Area of Northeast Tanzania," Land Degradation and Rehabilitation 3 (1992): 85-98.
23. Norman Uphoff, Local Institutional Development: An Analytical Sourcebook with Cases (West Hartford: Kumarian Press, 1986), 22-28.
24. Elinor Ostrom, Governing the Commons, 212.
25. See, for example, Fikret Berkes, "The Common Property Resource Problem and the Creation of Limited Property Rights," Human Ecology 13, no. 2 (June 1985): 187-208.
26. Elinor Ostrom, Governing the Commons, Chapter 4.
27. The failures of state management of natural resources has been described generally in William Ascher and Robert Healy, Natural Resource Policymaking in Developing Countries (Durham: Duke University Press, 1990); H. Jeffrey Leonard, ed., Divesting Nature's Capital: The Political Economy of Environmental Abuse in the Third World (New York: Holmes and Meier, 1985); Stephen G. Bunker, Underdeveloping the Amazon: Extraction, Unequal Exchange, and the Failure of the Modern State (Chicago: University of Chicago Press, 1985); Dennis J. Mahar, Government Policies and Deforestation in Brazil's Amazon Region (Washington, D.C.: World Bank, 1989).
28. This shift has been more theoretical than practical. See, for example, Dennis A. Rondinelli, Development Administration and U.S. Foreign Policy (Boulder: Lynne Rienner Publishers, 1987).
29. N. S. Jodha, "Common Property Resources: A Missing Dimension of Development Strategies," World Bank Discussion Paper Number 169 (Washington, D.C.: World Bank, 1992); Daniel W. Bromley and Michael M. Cernea, "The Management of Common Property Natural Resources: Some Conceptual and Operational Fallacies," World Bank Discussion Paper Number 57 (Washington, D.C.: World Bank, 1989).
30. George Honadle and Jerry VanSant, Implementation for Sustainability: Lessons from Integrated Rural Development (West Hartford, Conn.: Kumarian Press, 1985); Jon Moris, Managing Induced Rural Development (Bloomington: Indiana University, International Development Institute, 1981); David C. Korten, "Third-Generation NGO Strategies: A Key to People-Centered Development," World Development 1, no. 15 (Autumn 1987): 145-159. Korten notes that

As villagers learn to wait for outsiders to bring them charity, their own resources go unmobilized and as a consequence the total amount of resources mobilized for local development may actually decline...The issues involved go well beyond the simple decentralization of government authority. At least as essential is the development of the complex mosaic of independent yet inter-linked local organizations through which people define and pursue their individual and collective interests within a guiding framework of national policy. These organizations must in turn be supported by institutional structures and policies that create the necessary social and political space for them to function in their members' interests. (46-47)

31. David C. Korten, "Community Organization and Rural Development: A Learning Process Approach," Public Administration Review 40, no. 5 (1980): 480-511; Elinor Ostrom, Governing the Commons, Chapter 6.

32. Elinor Ostrom, Governing the Commons, 157-173.

33. David C. Korten, "Third Generation NGO Strategies;" Michael M. Cernea, "Nongovernmental Organizations and Local Development."

34. Robert Livernash, "The Growing Influence of NGOs in the Developing World," Environment 34, no. 5 (June 1992), 15.

35. See, for example, Dennis Glick and Michael Wright, "The Wildlands and Human Needs Program: Putting Rural Development to Work for Conservation," in Kent H. Redford and Christine Padoch, eds., Conservation of Neotropical Forests.

36. Michael M. Cernea, "Nongovernmental Organizations and Local Development."

37. Doug Hellinger, "NGOs and the Large Aid Donors: Changing the Terms of Engagement," World Development 1, no. 15 (Autumn 1987): 135-143.

38. Analysis of bilateral and multilateral cooperation for the environment has focused on the question of whether cooperation among sovereign nation can occur at all. The dominant paradigm in the study of international relations has long been structural or systemic. Systemic theories view nations as unitary actors possessing different levels of resources and capabilities and competing in the pursuit of wealth and power. International events, whether they be wars or treaties, can best be explained and predicted by assessing the relative power of the nations involved.

Issues of environmental protection are rarely discussed at all in this context, since they are peripheral to the higher-order military and economic concerns of states and because any international action in this issue will be self-interested and strategic. Because the state is considered a unitary actor and domestic politics are generalized out of the analysis, the role of domestic actors in influencing behavior and pressing for cooperation is not included as a variable.

As in the tragedy of the commons scenario, the dominant metaphor for international interaction has been provided by game theory, particularly the prisoners' dilemma game described in a previous note. Relations between nations are viewed as highly conflictual; cooperation is unlikely to occur, and is highly unstable if it is achieved at all, a situation aggravated by the absence of an external authority to enforce agreements between states. However, game theory approaches to interaction between nations, just as interaction among individuals, has been increasingly challenged by empirical evidence of stable cooperation. Similarly, game theory explanations of state behavior have been modified to allow long-term interaction and communication to explain for mutual recognition of interdependence. These modifications have permitted a specification of the conditions under which stable cooperation by self-interested actors is likely to occur, which include recognition of mutual gains from collaborative versus independent or conflicting behavior, possibilities for monitoring and enforcement to reduce the risk of being made a 'sucker,' extended time horizons resulting from expectations of continued interaction, and an equal distribution of benefits or risks, or at least a lack of information about the future distribution of risks. Also important are linkages and side payments, in which a nation may cooperate on an issue of peripheral importance in order to enhance cooperation on a more highly valued issue, or benefits in one issue area are offered to gain cooperation in another. Cooperation is also frequently attributed to the actions of a dominant actor, or hegemon, with the willingness and ability to initiate and sustain cooperation for the achievement of a valued public good.

For discussions of cooperation among nations, see Robert Axelrod, The Evolution of Cooperation (New York: Basic Books, 1984); Alexander George, Philip J. Farley, and Alexander Dallin, eds., U.S.-Soviet Security Cooperation: Achievements, Failures, Lessons (New York: Oxford University Press, 1988); Roger K. Smith, "Explaining the Non-proliferation Regime: Anomalies for Contemporary International Relations Theory," International Organization 41, no. 2 (1987): 253-281; Stephen Krasner, ed., International Regimes (Ithaca: Cornell University Press, 1983); Kenneth A. Oye, ed., Cooperation Under Anarchy

(Princeton: Princeton University Press, 1986); Oran Young, International Cooperation (Ithaca: Cornell University Press, 1989).

39. Stephen D. Krasner, "Structural Causes and Regime Consequences: Regimes as Intervening Variables," International Organization 36, no. 2 (1982), 196.

40. Robert O. Keohane, After Hegemony (Princeton: Princeton University Press, 1984); Marc A. Levy, Robert O. Keohane, and Peter M. Haas, "Institutions for the Earth: Promoting International Environmental Protection," Environment 34, no. 4 (May 1992): 12-36.

41. Helen Milner, "International Theories of Cooperation among Nations: Strengths and Weaknesses," World Politics 44 (April 1992): 477-478.

42. See, for example, Peter H. Sand, "International Cooperation: The Environmental Experience," in Preserving the Global Environment: The Challenge of Shared Leadership, ed. Jessica Tuchman Matthews (New York: W. W. Norton & Company, 1991); Marc A. Levy, Robert O. Keohane, and Peter M. Haas, "Institutions for the Earth: Promoting International Environmental Protection;" Lynton K. Caldwell, International Environmental Policy: Emergence and Dimensions, 2nd. ed. (Durham: Duke University Press, 1990); Ralph Osterwoldt, "Implementation and Enforcement Issues in the Protection of Migratory Species," Natural Resources Journal 29, no. 4 (Fall 1989): 1017-1049.

43. See Ernst B. Haas, "Why Collaborate? Issue Linkage and International Regimes," World Politics XXXII, no. 3 (1980): 357-405; James M. Rosenau, "Before Cooperation: Hegemons, Regimes, and Habit-Driven Actors in World Politics," International Organization 40, no. 4 (1986): 849-894; Oran R. Young, "The Politics of Regime Formation: Managing Natural Resources and the Environment," International Organization 43, no. 3 (1989): 351-375.

44. Peter M. Haas, "Do Regimes Matter? Epistemic Communities and Mediterranean Pollution Control," International Organization 43, no. 3 (Summer 1989): 377-403.

45. Peter Haas, Saving the Mediterranean (New York: Columbia University Press, 1990), 55.

46. Peter M. Haas, "Introduction: Epistemic Communities and International Policy Coordination," International Organization 46, no. 1 (Winter 1992): 1-35.

47. See Peter M. Haas, Saving the Mediterranean; Peter M. Haas, "Banning Chlorofluorocarbons: Epistemic Community Efforts to Protect Stratospheric Ozone," International Organization 46, no. 1 (Winter 1992): 187-224.

While the concept of epistemic community has helped to call attention to the role of ideas, learning, and non-governmental actors in encouraging international cooperation, the presence of an epistemic community as strictly defined above is not necessary for the incorporation of such variables into analysis of international interaction. Non-governmental environmental organizations may not be classified as forming part of an epistemic community because they often do not possess expertise in the issue area or have reacted to rather than initiated policy coordination. Whether environmentalists are described as an epistemic community or merely as a transnational pressure group, however, they have assumed a growing role in policy initiation, modification, and implementation at the national and international levels. They have also succeeded in many cases in forming coalitions with other interest groups to press for policy changes either in the absence of an epistemic community or even against the arguments of such a community. Legal and judicial forums may ensure their influence even in the absence of the authoritative expertise needed to convince policy-makers, as in the United States. In many cases, NGOs rather than experts, governments, or international institutions have provided research and monitoring functions used to pressure governments to participate in or comply with international agreements. See, for example, Marc A. Levy, Robert O. Keohane, and Peter M. Haas, "Institutions for the Earth." M. J. Peterson also calls attention to actual and potential conflicts between epistemic communities and NGOs. See M. J. Peterson, "Whalers, Cetologists, Environmentalists, and the International Management of Whaling," International Organization 46, no. 1 (Winter 1992): 147-186.

48. For a review of dependency theory, see Martin Staniland, What is Political Economy? (New Haven: Yale University Press, 1985), Chapter 5. Dependency as a theory of underdevelopment has been extensively criticized; see, e.g., Tony Smith, "The Underdevelopment of Development Literature: The Case of Dependency Theory," World Politics 31, no. 2 (January 1979): 25-66. It has, however, been a useful conceptual and analytical tool in the analysis of specific situations of underdevelopment. See, e.g., Gabriel Palma, "Dependency: A Formal Theory of Underdevelopment or a Methodology for the Analysis of Concrete Situations of Underdevelopment?" World Development 6 (July/August 1978). Dependency has also informed much of the literature on

Mexican political economy; see Gary Gereffi, The Pharmaceutical Industry and Dependency in the Third World (Princeton: Princeton University Press, 1983); Douglas C. Bennett and Kenneth E. Sharpe, Transnational Corporations Versus the State: The Political Economy of the Mexican Auto Industry (Princeton: Princeton University Press, 1985); and Steven E. Sanderson, The Transformation of Mexican Agriculture: International Structure and the Politics of Rural Change (Princeton: Princeton University Press, 1986).

CHAPTER 3  
HUNTING BY COMMONERS: A PRACTICAL VIEW  
OF WILDLIFE USE, CONSERVATION, AND DEVELOPMENT

Introduction

Equitable and sustainable use of wildlife resources poses a particularly difficult challenge in developing countries. Resource mobility, dispersion, and unpredictability are only one source of potential management failures. The economic constraints facing the small-scale subsistence and market hunters most dependent on game, and the legislative or de facto appropriation of wildlife resources by the state or economic elites, also typically generate competitive and conflictive exploitation by appropriators and dispossessed. Historically, measures ostensibly adopted for the purpose of resource conservation have merely reflected and reinforced these social conflicts. Recent efforts to protect species and diversity must be examined within this context.

The present chapter applies the concepts, theories, and hypotheses developed in the preceding pages to the specific problem of wildlife resource development. The economic, institutional, and regulatory contexts of wildlife use in a variety of geographical settings are reviewed in

order to suggest the causes of development and ecological failures, their relationship to contemporary conservation and management efforts, and some measures and approaches which offer possibilities for alleviating problems of inequity and unsustainability. This discussion forms a necessary prelude to the country analysis which follows, for it suggests not only what is problematic, but also what is possible.

#### Undermining Subsistence

Wild fauna is often a critical supplement or even mainstay in the economies of the rural poor; a few examples serve to highlight this importance.<sup>1</sup> In the Malaysian state of Sarawak, with a population of 1.38 million, annual game consumption is estimated at 18,000 tons per year, with trade in the meat of deer and bearded pigs valued at roughly US\$4 million annually.<sup>2</sup> Game consumption rates are estimated at 19 to 168 kg per person annually in the Peruvian Amazon,<sup>3</sup> and up to 90 kg per person per year in some areas of Botswana.<sup>4</sup> Game provides some 75% of the animal protein consumed in Zaire and roughly 20% of the animal protein consumed in rural areas in Nigeria.<sup>5</sup> Subsistence hunting in the Brazilian Amazon may involve the consumption of 19 million mammals, birds, and reptiles annually.<sup>6</sup>

Recent discussion of subsistence hunting has focused on the tropics of Asia and Latin America, regions

increasingly characterized by outside settlement of formerly inaccessible rural areas, land enclosures for private agricultural, livestock, and forestry production, and the development of commercial markets for game meat and products. Settlement frequently involves state-promoted incursions on indigenous lands and the arrival of new user groups--settlers, loggers, military forces, oil prospectors, and commercial hunters--whose activities do not fall within the range of local authority and institutional and enforcement capacity. While land conversion reduces game availability, the persistent poverty of the frontier maintains reliance on subsistence wildlife use and encourages resource users to take advantage of developing markets. In these circumstances, tragedies of commons and commoners have proven difficult to avoid.

Examples of these problems abound. On the Atlantic coast of Nicaragua, the establishment of a commercial plant for the slaughter and processing of sea turtles led to rapid overexploitation of a resource central to the subsistence and cash economy of the Miskito Indians and a decline in local consumption of sea turtle meat.<sup>7</sup> In Sarawak, game consumption in logged areas has decreased by two-thirds as a result of habitat modification, technological introductions, the development of commercial markets, and non-resident hunting.<sup>8</sup> The opening of highways and logging roads in the Amazon basin has similarly led to increased settlement and

to rapid increases in market hunting by colonists and traditional populations, aggravated by the tendency of recent settlers to concentrate hunting effort on a few large species such as deer and peccary and the importation of destructive techniques such as dynamite fishing.<sup>9</sup> The potential conflicts between native and settler hunting are suggested by data on the ungulate harvest near Iquitos, Peru, where 51% of the harvest was conducted by temporary lumber camps, 11% by market hunters, and only 38% by subsistence hunters.<sup>10</sup>

It is often assumed that traditional hunting by primitive societies could be sustained indefinitely given low population density and limited local demand, the use of relatively inefficient hunting technologies, distribution of hunting effort among a wide variety of species, and the existence of social and cultural norms limiting exploitation and ensuring the equitable distribution of game.<sup>11</sup> In the absence of specific mechanisms to allocate and manage wildlife resources, population growth and rising demands on these resources inevitably lead to problems of overexploitation and even resource collapse.

However, the widespread adoption of local variants of the hunting territory suggests that the demand for game has often exceeded supply, and that resource sustainability in traditional societies was maintained by rules distributing responsibility as well as access rights.<sup>12</sup> Equitable

distribution was the norm, but in many hierarchical societies highly valued animals were appropriated by the elite. The Mayan rulers of Central America and Mexico, for example, distributed individual collection rights for the feathers of the quetzal. These rights which were severely enforced by local overlords, and the killing of a quetzal was punishable by death.<sup>13</sup> Similarly, harvest rights to hawksbill turtles were owned by Malaysian princes, who rented them to individual communities.<sup>14</sup>

Evidence that common property regimes for game develop and persist does not mean that overhunting did not and does not occur in traditional hunting societies. It does conflict, however, with recent observations that traditional communities faced with declining game abundance merely shift their hunting effort to less preferred species, hunt longer, or consume less.<sup>15</sup> This apparent contradiction may be partially resolved by examining the historical and contemporary contexts of resource use.

#### The Primacy of Sport

European expansion altered both the ecological boundaries of wildlife exploitation and the ability of traditional hunters to adapt to changes in resource availability. In Europe, hunting has enjoyed a long history of exclusivity, first through the creation of hunting parks reserved to royalty and nobility, and later through the establishment of the revier system. Royal hunting parks

originated in England in the 11th century, with the king controlling hunting rights not only to his own forests but also to those granted to the nobility and to the church. Hunting by commoners undertaken for meat rather than sport was defined as poaching, and as late as the 19th century was prohibited on penalty of death. The social conflicts occasioned by English hunting law reached a peak in the 19th century as the expansion of large landholdings created a growing class of tenant farmers and landless labor.<sup>16</sup> In the economically depressed Scottish highlands, the conversion of more than three million acres to deer parks by the early 1900s became a particularly offensive symbol of class conflict.<sup>17</sup>

Sport hunting in Europe has remained the recreation of the elite, with hunters as a percentage of the total population ranging from 0.32% in West Germany and 0.66% in Great Britain to 3.95% in France.<sup>18</sup> Under the revier system adopted after World War II, hunting lands owned by individuals, corporations, or the state may be used by the owners or leased to individual or collective hunters. Game is intensively managed and subjected to selective culling to ensure trophy quality. Hunters and professional gamekeepers are subject to stringent educational requirements and expected to actively enforce hunting restrictions, and revier owners participate in the establishment of official seasons and quotas. The meat from culled and hunted game is

also extensively commercialized throughout Europe.<sup>19</sup> In the former Eastern bloc countries, recreational hunting was reserved to party elites and wealthy tourists, the latter serving as an important generator of foreign exchange.<sup>20</sup>

European expansion transferred sport hunting traditions to the developing world, and with them a legal framework developed to favor recreational over subsistence uses. This was particularly true of the British colonies in sub-Saharan Africa, where contemporary legislation continues to favor sport hunting and the safari hunting and wildlife tourism industries.<sup>21</sup> Game initially provided a critical subsidy to British exploration, pacification, prospecting, missionary activity, and settlement by furnishing meat to travelers and their native labor and traded products such as ivory, skins, meat, feathers, and ostrich eggs to finance much of this activity. As expanding settlement and overhunting reduced game populations, sport hunting and wildlife tourism gained importance. The rise of recreational wildlife use was accompanied by the adoption of new codes of sporting conduct and wildlife conservation and a movement to restrict the allegedly indiscriminate and inhumane hunting practices of native Africans.

Colonial game legislation typically granted property rights to game to large landowners, established special hunting rights for colonial administrators and military officers, and either prohibited hunting by Africans or

restricted them to small and relatively undesirable species through the establishment of game schedules. In the late 19th and early 20th centuries, game reserves began to be carved out of native lands, with Africans prohibited from hunting for subsistence or crop protection. The 1900 Convention for the Preservation of Wild Animals, Birds and Fish in Africa, and the 1933 Agreement for the Protection of the Fauna and Flora of Africa, were sponsored by the British government at the urging of white settlers and hunters and encouraged both the widespread adoption of restrictions on native hunting and the expansion of national parks and game reserves.

Sport hunting in sub-Saharan Africa now includes safari hunting on public lands, through government sale of individual hunts or leasing of concessions to private commercial operators. Government agencies are charged with regulation and enforcement, and collect license and trophy fees and lease revenues. Private landowners also often enjoy property or management rights for game on their lands, and a growing number offer safari hunts on their properties, often in connection with domestic livestock production, wildlife viewing, and the sale of meat and other products from culled animals.<sup>22</sup> Fee hunting in South Africa alone is valued at between US\$10 million to 50 million annually.<sup>23</sup>

By contrast, while parks, game areas, and hunting regulations have severely constrained traditional hunting rights on communal landholdings, the latter are seldom important as sites for wildlife-based recreation. Park entry and hunting license fees are claimed by government agencies rather than local communities, and little official effort has been made to manage wildlife on communal lands. In Kenya, where wildlife tourism is valued at some US\$400 million annually,<sup>24</sup> all hunting is prohibited, but tourism revenues are captured by the state-managed parks and game areas which are often established on or expand onto communal areas. As a result, land conversion affects wildlife populations on communal lands, while parks and game reserves are heavily impacted by hunting by residents or outsiders encountering little local resistance.<sup>25</sup>

As in Africa, exploration, conquest, and settlement of the North American continent were heavily subsidized by hunting and trapping.<sup>26</sup> The fur trade performed much the same role as the African ivory trade, luring Europeans into the frontier and engaging native hunters into highly exploitative market relationships which encouraged high rates of extraction.<sup>27</sup> By the late 19th century, urbanization and improved transportation had generated a large domestic market for such products as skins, venison, and waterfowl; with the elimination of native Americans, this market was generally supplied by white settlers.

Hunting regulation in the United States differs significantly from European and African systems, having developed first in reaction to the British tradition of exclusive game parks, and later to the effects of uncontrolled market hunting on native wildlife in the late 19th and early 20th centuries.<sup>28</sup> In the United States, wildlife legislation typically views wildlife as a public good to which equal sport hunting access is maintained by low hunting permit fees, allocation of permits and quotas according to estimated hunter numbers or by lottery when demand exceeds supply, and government regulation of seasons and limits on private as well as public lands. Severe restrictions are placed on the transportation of wildlife products, and many states prohibit their commercialization.

Despite this regulatory framework, game ranching and fee hunting on private lands are increasingly popular due to the ability of private landowners to ensure high hunter success rates and trophy quality and low frequency of contact with other hunters. Lease of hunting areas on otherwise unproductive land by clubs and associations represents a profitable venture for landowners, and for lessors facilitates hunting with familiar companions and counterparts, informal establishment of individual hunting areas, and the exclusion of noncooperative hunters. Fee and lease hunting are believed to be particularly prevalent on large landholdings in areas where the availability of public

hunting areas is limited. Smaller landholdings can also be pooled for these purposes; for example, some private ranches in Montana and Wyoming allow native wildlife to move freely among properties and pool fee hunting privileges and revenues among individual ranches.<sup>29</sup> In many cases wild game is mixed with domestic livestock, but commercial production of meat, hides, and antler velvet has remained limited due to legal and regulatory barriers.<sup>30</sup>

Conflicts between native hunting and a regulatory system developed primarily in response to the needs of sport hunters have been severe in the United States. Indian treaties and subsequent judicial decisions have established subsistence hunting rights on reservations and other native territories. However, state authority to regulate access and take for purposes of conservation and management has frequently served as a mechanism to deny native subsistence and commercial quotas in favor of recreational and non-native commercial users, especially in valuable fisheries.<sup>31</sup>

In at least one instance, international wildlife agreements have facilitated the exclusion of subsistence hunters. Migratory Bird Conventions signed with England (on behalf of Canada) in 1916, Mexico in 1936, Japan in 1972, and the Soviet Union in 1976 established stringent seasonal and quota limitations on the hunting of migratory birds. While the treaties with Japan and Mexico allowed exemptions

for private game farms, only the treaty with Japan exempted native subsistence hunting, despite the presence of large indigenous populations in Alaska and Mexico which were affected by these restrictions. Under the 1916 Migratory Bird Treaty between Canada and the United States, strict limits were placed on the harvest of migratory birds in order to maintain populations available for sport hunting, and hunting limited to only a short fall hunt for listed species. However, Eskimos in southwestern Alaska rely on hunting and egg collection of migratory geese in the spring, between sealing and salmon seasons. Open conflict generated by attempts to enforce these hunting restrictions have led to a policy of non-enforcement as well as federal efforts to amend the other three treaties, efforts which have thus far been defeated by the Alaskan sport hunters' lobby.

In Latin America, contemporary hunting laws and regulations generally reflect U.S. rather than European influence, with seasons and quotas established by government management agencies for private as well as public lands.<sup>32</sup> In this region, however, permit requirements as well as other restrictions are poorly enforced, and small and underfunded government agencies possess little capacity for research and data collection to support regulation.<sup>33</sup> In the neotropics, sport hunting is relatively unimportant relative to subsistence and commercial hunting, given the scarcity of large, abundant animals, difficult access, and

generally low incomes. This setting, and the presence of large and often unacculturated indigenous groups, have given rise to widespread government recognition of traditional hunting rights. However, subsistence hunting is typically subject to general license, seasonal, and species provisions, weakening the usefulness of its distinction.

Sport hunting on private lands is significant only in the temperate and arid regions, namely in northern Mexico, Chile, and Argentina. Here, the predominance of large private landholdings as well as higher game abundance and visibility have encouraged private game ranching and fee hunting, with a clientele drawn almost exclusively from the U.S. and Europe. Private landowners are excluded from license requirements for hunting on their own lands in Chile and Argentina, and can assume management authority for wildlife in Argentina and Mexico. Subsistence hunting rights are not legally recognized in these countries.

#### The Benefits of Trade

Commercial uses of wildlife pose particularly difficult problems for sustainable management because the number of potential consumers is unlimited and because the high economic values which give rise to commerce in wildlife products also encourage overexploitation. This has been particularly evident in the international wildlife trade, worth an estimated US\$5 billion annually.<sup>34</sup> Production systems concentrated on abundant and geographically

concentrated species, or relatively intensive management within well-delimited areas, has succeeded in generating self-sustaining and economically viable commercial operations.<sup>35</sup> More commonly, however, weak or highly dispersed management authority, fugitive wildlife resources, and the absence of well-defined user groups have encouraged competitive exploitation and illegal activity by uncoordinated users.<sup>36</sup>

Indeed, some of the earliest and most demanding national and international efforts to protect wildlife have focused on unsustainable trade. In the United States, for example, public pressure in support of wildlife conservation emerged in response to the decimation of exotic birds for the feather trade in support of ladies' hat fashions, and as early as 1900 the Lacey Act attempted to add federal support to state game laws by prohibiting interstate commerce in illegally hunted wildlife. The 1973 Endangered Species Act added an international dimension to these efforts.<sup>37</sup> Early international wildlife laws included the International Whaling Convention, the various fur seal conventions, and an agreement between Peru, Bolivia, Argentina, and Chile for the management of vicuna, all directed toward species highly valued in export markets.<sup>38</sup>

One of the most important influences on commercial wildlife trade is the 1973 Convention on International Trade in Endangered Species of Fauna and Flora (CITES), which by

early 1993 claimed 117 parties. CITES established international trade regulations for endangered and threatened species, and encouraged stricter national controls on international wildlife trade through its requirements--not always observed--that member states designate scientific and management authorities; require CITES permits for all import and export of listed species, and CITES-compatible permits for trade with non-parties; and link export authorizations to species status determinations and management plans. Information flows have been facilitated by the analysis of trade records by the CITES Secretariat and by collaborating organizations such as the Trade Records Analysis of Fauna and Flora in International Commerce (TRAFFIC) network of the Worldwide Fund for Nature (WWF) and World Wildlife Fund of the United States (WWF-US). Regular communication has been formalized by the biennial conferences of the parties and through regular notices from the CITES Secretariat.<sup>39</sup>

The failure of CITES to prevent the continuing depletion of highly traded species is widely acknowledged, however. Criticism of the Convention has most frequently focused on its inability to enforce membership or compliance, with continuing unsustainable trade from parties and non-parties alike.<sup>40</sup> In reality, enforcement of the convention has frequently been undertaken by the United States--also a leader in the creation of CITES--through

national legislation calling for trade sanctions against nations whose actions undermine international wildlife and fisheries agreements.

Much more serious obstacles to the effectiveness of CITES in controlling trade in developing countries have been posed by the inability of implementing agencies and member nations to recognize and influence subnational patterns of wildlife exploitation and trade.<sup>41</sup> National and international trade quotas do little to address the problems of unregulated and unrestricted domestic harvest and smuggling, and even those sustainable harvest schemes which have developed have focused exclusively on private landowners or on commercial exporters. Nearly universal failure to include communal and public lands in well-conceived management programs has also meant continuing inability to control wildlife harvest by local populations or to encourage their participation in excluding access by outside poachers and traders. Uniform restrictions designed to control trade in endangered or severely threatened species in turn discourage the initiation of appropriate management programs by restricting market access for the commodities whose value would encourage such efforts.

In many cases, intensive wildlife production systems have been adopted in an effort to avoid the thorny management problems posed by resource mobility, land ownership concentration and conflict, regulatory

requirements, and uncontrolled poaching. Their development has been encouraged by CITES exemptions for captive bred specimens, often echoed in national legislation. The most successful examples include crocodile and alligator farming worldwide,<sup>42</sup> deer farming for venison in Europe,<sup>43</sup> farming and ranching of furbearing species in North America,<sup>44</sup> and production of feathers, leather, and eggs from domesticated ostriches and rheas in Africa.

Intensive wildlife production requires the construction of adequate enclosures, maintenance of health and sanitation requirements, feeding, and other activities which are highly capital- and skill-intensive. There may also be a considerable lag in investment returns during facility construction and stock building. These factors imply both the concentration of farming and ranching operations in large, private, commercial enterprises, and significant limitations on their economic and ecological viability. Harvest from the wild almost inevitably involves lower production costs, while profit margins may be widened as higher-priced captive-bred specimens enter the market. Many farming and ranching operations also continue to rely on the collection of eggs, juveniles, and even adult stock from the wild. Thus, farming efforts and CITES export quotas for crocodylians have failed to prevent continued depletion of wild stocks.<sup>45</sup> The substantial investments required for farming are also feasible due to high prices

for rare luxuries, and are therefore highly vulnerable to changes in fashion or increased supply.<sup>46</sup>

Extensive wildlife production systems therefore remain widespread, complete with their associated management difficulties. Examples include the extensive worldwide trade in psittacines, or members of the parrot family, which has been managed primarily through the establishment of national export quotas.<sup>47</sup> Enforcement of the quotas has been difficult to achieve, however, due not only to the profitability of illegal smuggling but also to the fact that much of the actual harvest is undertaken by the rural poor. The weakness of current regulations led the United States in 1992 to pass new legislation requiring bird import bans against countries failing to demonstrate adequate conservation, regulatory, and enforcement programs.<sup>48</sup> More stringent proposals have been introduced to the CITES Conference of the Parties to prohibit all commercial trade in CITES-listed birds.<sup>49</sup>

The problems of national and international trade regulation are illustrated by a "sustainable harvest program" instituted in Suriname.<sup>50</sup> Suriname established conservative export quotas for twenty-one parrot species and initiated a research program for the study of population status and harvest impact, the results of which are to be used in annual adjustments to the export quotas. Exporters are required to join the national Association of Animal

Exporters, which participates in the establishment of the export quotas and distributes the quota among its members. Management agencies review exporter records of purchase and export transactions, inspect holding and transport facilities, and issue security stamps to accompany exported birds. Minimum export prices, ranging from US\$5.00 to \$300.00, and requirements for payment in hard currency are also established by central government agencies.

Surinam's parrot export program does not address, however, the context in which the birds are actually harvested. There is no local or regional component to provide training in harvest and transport techniques and to provide information to management authorities on local trends in resource abundance. There are no guaranteed prices or other mechanisms to establish fair compensation by exporters to harvesters. No attempt has been made to foster the organization of harvesters to participate in regulatory and price decisions, demand fair compensation, take over transport and marketing from middlemen, or assist in enforcement against illegal harvesters and traders.

The consequences of neglecting subnational harvest and trade patterns are illustrated by Venezuela's sustained-yield harvest programs for capybara and spectacled caiman.<sup>51</sup> The skins of both species are highly valued in international markets, while meat is consumed locally by subsistence hunters and supplies limited market demand. Both

subsistence and small-scale market hunting of these species are prohibited, and exploitation is legally restricted to large-scale commercial operations on private lands, usually cattle ranches. Commercial harvests of capybara were authorized in 1968 after a five-year prohibition on hunting and take place on roughly 53 ranches. Crocodile harvests began in 1982 after a ten-year ban on commercial hunting, and in 1987 197 licenses were issued out of 358 requests. Between 1975 and 1985, capybara harvests generated an average of 400,000 kg of salted meat and a gross income of US\$700,000. The caiman harvest generates net revenues to ranch owners totalling US\$1.67 million, with export revenues reaching roughly US\$8 million by 1987.

Both systems operate under intensive government regulation. Some 7% of the caiman populations and up to 30% of abundant capybara populations are permitted to be harvested, based on annual censuses of licensed ranches conducted by personnel of the Ministry of Environment. The harvests are also limited to adult male caiman and adult capybara, and size limits are set for caiman. Licenses and inspection are required for the transport of meat and skins off the ranch, and caiman skins are tagged before transport to tanneries and again inspected prior to export. An association of caiman producers and tanneries has also been formed to participate in further adjustments to the harvest

program, and has agreed to a system of self-taxation to fund research on status, population dynamics, and conservation.

However, these programs threaten to be undermined by continued poaching by local subsistence hunters and by small-scale market hunters, which operate with low profit margins due to the illegality of their products and their reliance on middlemen for marketing. No system has developed to regulate harvests of off-ranch populations, and although ranch owners participating in the program provide protection for their stocks, poaching is still believed to be causing declines in caiman populations on private ranches as elsewhere.

The most visible expressions of the difficulties facing trade controls are the various national and international mechanisms adopted to control the decimation of African elephant populations for the ivory trade. The African elephant was listed in CITES Appendix II at the first conference of the parties. In response to evident declines in elephant populations, the CITES Secretariat in 1985 established the Ivory Control System, which included the setting of annual ivory export quotas for producer nations party to CITES. Given the domestic settings described above, however, regulation merely served to drive up international ivory prices and encourage poaching and smuggling.

In 1988 the United States passed the African Elephant Conservation Act, which authorized the U.S. Fish and Wildlife Service (USFWS) to evaluate national elephant conservation programs and to prohibit ivory imports from any nation unable to demonstrate adequate conservation and trade controls. In 1989, however, USFWS determined that no producer or intermediary nation met this standard, and the United States banned all ivory imports. Also in 1989, CITES transferred the African elephant to Appendix I, subject to an appeal process allowing specific populations to be transferred to Appendix II when justified by population status and adequate management and control efforts. Proposals by Botswana, Malawi, Namibia, Zambia, Zimbabwe, and South Africa, countries with large elephant populations and in some cases unusually effective conservation efforts, have proposed first that their ivory or non-ivory products be exempted from the ban, but lack of adequate controls elsewhere has prevented acceptance of their appeals.<sup>52</sup> The ban has in turn affected the efforts of Zimbabwe and Zambia to include local communities in development benefits of wildlife use, which are discussed below.

Wildlife Resources and the Rural Poor:  
Experiments in Local Participation and Community Development

In the preceding chapter, it was suggested that the state may play a positive role in providing information on natural resource problems, contributing institutional frameworks to allocate resources and resolve conflicts among

competing groups of resource users, and developing regulatory frameworks to encourage cooperation and compliance. The evidence presented above suggests that these roles have seldom been fulfilled by agencies charged with natural resource and wildlife management in developing countries. The state typically declares ownership and administrative authority over wildlife resources, in the process undermining the local authorities which formerly fulfilled that role, but lacks the political will or financial means to enforce restrictions on use.

In many cases, subsistence use rights are not recognized by law, or are only granted insofar as traditional technologies are employed. Generally, hunting regulations are based primarily on the needs of recreational sport hunters, and are therefore inconsistent with the needs of indigenous and other disadvantaged rural communities.<sup>53</sup> For example, official lists of game animals subject to legal hunting often fail to include the small rodents, reptiles, and other less spectacular fauna hunted for subsistence. License requirements are accompanied by prohibitive fees and administrative procedures, and the establishment of hunting seasons, quotas, and gear restrictions are likely to conflict with the year-round game requirements and seasonal variations in hunting activity of subsistence hunters. The issuance of permits and bag limits to individual hunters may

also ignore the fact that a small number of hunters supply game to an entire community.<sup>54</sup>

The rural poor have often failed to benefit from the development of recreational and commercial uses of wildlife as well. The denial of subsistence hunting rights often accompanies state appropriation of these values or their exclusive allocation to private landowners and commercial establishments.<sup>55</sup> In other cases, rural producers may not see wildlife as a productive resource which can be exploited and managed in the same manner as agriculture, livestock, or forestry resources. This attitude may stem in part from cultural tradition, government policies favoring other productive land uses, or a history of state control over wildlife resources.

In addition, wildlife tourism, sport hunting, or production of marketable products may conflict with local survival strategies; they may offer significant cash earnings, but fail to guarantee food security. The cash value of wildlife may also not be recognized, particularly when ready access to potential markets is not available. The ecological and productive values of maintaining wildlife habitat may also be unrecognized, or unrealized due to controls over land use by the state or other outside interests. The skills and resources needed for management and sustainable use in a context of limited wildlife populations and demanding state requirements are also

generally lacking among rural communities.<sup>56</sup> Development assistance to rural communities for wildlife resource exploitation is rarely provided, in part due to failures to recognize its economic potential, and in part due to a widespread perception that such communities lack the capacity to implement and manage commercial wildlife exploitation. The search for sustainability therefore continues to target private landowners and producers.

Available models are not easily adaptable to the goals of rural development, as can be seen in a number of recent efforts to involve local communities in wildlife conservation. One example is the encouragement of intensive wildlife production for local subsistence and marketing, as in the pilot iguana farms established in Panama, Costa Rica, Guatemala, and Mexico. Ten years of research in Panama and Costa Rica have established the biological requirements for captive breeding and rearing of iguanas for release in forested areas near small farmer households, and generated interest among local residents. However, preliminary economic feasibility studies suggest that the costs of constructing enclosures, shelters, and incubation facilities and providing supplemental feeding may be prohibitive for small farmers. Even if economic viability can be demonstrated, captive production is again highly skill-intensive and time-consuming, and farmer interest in assuming production tasks remains uncertain.<sup>57</sup>

While an experiment in Papua New Guinea with crocodile farming encountered predictable difficulties,<sup>58</sup> however, considerable success has been achieved in small-scale butterfly production. Butterfly "farming" actually involves extensive production, and natural habitat can easily be enriched with larval food plants. Start-up costs for cages, drying facilities, and packing materials are also low. A governmental program begun in Papua New Guinea in 1974 restricted export of butterflies to citizens, conducted market and technical research, and offered technical assistance to interested farmers. In 1978, a non-profit government organization was created to supply and purchase from farmers, market the butterflies abroad, and ensure quality control and price standardization. By 1984, more than 500 rural butterfly farms were in operation.<sup>59</sup>

If the sustainable management of wild, free-ranging wildlife populations generally remains the most practicable for application in rural communities, only recently have efforts begun to involve local participation in the management and conservation of wildlife and habitat. To date, most such efforts are directed at communities within or bordering on protected areas, particularly in the buffer zones of biosphere reserves. Biosphere reserves, a concept developed by the Man and the Biosphere program of the United Nations Economic and Social Council (UNESCO), are intended as alternatives to the traditional national parks. They

generally incorporate a protected core zone, a surrounding buffer zone where low-impact economic activities such as tourism are permitted, and transition zone in which more intensive but sustainable productive activities may be permitted. UNESCO recognition of such reserves also incorporates them into an international network facilitating the exchange of information on not only species and habitat status and conservation, but also on management design and implementation.

In practice, however, biosphere reserves and buffer zone management have offered few substantive changes in conservation policy. Although many reserves incorporate human populations, absolute protection rather than sustainable resource development remains the priority of reserve managers and responsible agencies.<sup>60</sup> Reserves are typically planned, created, and managed centrally, with little communication or input by local populations. Weak governmental management and extension capacity has often meant that natural resource exploitation has remained legally off limits even in populated areas. Those sustainable resource management programs which have been initiated are limited to agricultural and forestry activities in an effort to protect habitat, while wildlife exploitation has generally been ignored.<sup>61</sup>

Recent evaluations of NGO buffer zone management programs also suggest that their scale is too small to

affect human populations or reserve management, that local residents are often not consulted in program development and implementation, and that real efforts at resource management are extremely limited.<sup>62</sup> These programs often involve no more than direct compensation in cash or in kind in exchange for loss of access to protected land and resources, including wildlife.<sup>63</sup> Such handouts are only effective while they continue, while efforts to create employment opportunities through tourism development continue to be frustrated by government unwillingness to assist local infrastructure development and training or to share entry fees and other tourism revenues with residents.<sup>64</sup>

Relatively few mechanisms have been established to permit small-scale subsistence or commercial hunters to control or participate in decision-making in the management of wildlife resources. A program in Costa Rica does permit small subsistence and commercial takes of the eggs of olive ridley turtles. Although the harvest of marine turtle eggs is generally prohibited in Costa Rica, as it is in many other Central American nations, large-scale mass nesting at the beach of Ostional led researchers to suggest the potential sustainability of local harvests. Egg harvests were legalized at the beach, conditional on the formation of a local economic association, which would direct 80% of the profits from egg harvests to community development projects and return 20% to the national government. Local

organization and user rights represent only first steps, however, and the program continues to suffer from several shortcomings. Most importantly, government revenues, whether derived from the harvest or from other sources, have not been returned to the area in the form of research and management activities, and no mechanism has been established to solicit local input into continuing status assessments. Furthermore, no means have been developed to ensure that legally commercialized eggs receive market preference over illegally harvested eggs, and government enforcement assistance has been minimal.<sup>65</sup>

More comprehensive programs have been initiated in Africa, where the governments of Botswana, Kenya, Zimbabwe, and Zambia, have begun to experiment with sustainable wildlife management on communal lands, primarily as a response to the uncontrolled poaching of elephants and rhinos affecting adjacent public lands.<sup>66</sup> One particularly promising experiment Zimbabwe's CAMPFIRE Program, administered with technical and financial support from Zimbabwe Trust.<sup>67</sup>

The CAMPFIRE Program encourages the development of district-level organizations for the administration of safari hunting, establishment of hunting and culling quotas, control of problem animals, enforcement against poaching, distribution of revenues to households, or some combination of these activities.<sup>68</sup> The program was initiated in two

districts in 1989. One of them created its own safari operation and received concession and trophy fees from a private operator; the other licensed two private operators, marketed subsidized game meat from culling operations, and provided compensation for crop losses or injury and death by problem animals. Meat from culling, elimination of problem animals, or trophy hunting is also distributed in the community closest to the kill site, although low wildlife abundance has meant that little culling has been conducted thus far, limiting meat availability. Hunting by community members themselves also remains prohibited. However, safari hunting in these districts generated over US\$60,000 in the first year of operation. By 1992, nine districts had received authorization to participate in the program.

Similar community wildlife management programs have also been initiated in the Lupanda region of the Luangwa Valley of Zambia, where safari hunting yields revenues of approximately US\$350,000 per year.<sup>69</sup> Until the early 1980s, hunting by local residents was prohibited, and little of the revenue generated by tourism and safari hunting remained in local communities or was returned to wildlife management costs. Considerable poaching was affecting wildlife populations, particularly elephants and rhinos, and poachers from outside the valley gained local support through the sharing of harvested meat.<sup>70</sup>

Zambia's ADMADE program was begun in the Lupande Game Management Area (GMA) and subsequently initiated in 15 other GMAs throughout the country, with the assistance of WWF-US and USAID through the Wildlands and Human Needs Program.<sup>71</sup> Similar wildlife projects have also been included in the Luangwa Integrated Resource Development Project (LIRDP) covering the Lupande GMA and the South Luangwa National Park and assisted by WWF and the Norwegian Agency for Development Assistance. Both programs are to be self-financing through their own revolving funds. LIRDP was intended as an integrated development project covering agriculture, forestry, fisheries, water resources, and infrastructure as well as wildlife, but much of its revenue has derived from the wildlife component, chiefly safari fees from a newly established community operation.

Under both programs, local hunting is permitted under district hunting licenses distributed among the local chieftanships by local leadership committees and issued during visits by park rangers. Culling operations have been established with local management, and culled meat is also distributed to communities. Local employment is generated through the hiring of village scouts, and safari and tourism fees are shared with the community. Under ADMADE, 35 percent of revenues are returned to community projects within the GMA, 40 percent to wildlife management and enforcement, mostly through the employment of village

scouts, 15 percent to the national park, and 10 percent to the Zambia National Tourist Board. Under LIRD, 40 percent of revenues are destined for community projects in the Lupata GMA, and 60 percent is returned to LIRD's administrative and operating budget. Thus, the LIRD is relying primarily on revenues generated by the unusually lucrative nature of sport hunting in Africa to finance development of agriculture, forestry, fisheries, and infrastructure development.

Revenue sharing, employment generation, meat distribution, and the recognition of local hunting rights have reportedly contributed to a 90 percent decline in elephant poaching in the Luangwa Valley and considerable local cooperation in enforcement. In both Zimbabwe and Zambia, however, external evaluations have pointed to the lack of meaningful local participation in development planning and implementation as one of the most serious limitations to continued program success.<sup>72</sup> In the CAMPFIRE Program, for example, participation is limited to district-level wildlife management agencies, and much of the revenue has remained in the district councils instead of being distributed to communities and households.

Another approach to reconciling conflicts over wildlife use and conservation is represented by a series of comanagement arrangements established in the Arctic, where hunting and fishing continue to represent the central, or

even the only, economic activities supporting native communities.<sup>73</sup> Land claims settlements in both Alaska and Canada have recognized the importance of subsistence hunting, several efforts have been made to adapt the state regulatory system to the needs of native hunters. In Canada's Northwest Territories, for example, annual general hunting licenses without seasonal restrictions are issued to native hunters, while in northern Quebec, wildlife agencies regulate native hunting only when necessary for conservation and only following consultation with user groups, which are represented on a Hunting, Fishing, and Trapping Coordinating Committee.

The Porcupine Caribou Management Agreement was signed in 1985 to achieve cooperative management of the Porcupine caribou herd of the Yukon and Northwest Territories. The agreement created a management board with representatives of management agencies and native peoples' organizations to cooperatively decide issues of allocation among native and other users and to incorporate local knowledge into management decisions. The Porcupine Management Board has developed a management plan for the herd, negotiated guidelines for hunting and inter-community trade and barter of caribou meat, and instituted a biweekly radio news and information service. The herd also ranges into Alaska, however, creating conflict over harvest levels and conservation issues involved in the development of North

Slope petroleum reserves. In 1987, Canada and the United States signed the Agreement on the Conservation of the Porcupine Caribou Herd, establishing negotiation in setting overall quotas on each side of the border. Quotas are in turn distributed locally by community organizations, although Alaska does not yet have a management board similar to Yukon's.<sup>74</sup> Discussions during meetings of the Porcupine Caribou Herd also led to the establishment of a joint polar bear management program with cooperation from native organizations in Alaska and Canada.<sup>75</sup>

When declining stocks of beluga whales generated concern among scientists in the early 1980s, the Canadian Department of Fisheries and Oceans provided available information to a native hunter organization, Anguwigaq Wildlife, and encouraged them to decide independently on conservation measures. Member communities prohibited the hunting of females accompanied by calves, required hunters to harpoon before shooting to increase retrieval rates, established a sanctuary where the whales are completely protected, and established regional and community harvest quotas which reduced beluga takes from an annual average of 310 to 200. Native measures were incorporated into an official management plan published in 1986, which was revised in 1987 and 1988 following meetings with Anguwigaq and individual communities.<sup>76</sup>

In Alaska, native organizations have participated since 1981 in the Alaska Eskimo Whaling Commission, which combines traditional knowledge and research by government agencies in the establishment of special subsistence quotas for bowhead whales in the Bering and Beaufort seas under the U.S. Marine Mammal Protection Act and the International Whaling Convention.<sup>77</sup> A similar mechanism was established for Pacific walrus in 1987, with participation by the Eskimo Walrus Commission.<sup>78</sup> The Kuskokwim River Salmon Management Working Group formed was created in 1988, in which representatives of native subsistence fishermen, commercial fishermen, processing and marketing industries, and the Alaska Department of Fish and Game regulate fishery exploitation by determining season openings by consensus.<sup>79</sup>

The Yukon-Kuskokwim Delta Goose Management Plan developed in Alaska in 1985 also established cooperation between federal wildlife agencies and native hunters.<sup>80</sup> Efforts to enforce the U.S.-Canada Migratory Bird Treaty encountered native resistance in both Alaska and Canada, and in 1960, when a native representative to the Alaskan legislature was arrested for hunting out of season, more than 100 other hunters shot ducks and presented them to the local game warden. Consequently, little effort was made to enforce the treaty against native hunters until the 1980s, when populations of four species of geese had declined severely due to sport hunting, habitat loss, and pollution.

In 1982, the U.S. Fish and Wildlife Service began to solicit voluntary limitations on goose harvests. Under the Goose Management Plan of 1985, optimum, minimum, and midrange population levels for four goose species were established. Government representatives agreed to prohibit hunting of cackling Canada geese and to reduce sport hunting quotas for Pacific white-fronted geese, emperor geese, and Pacific brant. Native representatives in turn agreed to stop hunting cackling geese, to refrain from hunting the other three species during nesting, rearing, and molting, and to prohibit egg collection. In 1986, when populations of emperor geese dropped below the minimum optimal level established by the plan, native representatives voluntarily agreed to a ban on hunting of the species. An Information and Education Task Force was also created to promote awareness of the goals and decisions of the Plan, and a supplemental agreement signed for cooperation in monitoring, verification, and enforcement. Harvest studies suggest a high level of compliance with the plan by native hunters. The Plan remains formally illegal, however, due to inability to amend the Treaty.

These comangement arrangements have not completely eliminated conflict among resource users and other interested groups. They continue to arouse opposition from sport hunters, for example, who fear reduced hunting opportunities resulting from the exemptions granted to

subsistence hunters, and who have continued to block amendments to the Migratory Bird Treaty. In many cases, restrictions on native hunters are a consequence of overhunting and habitat degradation elsewhere. Nor are comanagement institutions easily transferred to conflictive settings in developing countries, for cooperative management in Alaska and Canada is greatly facilitated both by the existence of strong native organizations formed to protect territorial, cultural, and resource use rights, and relatively well-funded state and federal wildlife agencies with the capacity to provide assessments of both wildlife status and subsistence needs.

Nonetheless, these systems do offer useful lessons for wildlife resource management elsewhere. Comanagement has contributed considerably to cooperation and voluntary compliance by native hunters by replacing conflict and the imposition of penalties with opportunities by local communities and organizations to participate in regulatory decisions and to ensure that the measures undertaken are equitable and as consistent with native needs as possible. Their participation has been encouraged by providing increased communication on species status, hunting pressures, and the technical demands of conservation, and has in turn contributed significantly to the information available to regulatory agencies through native

participating not only in hunter surveys but also in game censuses and other research.

### Conclusion

If linkage between local development needs and wildlife conservation goals is often technically and economically feasible, more persistent obstacles are posed by the difficulty of achieving local proprietorship, management control and capacity, and access to benefits. Wildlife resources differ little from forestry, agriculture, and livestock resources in their susceptibility to problems of local marginalization, unequal political representation, and poorly conceived development policy and development assistance. The preceding pages have attempted to suggest both the reasons for and the social and ecological consequences of neglecting rural wildlife use in conservation and development policy.

Wildlife resources widely suffer from problems of open access and competitive overexploitation. It would, however, be inaccurate to conclude that competitive exploitation stems from the absence of any institutions governing exploitation and allocation. In many cases, targeted programs, regulatory frameworks, decision-making bodies, and international agreements have been created to reduce conflicts among resource users and foster resource conservation. The problem is instead that substantial groups of resource users have been excluded from these

mechanisms, often intentionally. Often, the real tragedy of the commons is the situation faced by communal landholders, who have been neglected by wildlife and conservation policies as well as development policy. It is consistently this segment of the population which relies most heavily on the exploitation of wildlife resources, which fails to receive the benefits of resource development, which bears the brunt of conservation measures decided without their participation, and which therefore lacks opportunities for sustainable resource use and development.

Several of the case studies also, however, suggested some useful lessons from past attempts to address this neglect. It is noteworthy that in all of the examples qualified as successes, local participation in resource management and conservation was the result of significant policy changes, inputs, and assistance from external actors, whether government agencies or NGOs. Generally, this is because past natural resource policies had already resulted in the deterioration of both resources and local attitudes. Furthermore, even in areas where strong local organization and awareness and interest in wildlife status already existed, as in the Arctic, the involvement of government agencies was critical for providing information on resource status and threats, creating forums to represent and resolve conflicts among different user groups, and enforcing joint decisions. In Africa and Papua New Guinea, government

agencies provided the initial research, technical assistance, and market information which stimulated the local development of commercial uses of wildlife. In Zimbabwe, a local NGO not only speeded halting government efforts to encourage local wildlife management but also helped to meet initial investment costs.

The fact that even qualified successes are rare lends urgency to the questions raised in the preceding chapter. What openings are available for local participation in management? How likely is it that the state will intervene on behalf of commons and commoners? What role do national and foreign conservationists play in the formulation of domestic policy? What array of interests structures participation in international institutions? The following chapters look to Mexico for some tentative answers.

#### Notes

1. For reviews of available quantitative data on subsistence hunting, see Antoon de Vos, "Game as Food: A Report on its Significance in Africa and Latin America," Unasylva 29, no. 116 (1977): 2-12; and J. B. Sale, The Importance and Values of Wild Plants and Animals in Africa (Gland: IUCN, 1981).
2. Julian Caldecott, Hunting and Wildlife Management in Sarawak (Gland: IUCN, 1988), 46-57.
3. M. J. Dourojeanni, "Over-exploited and Under-used Animals in the Amazon Region," in G. T. Prance and T. E. Lovejoy, eds., Key Environments--Amazonia (Oxford: Pergamon Press, 1985), cited in Caldecott.
4. Graham Child, "Wildlife Utilization and Management in Botswana," Biological Conservation 3, no. 1 (1970), 20.
5. J. B. Sale, The Importance and Values of Wild Plants and Animals in Africa, 8.

6. Kent H. Redford, "The Empty Forest," BioScience 42, no. 6 (June 1992), 414.
7. Bernard Nietschmann, "Hunting and Fishing Focus Among the Miskito Indians, Eastern Nicaragua," Human Ecology 1, no. 1 (1972): 41-67; Bernard Nietschmann, "The Cultural Context of Sea Turtle Subsistence Hunting in the Caribbean and the Problems Caused by Commercial Exploitation," in Biology and Conservation of Sea Turtles, ed. Karen A. Bjorndal (Washington, D.C.: National Academy Press, 1982).
8. Julian Caldecott, Hunting and Wildlife Management in Sarawak, Chapter 6.
9. Nigel J. H. Smith, "Utilization of Game Along Brazil's Transamazon Highway," Acta Amazonica 6 (1976): 455-466; Kent H. Redford and John G. Robinson, "The Game of Choice: Patterns of Indian and Colonist Hunting in the Neotropics," American Anthropologist 89, no. 3 (1987): 650-667. See also the case of the Yuqui described by Allyn Maclean Stearman, "Neotropical Indigenous Hunters and Their Neighbors: Sironio, Chimane, and Yuqui Hunting on the Bolivian Frontier," in Conservation of Neotropical Forests: Working from Traditional Resource Use, ed. Kent H. Redford and Christine Padoch (New York: Columbia University Press, 1992)
10. R. E. Bodmer, T. G. Fang, and L. M. Ibanez, "Ungulate Management and Conservation in the Peruvian Amazon," Biological Conservation 45 (1988): 303-310.
11. See, for example, Jason W. Clay, Indigenous Peoples and Tropical Forests (Cambridge: Cultural Survival, 1988).
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156. The observance of individual hunting territories is also reported for several cultures in Latin America and Africa. Patrick Deshayes, "La Manera de Cazar de los Huni Kuin," Cultural Survival Quarterly, No. 5 (March 1986): 7-10; E. L. Edroma, "Traditional Hunting in Uganda," in Wildlife Management and Utilization: Proceedings of the Fifth Regional Wildlife Conference for Eastern and Central Africa, ed. Mushanana L. Nchunga (Gaborone: Department of Wildlife and National Parks, Botswana, 1978); Emmanuel O. A. Asibey, "Traditional Hunting in West Africa with Special Reference to Ghana," in Mushanana L. Nchunga, ed., Wildlife Management and Utilization: Proceedings of the Fifth Regional Wildlife Conference for Eastern and Central Africa.

13. Lawrence H. Feldman, A Tumpine Economy: Production and Distribution Systems in Sixteenth-Century Eastern Guatemala. (Culver City: Labyrinthos, 1985), 90.

14. Eric Mjöberg, Forest Life and Adventures in the Malay Archipelago (Singapore: Oxford University Press, 1988), 87-88.

15. Raymond Hames, "Wildlife Conservation in Tribal Societies," in Biodiversity: Culture, Conservation, and Ecodevelopment, ed. Margery L. Oldfield and Janis B. Alcorn (Boulder: Westview Press, 1991); Julian Caldecott, Hunting and Wildlife Management in Sarawak; Jorge E. Orejuela, "Traditional Productive Systems of the Awa (Cuaiquer) Indians of Southwestern Colombia and Neighboring Ecuador," in Kent H. Redford and Christine Padoch, eds., The Conservation of Neotropical Forests.

16. Richard H. Thomas, The Politics of Hunting (Aldershot: Gower Publishing Company Limited, 1983).

17. Willie Orr, Deer Forests, Landlords and Crofters: The Western Highlands in Victorian and Edwardian Times (Edinburgh: John Donald Publishers LTD, 1982).

18. Anne Innis Dagg, Wildlife Management in Europe (Waterloo, Ontario: Otter Press, 1977), 226-227.

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20. Philip R. Pryde, Environmental Management in the Soviet Union (Cambridge: Cambridge University Press, 1991), Chapter 171; Philip R. Pryde, "Strategies and Problems of Wildlife Preservation in the USSR," Biological Conservation 36, no. 4 (1986): 351-374; A. B. Bubenik, "Sport Hunting in Continental Europe."
21. John M. MacKenzie, The Empire of Nature: Hunting, Conservation and British Imperialism (Manchester: Manchester University Press, 1988).
22. S. K. Eltringham, Wildlife Resources and Economic Development (New York: John Wiley and Sons, 1984); D. H. M. Cumming, "Commercial and Safari Hunting in Zimbabwe," in Robert J. Hudson, K. R. Drew, and L. M. Baskin, eds., Wildlife Production Systems; J. Barnes, J. Burgess, and D. Pearce, "Wildlife Tourism," in Economics for the Wilds: Wildlife, Diversity, and Development, ed. Timothy M. Swanson and Edward B. Barbier (Washington, D.C.: Island Press, 1992).
23. Richard Luxmoore, "Game Farming in South Africa as a Force in Conservation," Oryx 19, no. 4 (1985), 225-231. Some 7000 to 10,000 South African farmers derive some economic benefit from the wildlife on their lands. See Delwin E. Benson, "Values and Management of Wildlife and Recreation on Private Land in South Africa," Wildlife Society Bulletin 19 (Winter 1991): 497-510.
24. J. Barnes, J. Burgess, and D. Pearce, "Wildlife Tourism," 137.
25. See the case studies in Living with Wildlife: Wildlife Resource Management with Local Participation in Africa, ed. Agnes Kiss, World Bank Technical Paper Number 130, Africa Technical Department Series (Washington, D.C.: World Bank, 1990).
26. See Robert Prescott-Allen and Christine Prescott-Allen, The First Resource: Wild Species in the North American Economy (, 1986); Richard E. McCabe and Thomas R. McCabe, "Of Slings and Arrows: An Historical Retrospective," in White-Tailed Deer: Ecology and Management, ed. Lowell K. Halls (New York: Stackpole Books, 1981).
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Press, 1974); Shepard Krech III, ed., The Subarctic Fur Trade: Native Social and Economic Adaptations (Vancouver: University of British Columbia Press, 1984); J. C. Yerbury, The Subarctic Indians and the Fur Trade, 1860-1860 (Vancouver: University of British Columbia Press, 1986).

28. See Michael J. Bean, The Evolution of National Wildlife Law, revised edition (New York: Praeger, 1983), Chapter 2.

29. Terence P. Yorks, "Ranching native and exotic ungulates in the United States," in Robert J. Hudson, K. R. Drew, and L. M. Baskin, eds., Wildlife Production Systems.

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31. Michael L. Bean, The Evolution of National Wildlife Law, Chapter 3.

32. This discussion is based on the author's review of wildlife law in Costa Rica, Guatemala, Nicaragua, Panama, Colombia, Mexico, and Venezuela, and the legal summaries found in World Wildlife Fund, Latin American Wildlife Trade Laws, Revised Edition (Washington, D.C., 1986).

33. See, for example, Christopher Vaughan and Miguel Rodriguez, "White-Tailed Deer Management in Costa Rica," in Neotropical Wildlife Use and Conservation, ed. John G. Robinson and Kent H. Redford (Chicago: University of Chicago Press, 1991); Peter A. Brokx, "South America," in Lowell K. Halls, ed., White-tailed Deer.

34. TRAFFIC USA, "World Trade in Wildlife," Factsheet, photocopied.

35. Examples include reindeer husbandry in North America and northern Europe; commercial production of reindeer, moose, saiga antelope, and other species in the Soviet Union; and game ranching in southern Africa and North America. See the case studies in Robert J. Hudson, K. R. Drew, and L. M. Baskin, eds., Wildlife Production Systems.

36. See, for example, John Nichol, The Animal Smugglers and Other Wildlife Traders (New York: Facts on File, 1987).

37. Michael J. Bean, The Evolution of National Wildlife Law, Chapters 2, 5, 10, and 12.

38. Simon Lyster, International Wildlife Law (Cambridge: Grotius Publications, 1985); Migratory Species in International Instruments, IUCN Environmental Policy & Law Occasional Paper No. 2 (Gland: IUCN, 1986).

39. CITES regulates international trade of species listed in its three Appendices; Appendix I lists endangered species for which commercial trade is prohibited, Appendix II includes species which are or may be threatened as a result of commercial trade, and Appendix III list species protected and nominated by individual countries seeking international assistance in trade controls. For non-commercial trade in Appendix I species, CITES export and import permits are required for trade. For commercial trade in Appendix II species, importers are to require presentation of an export permit issued by the exporting country following a determination that the transaction does not pose a threat to species status. Requirements for export permits for Appendix III species are implemented on a somewhat more voluntary basis. CITES is discussed in Simon Lyster, International Wildlife Law, chapter 12.

40. Laura Kosloff and Mark C. Trextler, "The Convention on International Trade in Endangered Species: No Carrot, But Where's the Stick?" Harvard International Law Reporter XVII, no. 7 (1987): 10222-10236.

41. These problems have affected other international agreements as well. The International Whaling Commission, for example, has been faced with the difficulty of exempting traditional subsistence quotas to native populations from the general whaling moratorium. Many of the delegates to the sixth annual Inuit Circumpolar Conference in July 1992 pressed for the formation of a parallel whaling agency to represent and protect aboriginal hunting rights and needs. "Whalers Seek to Protect Traditions," TRAFFIC Bulletin 13, no. 2 (1992): 53.

42. See Richard A. Luxmoore, ed., A Directory of Crocodylian Farming Operations, 2nd. Ed. (Gland: IUCN, 1992).

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44. Milan Novak, eds, Wild Furbearer Management and Conservation in North America (Ontario: Canadian Ministry of Natural Resources, 1986).

45. Andrea L. Gaski and Ginette Hemley, "The Ups and Downs of the Crocodylian Skin Trade," TRAFFIC (USA) 8, no. 1 (February 1988): 1-16; Richard A. Luxmoore, "Current Issues

in the World Crocodylian Skin Trade," TRAFFIC (USA) 10, no. 2 (June 1990): 2; Ginette Hemley, "Illegal Trade in Crocodile Skins," TRAFFIC (USA) 10, no. 2 (June 1990): 3-4; Ginette Hemley and J. Caldwell, "The Crocodylian Skin Trade Since 1979," paper presented at the 7th Working Meeting of the IUCN/SSC Crocodile Specialist Group, Caracas, Venezuela, 21-28 October 1984. Intensive production of sea turtles for meat and skins has experienced little success due to technical difficulties and reliance on eggs from the wild, as well as stricter controls on commercialization and trade, which is now prohibited in most countries. David W. Ehrenfeld, "Conserving the Edible Sea Turtle: Can Mariculture Help?" American Scientist 62, no. 1 (1974): 23-31; Kenneth C. Dodd, "Does Sea Turtle Aquaculture Benefit Conservation?" in Biology and Conservation of Sea Turtles, ed. Karen A. Bjorndal (Washington, D.C.: Smithsonian Institution Press, 1982).

46. Crocodile and alligator farming operations were indeed affected by increased production in the 1980s. Ronald Smothers, "Louisiana Farmers, Finding Gold in Alligator Skins, Face a Changing Market," The New York Times, 1 April 1991.

47. In theory, the harvest of wild psittacines is amenable to active management, whether through the scientific establishment of sustainable harvest levels for specific areas or populations or more intensive methods such as the provision of artificial nesting sites or the removal and incubation of eggs laid early in the season or from double clutches. Little effort has been made to experiment with such systems. See Steven R. Beissinger and Enrique H. Bucher, "Can Parrots Be Conserved through Sustainable Harvesting?" BioScience 42, no. 3 (March 1992): 164-173.

48. Wild Bird Conservation Act of 1992, P.L. 102-440 of 23 October 1992.

49. "Eighth Meeting of the Conference of the Parties to CITES," TRAFFIC (USA) 11, no. 3 (August 1992), 7.

50. Jorgen Bent Thomsen and Amie Brautigam, "Sustainable Use of Neotropical Parrots," in Neotropical Wildlife Use and Conservation, ed. John G. Robinson and Kent H. Redford (Chicago: University of Chicago Press, 1991).

51. From John B. Thorbjarnarson, "An Analysis of the Spectacled Caiman (Caiman crocodilus) Harvest Program in Venezuela," and Juhani Ojasti, "Human Exploitation of Capybara," in John G. Robinson and Kent H. Redford, eds., Neotropical Wildlife Use and Conservation.

52. John B. Hallagan, "Effects of the Regulation of the International Ivory Trade on African Elephant Conservation," in Transactions of the 55th North American Wildlife and Natural Resources Conference (Washington, D.C.: Wildlife Management Institute, 1990); Ginette Hemley, "CITES 1992: Endangered Treaty" TRAFFIC (USA) 11, no. 3 (August 1992): 1-3. For a discussion of the issues and problems involved in regulating the ivory trade, see Edward B. Barbier, Joanne C. Burgess, Timothy M. Swanson, and David W. Pearce, Elephants, Economics and Ivory (London: Earthscan Publications Ltd., 1990).

53. The most accessible sources of information on contemporary wildlife laws in developing countries are African Wildlife Laws, IUCN Environmental Policy & Law Occasional Paper No. 3 (Siegburg: Daemisch Mohr GmbH, 1986); Latin American Wildlife Trade Laws (Washington, D.C.: TRAFFIC, 1985); and Asian Wildlife Trade Laws (Washington, D.C.: TRAFFIC, 1991).

54. Some of these problems are reviewed by Gail Osherenko, "Can Co-Management Save Arctic Wildlife?" Environment 30, no. 6 (July/August 1988): 6-13, 29-34.

55. In Zaire, for example, the lucrative nature of the ivory trade led to the establishment of a government monopoly of harvest and trade and a prohibition on the subsistence hunting of elephants. See Emizet Kisangani, "A Social Dilemma in a Less Developed Country: The Massacre of the African Elephant in Zaire," in Proceedings of the Conference on Common Property Resource Management (Washington, D.C.: National Academy Press, 1986).

56. Agnes Kiss, ed., Living with Wildlife, Part 5.

57. Jeffrey P. Cohn, "Iguana Conservation and Economic Development," BioScience 39, no. 6 (June 1989): 359-363; Dagmar I. Werner, "The Rational Use of Green Iguanas," in John G. Robinson and Kent H. Redford, eds., Neotropical Wildlife Use and Conservation.

58. Melvin Bolton and Miro Laufa, "The Crocodile Project in Papua New Guinea," Biological Conservation 22, no. 3 (1982): 169-179. Experiments with both private and community wildlife farming have focused on reptiles, namely crocodylians, aquatic turtles, and iguanas, although several projects in the Latin American tropics have also experimented with intensive or semi-intensive production of peccaries and small rodents. See, for example, Flavio Coello Hinojosa, "The Cuyabeno Wildlife Production Reserve: Human Needs and Natural Resource Conservation in the Ecuadorean Amazon," in Kent H. Redford and Christine Padoch,

Conservation of Neotropical Forests, 255-256. Captive breeding of mammals, however, raises new difficulties, for many species exhibit strong territoriality, competition between males, and failure to breed in captivity.

59. Pilot farms were also established in India in 1985, but information on their performance is not available. Angus F. Hutton, "Butterfly Farming in Papua New Guinea," Oryx 19, no. 3 (July 1985): 158-162.

60. William P. Gregg, Jr., "MAB Biosphere Reserves and Conservation of Traditional Land Use Systems," in Biodiversity: Culture, Conservation, and Ecodevelopment, ed. Margery L. Oldfield and Janis B. Alcorn (Boulder: Westview Press, 1991).

61. See, for example, Kent H. Redford and Allyn M. Stearman, "Local Peoples and the Beni Biosphere Reserve, Bolivia," Vida Silvestre Neotropical 2, no. 1 (1989): 49-56.

62. Michael Wells and Katrina Brandon, with Lee Hannah, People and Parks: Linking Protected Area Management with Local Communities (Washington, D.C.: World Bank, World Wildlife Fund, and U.S. Agency for International Development, 1992); and Krishna B. Ghimire, Parks and People: Livelihood Issues in National Parks Management in Thailand and Madagascar, Discussion Paper 29 (Geneva: United Nations Research Institute for Social Development, December 1991).

63. Michael Wells, Katrina Brandon, and Lee Hannah, People and Parks; Jeffrey A. McNeely and Kenton R. Miller, National Parks, Conservation, and Development: The Role of Protected Areas in Sustaining Society (Washington, D.C.: IUCN and Smithsonian Institution Press, 1984); John MacKinnon, Kathy MacKinnon, Graham Child, and Jim Thorsell, Managing Protected Areas in the Tropics (Gland: IUCN, 1986).

64. Sheila O'Conner, "Madagascar: Beza Mahafaly and Andohahela," L. Talbot and P. Olindo, "Kenya: The Maasai Mara and Amboseli Reserves," and Amy Vedder and William Weber, "Rwanda: The Mountain Gorilla Project (Volcanoes National Park)," in Agnes Kiss, ed., Living With Wildlife; Martha J. Groom, Robert D. Podolsky, and Charles A. Munn, "Tourism as a Sustained Use of Wildlife: A Case Study of Madre de Dios, Southeastern Peru," in John G. Robinson and Kent H. Redford, eds., Neotropical Wildlife Use and Conservation.

65. Stephen E. Cornelius, Mario Alvarado Ulloa, Juan Carlos Castro, Mercedes Mata del Valle, and Douglas C. Robinson, "Management of Olive Ridley Sea Turtle (Lepidochelys

olivacea) Nesting at Playas Nancite and Ostional, Costa Rica," in John G. Robinson and Kent H. Redford, eds., Neotropical Wildlife Use and Conservation.

66. For discussions of programs in Kenya and Botswana, see L. Talbot and P. Olindo, "Kenya: The Maasai Mara and Amboseli Reserves," and David Lawson and Poppy Mafela, "Botswana: Development of the WMA Concept," in Agnes Kiss, ed., Living with Wildlife.

67. This discussion is based on information from Felix Murindagomo, "Zimbabwe: WINDFALL and CAMPFIRE," in Agnes Kiss, ed., Living with Wildlife; Edward B. Barbier, "Community-Based Development in Africa," in Timothy M. Swanson and Edward B. Barbier, eds., Economics for the Wilds; D. H. M. Cumming, "Commercial and Safari Hunting in Zimbabwe," in Robert J. Hudson, K. R. Drew, and L. M. Baskin, eds., Wildlife Production Systems; and Graham Child, "Managing Wildlife for People in Zimbabwe," in Jeffrey A. McNeely and Kenton R. Miller, eds., National Parks, Conservation, and Development.

68. The first efforts to include local participation in wildlife management were taken under the 1975 Parks and Wildlife Act, which provided for the declaration of district councils representing communal landholders as "appropriate authorities" for wildlife management on communal lands, in cases where government agencies were satisfied with the councils' management capacity. In 1978, Project WINDFALL (Wildlife Industries New Development for All) was launched to encourage local interest and assistance in wildlife conservation by providing local communities with meat and revenue from government culling programs, but little revenue actually reached originating communities.

CAMPFIRE (The Communal Area Management Programme for Indigenous Resources) was created in 1984 and originally intended to create a system of natural resource cooperatives with collective rights of ownership and management authority for grazing lands, forestry and water resources, and wildlife. An agency for implementation and technical support was also to be established within the Department of National Parks and Wildlife Management. Government failure to implement the program led two district councils, with the support of The Zimbabwe Trust and the University of Zimbabwe, to seek permission to initiate the wildlife management activities in the CAMPFIRE Program. As of 1992, nine other districts had received authorization to begin similar management areas.

69. This discussion is based on Fedelius B. Lungu, "Zambia: Administrative Design for Game Management Areas (ADMAGE) and Luangwa Integrated Rural Development Project (LIRDP)," in

Agnes Kiss, ed., Living with Wildlife; Jeffrey A. McNeely, Economics and Biological Diversity: Developing and Using Economic Incentives to Conserve Biological Resources (Gland: IUCN, 1988), 184-185; Edward B. Barbier, "Community-Based Development in Africa," in Timothy M. Swanson and Edward B. Barbier, eds., Economics for the Wilds; and Dale Lewis, Gilson B. Kaweche, and Ackim Mwenya, "Wildlife Conservation Outside Protected Areas--Lessons from an Experiment in Zambia," Conservation Biology 4, no. 2 (1990): 171-180.

70. Excellent background studies on hunting by the Valley Bisa are available in Stuart A. Marks, Large Mammals and a Brave People: Subsistence Hunters in Zambia (Seattle: University of Washington Press, 1976); Stuart A. Marks, The Imperial Lion: Human Dimensions of Wildlife Management in Africa (Boulder: Westview Press, 1984); Nick Abel and Piers Blaikie, "Elephants, People, Parks and Development: The Case of the Luangwa Valley, Zambia," Environmental Management 10, no. 6 (1986): 735-751. For discussion of the economics of "poaching" in the Luangwa Valley, see N. Leader-Williams, S. D. Albon, and P. S. M. Berry, "Illegal Exploitation of Black Rhinoceros and Elephant Populations: Patterns of Decline, Law Enforcement, and Patrol Effort in Luangwa Valley, Zambia," Journal of Applied Ecology 27 (1990): 1055-87; E. J. Milner-Gulland and N. Leader-Williams, "A Model of the Incentives for Illegal Exploitation of Rhinos and Elephants: Poaching Pays in Luangwa Valley, Zambia," Journal of Applied Ecology 29 (1992): 388-401; and E. J. Miler-Gulland and Nigel Leader-Williams, "Illegal Exploitation of Wildlife," in Timothy M. Swanson and Edward B. Barbier, eds., Economics for the Wilds.

71. Severe poaching pressure led the National Parks and Wildlife Service to begin experimenting with mechanisms for the reduction of poaching. In 1983, a Wildlife Conservation Revolving Fund was established to capture revenues from wildlife harvests and safari concessions for increases in enforcement staff, wildlife management expenses, and returns to communities. Village scouts were trained and designated as official wildlife officers, permitting a significant increase in enforcement effort. The village scout program and the revolving fund were subsequently integrated into ADMADE.

72. See also Michael Wells, Katrina Brandon, and Lee Hannah, People and Parks, 43-44, 80.

73. Subsistence use, resource conflicts, and efforts to resolve them are discussed generally in David R. Klein, "Northern Subsistence Hunting Economies," in Robert J. Hudson, K. R. Drew, and L. M. Baskin, eds., Wildlife

Production Systems; Thomas R. Berger, "Conflict in Alaska," Natural Resources Journal 28, no. 1 (1988): 37-62; G. H. Finney, "Some Aspects of the Native Harvest of Wildlife in Canada," Transactions of the Forty-Fourth North American Wildlife and Natural Resources Conference (Washington, D.C.: Wildlife Management Institute, 1979); Steve J. Langdon, ed., Contemporary Alaskan Native Economies (Lanham: University Press of America, 1986); Charles A. Drolet, Austin Reed, Mimi Breton, and F. Berkes, "Sharing Wildlife Management Responsibilities with Native Groups: Case Histories in Northern Quebec," Transactions of the 52nd North American Wildlife & Natural Resources Conference (Washington, D.C.: Wildlife Management Institute, 1987); Andy Carpenter, Bruce M. V. Hanbidge, and Richard M. Binder, "Co-Management of Wildlife in the Western Canadian Arctic: An Inuvialuit Perspective," Transactions of the 56th North American Wildlife and Natural Resources Conference (Washington, D.C.: Wildlife Management Institute, 1991); Gail Osherenko, Sharing Power with Native Users: Co-Management Regimes for Arctic Wildlife, CARC Policy Paper 5 (Ottawa: Canadian Arctic Resources Committee, 1988); Gail Osherenko, "Can Co-Management Save Arctic Wildlife?"; Ken M. East, "Joint Management of Canada's Northern National Parks," in Resident Peoples and National Parks: Social Dilemmas and Strategies in International Conservation, ed. Patrick C. West and Steven R. Brechin (Tucson: University of Arizona Press, 1991).

74. Albert Peter and Douglas Urquhart, "One Caribou Herd, Two Native Cultures, Five Political Systems: Consensus Management on the Porcupine Caribou Range," Transactions of the 56th North American Wildlife and Natural Resources Conference (Washington, D.C.: Wildlife Management Institute, 1991); Robert F. Keith, "Arctic Borderlands: Environment and Development Issues in Canadian-American Relations," Behind the Headlines [Canadian Institute of International Affairs] 48, no. 2 (Winter 1990-1991): 1-19.

75. Benjamin P. Nageak, Charles D. Brower, and Scott L. Schliebe, "Polar Bear Management in the Southern Beaufort Sea: An Agreement Between the Inuvialuit Game Council and North Slope Borough Fish and Game Committee," in Transactions of the 56th North American Wildlife and Natural Resources Conference. Alaskan native representatives also cooperated with Canadian Inuvialuit efforts to reinstate a subsistence quota for bowhead whales. See Milton M. R. Freeman, Eleanor E. Wein, and Darren E. Keith, Recovering Rights: Bowhead Whales and Inuvialuit Subsistence in the Western Canadian Arctic (Edmonton, Alberta: Canadian Circumpolar Institute and Fisheries Joint Management Committee, 1992).

A comanagement system for the Beverly and Kaminuriak caribou herds of the central Arctic was developed in 1982. The regime developed in response to findings by official wildlife managers that the caribou herds were declining drastically, leading to proposals to impose native hunting quotas. Opposition from native hunters and the impossibility of enforcement of the quotas led to the creation of a Caribou Management Board, composed of eight native representatives and five government representatives, to coordinate herd management and recommend conservation measures. The native representatives questioned the findings of government biologists, and the Board delayed the imposition of quotas until improved population surveys could be conducted, and initiated harvest studies by native communities. The Board discovered that the perceived decline of caribou herds had been in part the result of natural and temporary fluctuations in herd numbers, and in part the result of inadequate census techniques. By 1984, census results had documented sizeable and increasing caribou herds, and the Board had established optimum population levels and minimum herd levels below which hunting quotas would be imposed. A long-range management plan for the herds was completed in 1987, which has been largely followed by government agencies. See Gail Osherenko, "Can Comanagement Save Arctic Wildlife?"; George W. Scotter, "The Beverly and Kaminuriak Caribou Management Board: An Example of Cooperative Management," in Transactions of the 56th North American Wildlife and Natural Resources Conference.

76. Gail Osherenko, "Can Co-Management Save Arctic Wildlife?"

77. See Milton R. Freeman, "The Alaska Eskimo Whaling Commission: Successful Co-Management under Extreme Conditions," in Co-Operative Management of Local Fisheries: New Directions for Improved Management & Community Development, ed. Evelyn Pinkerton (Vancouver: University of British Columbia Press, 1989).

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PART II  
MEXICO IN CONTEXT: RESOURCES, DEVELOPMENT,  
AND THE RURAL POOR

CHAPTER 4  
THE PATTERNS OF MEXICAN DEVELOPMENT

Introduction

Rapid economic growth from the 1950s through the 1970s transformed Mexico from a predominantly rural, agricultural nation to one of the most industrialized economies of Latin America. The importance of rural producers in the national economy has decreased significantly; rural agriculturalists fell from 57% of the total population in 1950 to one-third by 1990, while the primary sector's contribution to GDP declined from 19.1% to 8.1%.<sup>1</sup> Although the economic crisis which began in 1982 slowed industrial output and temporarily boosted agriculture's share in total economic activity, renewed growth in the late 1980s and 1990s is likely to continue the shift from countryside to city.

The Mexican countryside, however, has not lost its central place in national development. Not only does the campesino, or country person, retain a place in national political culture,<sup>2</sup> but the concentration of Mexico's poor in rural areas demands public intervention even in the midst of a radical cutback in the state's role in social and economic life.<sup>3</sup> The countryside is now a critical component of Mexico's emerging environmental policy as well,

in part because the urban and industrial bias of past development policy and consequent rural poverty have ensured the continued importance of wildlife and other extractive natural resources to rural survival strategies.

This chapter provides an brief overview of the goals and phases of Mexican economic development policy, with attention to conditions prevailing in the primary sector (agriculture, livestock, forestry, and fisheries) and to those elements most important in determining the appropriation, allocation, and governance of Mexico's natural resources. These include not only land ownership, credit, and rural development policies which have prevented the tenure security and capital accumulation necessary for effective local management of wildlife and other resources, but also patterns of organization and representation which have constrained efforts to change this context.

Overview: The Primary Sector in Mexican Development Policy

National development in most of the post-war period has been dominated by the goals of economic modernization and political consolidation. The former was pursued until the early 1980s through the strategy of import substitution industrialization, in which highly protectionist trade policies were adopted in order to foster the growth of domestic industries oriented toward producing goods formerly supplied by imports. The resources needed for domestic industry were to be generated by the primary sector through

the development of commercial agriculture, increased agricultural exports, and the transfer of capital from the agricultural toward the industrial sector.

The second priority involves the strengthening of the Mexican state vis-á-vis key sectors of the domestic population. State control over both popular mobilization and dissent has been achieved through a set of mechanisms commonly described under the rubric of authoritarian corporatism, characterized by "strong and relatively autonomous governmental structures that seek to impose on the society a system of interest representation based on enforced limited pluralism."<sup>4</sup> The establishment of centrally-controlled organizations for channeling communications and demands has been coupled with the control of spontaneous or organized dissent through the selective distribution of concrete benefits or, when necessary, the harassment, arrest, imprisonment, torture, or murder of those challenging state control.<sup>5</sup>

The presidency of Lázaro Cárdenas (1934-1940) established the corporatist relationship between the dominant Institutional Revolutionary Party (Partido Revolucionario Institucional, or PRI) and the popular sectors, chiefly agriculture and labor. Faced with the need to strengthen the administration's authority in the face of both leftist and rightist opposition, Cárdenas adopted a "platform of agrarian reform, justice in the workplace,

nationalism, and economic development under the rectoría of the state."<sup>6</sup> While political power was concentrated in the alliance of state, PRI, and political and economic elites, the creation of the Confederation of Mexican Workers (Confederación de Trabajadores Mexicanos, or CTM), the National Campesino Confederation (Confederación Nacional Campesino, or CNC) and the National Confederation of Popular Organizations (Confederación Nacional de Organizaciones Populares, or CNOP) permitted more effective demand-making and distribution of state benefits as well as the mobilization of political support.<sup>7</sup> Through these organizations, the state espoused the causes of agrarian reform and labor organization while simultaneously fostering capitalist economic development through state investment and intervention in agricultural, forestry, industrial, infrastructure, and petroleum development.

While the Mexican revolution of 1910-1917 had granted the campesino a central place in the nation's political culture, it was again the Cárdenas administration which the terms of political dialogue which would persist until the 1970s. In the countryside, the central institution of land reform, rural production and credit, and campesino mobilization was the ejido, federally-owned agricultural land with use rights collectively granted to peasant communities without the rights of sale or transfer. Although the ejido system was established during the

revolution as a means of transferring power from large prerevolutionary landowners to rural labor, land reform languished until the presidency of Cárdenas, who distributed over 20 million hectares to some 763,000 applicants.<sup>8</sup> The CNC served as the channel for both bottom-up demands for agricultural land redistribution and political support to the state, and for top-down distribution of land, credit, and political control.

Although the Cárdenas platform has remained central to the rhetoric of his successors, post-Cárdenist administrations have altered the balance of distribution versus control, and the rhetoric of populism has come to lose much of its substantive content. A reconcentration of resources in the countryside has occurred as the state distributed much smaller amounts of increasingly marginal lands to campesinos<sup>9</sup> while channeling the bulk of public investment in agriculture toward the modern commercial sector. With the arrival of the Green Revolution in Mexico in the late 1940s, the introduction of improved wheat varieties led to federal support for the development of large irrigation districts in northwestern Mexico for large-scale mechanized production with high chemical inputs. After 1960 production in these irrigation districts expanded to include feedgrains, fruits and vegetables for export. This dual policy has created a stark contrast between the small-scale, rainfed peasant agriculture of the center and

south of the country, based on the staple crops of corn and beans, and the export-oriented production of fruits, vegetables, and grains in the north and northwest, benefitting from federally subsidized irrigation and legislative changes permitting the accumulation of large private landholdings.<sup>10</sup>

From the mid-1950s to 1970, a strong emphasis on urban industrial development and the reaching of agriculture's extensive growth margins led to increasing stagnation and poverty in the Mexican countryside. Despite steady per capita growth, protectionist trade policies combined with controls on agricultural and food prices to favor urban consumers and industry. Guaranteed prices for staple crops fell in relation to the minimum wage index, and many rural producers lacked access to official purchasers and so obtained even lower prices from private middlemen. Production of basic crops fell as producers cut back to subsistence levels and diverted surplus labor to the wage sector, while rapid population growth helped to prevent the absorption of this surplus rural labor by the industrial sector.<sup>11</sup> Migration to Mexico's urban centers and to the United States increased considerably as a result.<sup>12</sup>

The bias against small agricultural producers was aggravated by land tenure, credit, and subsidy policies which favored the development of commercial agricultural and livestock production. Extensive cattle production in

particular led to legal and illegal forms of land concentration, while the stimulation of sorghum and other feedgrains for intensive production of pork and poultry diverted land and credit away from basic food crops.<sup>13</sup> The redistribution of agricultural land slowed, aided by granting of certificates of nonaffectability and of legal claims by landowners against redistribution, which favored large livestock producers. These trends, coupled with low social spending, created growing pressures for state intervention to correct regional inequalities and social problems.<sup>14</sup>

President Luis Echeverría, assuming office after the 1968 student-led protests and subsequent unrest and continuing rural guerrilla activity, ushered in a brief renewal of Mexican populism. Part of his administration's effort to increase the government role in reducing poverty and inequality involved increased public investment in agricultural development, which rose from 11% of public investment during the previous administration to 17% in 1970-1976.<sup>15</sup> A new Agrarian Reform Law called for the formation of unions of ejidos and second-level Rural Collective Interest Associations (Asociaciones Rurales de Interés Colectivo, or ARICs) to facilitate government assistance, and in some cases New Ejidal Population Centers (Nuevos Centros de Población Ejidal, or NCPes) were created to concentrate rural populations for the more effective

provision of infrastructure and social services. The National Fund for Ejidal Development (Fondo Nacional de Fomento Ejidal, or FONAFE) was also created, and the National Coordinating Committee for Support of Popular Consumption (CONASUPO) expanded.

Renewed emphasis on land reform sparked land invasions in seven states, to which the federal government responded with expropriations. In all, over 12.7 million hectares were distributed under his administration.<sup>16</sup> Greater emphasis was also placed on regional development and on improving living standards for indigenous communities, and land grants were made to the Lacandon Maya of Chiapas<sup>17</sup> and to the Seri Indians of Isla Tiburon.<sup>18</sup>

The formation of state-owned enterprises accelerated during this period as well. State agencies were created to direct production and marketing of individual commodities such as coffee (Mexican Coffee Institute, or INMECAFE), tobacco (Mexican Tobacco Institute, or TABAMEX), barbasco (Mexican Plant Chemical Products, or PROQUIVEMEX), and minor forestry products such as palm (FIDEPAL) and candelilla (FONCAN). Low nationwide forestry production prompted the creation of parastatals such as Aprovechamientos Forestales de Nayarit, Productos Forestales de la Tarahumara in Chihuahua, Forestal Vicente Guerrero in Guerrero, and of ejidal forestry enterprises with support from FONAFE.<sup>19</sup>

The agrarian activism, high federal spending, budget deficits, and inflation of Echeverría's presidency alienated the private sector, and the government of Jose Lopez Portillo (1976-1982) declared an end to the era of land reform. In place of continued land distribution, the administration stressed the importance of raising standards of living and meeting basic needs. The Mexican oil boom of 1978-1981 and foreign borrowing on expected oil revenues provided the wherewithal to institute programs such as the Mexican Food System (Sistema Alimentario Mexicano, or SAM) to achieve food self-sufficiency and raise rural incomes through guaranteed prices for basic grains, as well as improve nutrition among the poor.

While the SAM achieved temporary improvements in agricultural output and rural welfare, its high cost led to its rapid abandonment. At the same time, technical and infrastructure development and steadily increasing production of livestock and feed crops encouraged the continued concentration of agricultural landholdings. Federal promotion of tourism development during this period, as with the creation of the Caribbean resort town of Cancun, similarly increased rural land values and encouraged their private acquisition.<sup>20</sup> The legislative basis for land reform was also undermined by measures such as the Law of Agricultural and Livestock Development (Ley de Fomento

Agropecuario) of 1980, which permitted the use of ejidal lands by private enterprises.<sup>21</sup>

When the price of oil fell in mid-1981, high international interest rates and inflation led to Mexico's 1982 debt crisis and to a prolonged period of severe losses in living standards for Mexico's urban and rural poor. Stabilization policies implemented during the presidency of Miguel de la Madrid (1982-1988) included large devaluations of the peso, tight monetary policy, sharp reductions in government spending, and wage and price controls. Annual growth in the gross domestic product, 8.8% in 1981, was negative in 1982, 1983, and 1986,<sup>22</sup> and real wages per worker fell a cumulative 41.5% between 1983 and 1988.<sup>23</sup> Overall social spending fell a cumulative 33% during this period; with continued population growth, per capita social spending dropped 40% in this period.<sup>24</sup>

Agricultural output actually grew during 1983-1985 as a result of good weather conditions and price improvements deriving from currency devaluation. Although agricultural wage incomes declined, nonwage incomes increased as a result of increased production. This trend reversed itself in 1986-1988, however, with declines in both wage and non-wage agricultural incomes during this period and for the overall 1983-1988 period.<sup>25</sup> The agricultural sector fared slightly better than the economy as a whole, however; its

contribution to total GDP actually rose from 7.9% in 1982 to 8.5% in 1987, declining again thereafter.<sup>26</sup>

If the economic crisis of the 1980s strengthened some of the tendencies toward income and land concentration, it undoubtedly weakened others. For example, declining domestic demand for beef contributed to the stagnation of the cattle industry for the first time in its history, with total herd size declining from 37,522,474 in 1983 to 32,565,465 in 1988.<sup>27</sup> Beef sales fell by half between 1984 and 1990, and production of forrage and oleaginous seeds on irrigated lands fell 6.4% between 1982 and 1987.<sup>28</sup> Declining domestic meat consumption and the termination of subsidies for sorghum production in 1985 led to a declining share of land devoted to this crop in relation to that dedicated to corn.<sup>29</sup>

On the other hand, incomes and consumption also fell drastically among lower- and middle-income households, and income concentration increased, the highest 10% increasing their share 5.1% between 1984 and 1989, while the lowest 10% suffered a 1.4% drop and the middle class 3.7%. Although agricultural wage and non-wage monetary income fell less sharply than in the nonagricultural population, the rural and urban poor are less able to withstand even a small decline in incomes.

The rural poor were further disadvantaged by legislative initiatives undertaken during this period.

Reform of the agrarian code authorized the sale or rental of federal lands formerly set aside for distribution to ejidos; decentralized control over land distribution, thus increasing the vulnerability of land reform decisions to local landholding interests; permitted contracts between ejidal authorities and private capital to exploit ejidal forests, mines, fisheries, and tourism resources, thereby encouraging the corruption of local officials; and abolished important internal checks on corruption by ejidal authorities. The cattle industry was also given official encouragement by accelerating grants of land nonaffectability to large landholdings and by legalizing the rental of ejidal lands.<sup>30</sup>

President Carlos Salinas de Gortari, upon assuming office in 1988, pursued economic stabilization through industrial privatization and deregulation; the signing of a new debt agreement with commercial banks which allowed a reduction of debt and interest payments and the resumption of new capital inflows; and a continuation of the trade liberalization begun under de la Madrid and culminating in the negotiation of a free trade agreement with the United States and Canada. Economic growth resumed in 1989 and accelerated in 1990 and 1991. Price controls in 1988 and 1989 kept agricultural prices particularly low and may have contributed to a fall in output in these years, but price liberalization was pursued beginning in 1990. Renewed

external lending allowed some recovery in social spending, particularly through the National Solidarity Program (Programa Nacional de Solidaridad, or PRONASOL) and targeted food subsidies.<sup>31</sup>

One of the most important components of economic liberalization by the Salinas administration is the amendment of Article 27 of the Mexican Constitution of 1917, granting ejidos individual titles to their property and the right to sell, rent, transfer, or privatize formerly communally-held lands. These reforms are coupled with the severe cutbacks in federally subsidized credit to ejidos and cooperatives and legislative initiatives entailing the lifting of important restrictions on private and foreign investment in forestry, mining, fisheries, and agriculture to encourage modernization and efficiency gains. These changes are likely to bring rapid concentration in landholdings and the elimination of many small producers from the primary sector. Trade liberalization with NAFTA will accelerate this process by encouraging commercial export production and the importation of many basic foodstuffs now produced by small farmers.<sup>32</sup>

The Distributional and Environmental Consequences  
of Rural Development Policy

Regardless of varying levels of rhetorical commitment to the countryside, both official policy and structural constraints have maintained a consistent bias against the rural poor in the allocation of Mexico's scarce natural and

financial resources. This bias is particularly evident in the distribution of agricultural lands. Only about 18%, or 35 million hectares, of Mexico's land surface is arable. Under Cárdenas, some 23% of the land distributed to campesinos was suitable for agricultural production, 5% of this irrigated. However, land distributed by later presidential administrations increasingly involved non-arable land. A comparable amount of land distribution was repeated only under Díaz Ordaz (1965-1970), under whom only 8% of the land distributed was arable, and none of it irrigated.<sup>33</sup> Although as a result of these uneven distributional effects of agrarian reform, much of the land area now occupied by ejidos consists of forests and pasture, ejidal forestry and livestock production have been discouraged by state land use and credit policies.

The concentration of Mexico's rural poor on marginal agricultural land has been intensified not only by state guarantees to large private and commercial landholders against redistribution, but also by takeovers by private cattle ranchers and forestry enterprises of ejidal lands and portions of communal landholdings that had been granted to indigenous communities. The enforcement of these takeovers has involved physical repression by privately-hired pistoleros and by state police and military forces.

The ecological consequences of land concentration can be seen in Mexico, as elsewhere in Latin America, in the

displacement of small farmers to steep hills and mountainsides, leading to extensive problems with erosion.<sup>34</sup> In the 1950s and 1960s, land redistribution, as well as resettlement projects associated with hydroelectric developments and natural disasters, increasingly took the form of large-scale colonization projects in the Mexican tropics, particularly in Chiapas, Campeche, Quintana Roo, Oaxaca, Veracruz, and Tabasco. By 1970, some 800,000 hectares in the southeast had been affected, with disappointing results for rural development.<sup>35</sup> Spontaneous colonization also accelerated with land conflicts elsewhere and the opening of new lands by PEMEX and logging interests. Deforestation and soil degradation have been the near universal results of both state-planned and unplanned agricultural activity in these ecologically fragile zones.<sup>36</sup>

#### The Exploitation of Forestry Resources

With the exception of the Cárdenas administration, under whom, for example, large tracts of forested land in Quintana Roo were set aside for cooperative chicle production, much of the forested land area involved in agrarian reform was redistributed precisely because of its lack of value for agricultural production. As a result, seventy percent of the country's forestry resources are found on ejidal and communal lands. Mexico's conifer and deciduous forests are concentrated in Chihuahua, Durango,

Jalisco, Oaxaca, Guerrero, Michoacan, and Chiapas, while tropical forests are found primarily in Oaxaca, Chiapas, Campeche, and Quintana Roo. Mexico's indigenous population is also concentrated in these states, although with the exception of Oaxaca, Chiapas, and Guerrero, most have been displaced from agricultural to forestry lands or settled from entirely different ecological regions. One consequence of this tendency has been extensive deforestation to make way for crop and livestock production techniques suited for lowland agricultural areas but inappropriate in highland or tropical ecosystems to which they have been transferred.

There has never been an official credit bank to fund forestry production by ejidos and communal land holders, nor are private credits generally available for this purpose. The exploitation of remaining forested areas has thus remained outside the control of their ejidal and communal owners due to the substantial investment required in the construction of logging roads, the purchase of extractive machinery, transportation, and the required forest inventory studies, which until recently were carried out by the Secretariat of Agriculture for a per-hectare fee. Typically, the resource is controlled by private firms granted concessions of 25 to 60 years, with some 40% of communities with forestry resources simply obtaining stumpage fees from the logging companies. These stumpage fees are equal to approximately 1% of the final value of the

lumber, and only 25% of the fees are paid up front. The remaining 75% is controlled by FONAFE, to be returned (without interest) to the community only in the case that the community proposes an investment project which meets federal approval.<sup>37</sup>

Another 20% of communities extract the logs themselves, selling them to private or parastatal companies at prices set by the company, typically between 15 and 20% of the lumber's final market value. A further 20% possess community sawmills, which allow them to capture roughly half of the lumber's market value. Less than 1% of the ejidal and communal logging enterprises produce finished goods such as packing crates, parquet or other finished products.<sup>38</sup>

The failure of Mexico's communities and ejidos to benefit from their forestry resources has been perpetuated by rural power structures dominated by local caciques, or local power brokers.<sup>39</sup> These caciques, with the complicity of military and civilian authorities, employ physical repression and bribery of community, state, and federal officials to gain access to vast tracts of forested lands. Ejidatarios may be employed at below minimum wage, forced to purchase supplies at company stores, and manipulated into highly exploitative supply contracts. In many cases the exploitation of forest owners has been accompanied by degradation of the resource itself due to inappropriate

harvesting techniques and failure to undertake reforestation and other protective measures.<sup>40</sup>

### Livestock Production

In the 1960s and early 1970s, rising domestic demand and for meat and dairy products stimulated private investment in the livestock sector and the development of various mechanisms to transfer of ejidal and communal lands to private livestock rearing. As with forestry, however, direct participation by ejidos in cattle production is discouraged by the lack of soft official credits for non-crop production and peasant inability to obtain the private credits which favor livestock over crop production.<sup>41</sup> Government subsidies for the production of sorghum also stimulated the commercial pork and poultry industries, which has succeeded in driving out many small, traditional producers.<sup>42</sup> Intensive dairy production, stimulated by transnational corporations such as Nestle, is also concentrated in private hands, with technical assistance and credits biased in favor of large commercial enterprises.<sup>43</sup>

These constraints have created particularly acute problems in the case of cattle production. Lack of capital investment in this sector has meant that beef production is nearly always extensive, and the accumulation of commercial-scale tracts of land has been facilitated by Mexico's Agrarian Law, under which the legal definition of a small livestock holding is up to 50,000 hectares.<sup>44</sup> Throughout

Mexico the need for extensive grazing lands has led to violent conflicts between private ranchers and campesinos. A further consequence has been the conversion of prime agricultural and forested lands to pasture, and the degradation of the northern borderlands due to overgrazing.

The spread of livestock production and the conversion of land to pasture has also been furthered by campesino survival strategies. Small producers faced with low market prices for agricultural goods or an oversupply of unproductive land often engaged in the formerly illegal rental of ejidal lands for cattle grazing. The desire for livestock and lack of means for herd building also gave rise to mechanisms such as the maintenance of private herds on ejidal lands in return for calves.<sup>45</sup>

#### Fisheries Development

Despite its extensive coastal resources, Mexico's fisheries sector was mostly limited to small artisanal fleets until the 1970s. The formation of fishing cooperatives, with membership limited to authorized users of public lands such as communities and public entities, was promoted by the General Law of Cooperative Societies passed in 1937 during the presidency of Cárdenas. The General Law also reserved access rights to several valuable fisheries, including lobster, shrimp, abalone, oysters, and eleven species of bass, grouper, and hinds.<sup>46</sup>

Fisheries modernization was stimulated in the 1950s during the presidency of Adolfo Ruíz Cortines, but at the end of the Echeverría administration, the establishment of Mexico's 200-mile Exclusive Economic Zone (EEZ) led to a redoubling of fisheries development efforts. Fisheries were to provide both employment opportunities for Mexico's landless rural labor force and enhanced protein consumption, particularly by the poor, an approach typified by the program of "Diez Mil Lanchas" (Ten Thousand Boats). In 1976 the administration created the National Fisheries and Ports Development Bank (Banco Nacional Pesquero y Portuario, or BANPESCA) and parastatal enterprises of Fisheries Products of Mexico (Productos Pesqueros de Mexico, or PROPEMEX), which provided credit, markets, and processing facilities primarily to the cooperative sector. The number of fishing cooperatives nearly doubled in this period, rising from 237 in 1970 to 493 in 1976, while the high seas fleet increased from less than 1800 in 1970 to 3,293 in 1976. Foreign concessions to the shrimp fishery ended in 1979.<sup>47</sup>

Mexico's fisheries industry has continued to grow rapidly. The fisheries serve as an outlet for underemployed rural labor, aided by state promotion of coastal tourism development and the subsequent expansion of the luxury seafood market. Mexico's cooperative-owned fishing fleet grew from 12,782 vessels in 1975 to 35,740 in 1991, while the number of private vessels rose from 11,415 in 1975 to

38,777 in 1991.<sup>48</sup> Led by anchoveta, sardines, oysters, shrimp, shark, and tuna, fisheries production also increased dramatically in the 1970s, from a total of 451,330 tons in 1975 to over 1.2 million tons in 1988.<sup>49</sup>

The sector has been plagued by severe problems, however, including the perpetual one of "too many fishers chasing too few fish,"<sup>50</sup> and the inability of cooperatives to exclude competition from independent fishermen. The result has been the overexploitation of lobster, shrimp, oyster, clam, conch, and shark fisheries, among others. Overcapitalization of Mexico's fisheries was subsidized by the state through PROPEMEX processing facilities, which served as a source of scarce production credits, but in turn required a guaranteed supply of raw materials at below-market prices, and BANPESCA, which provided high-interest credits to cooperatives for the purchase of vessels and gear which frequently could not be paid back.<sup>51</sup> With economic liberalization in the early 1990s, BANPESCA and many of the PROPEMEX subsidiaries have been dissolved, leaving the cooperative sector with a huge outstanding debt and few available sources of credit. Coupled with the end of exclusive fishing rights and the weakening of restrictions on foreign investment in fisheries production, the likely result will be the appropriation of many of Mexico's lucrative fisheries by foreign and private capital.

SEPESCA has also promoted the development of rural freshwater aquaculture projects as a means of encouraging traditionally low fisheries production in inland waters and of increasing protein consumption in the countryside. Species of preference include tilapia, production of which has increased from 3038 tons in 1970 to 83,942 tons in 1988.<sup>52</sup> Much of this increase resulted from their introduction in natural bodies of water, in which this aggressive species has replaced native fish species. Little information is available, however, on the contribution of inland fisheries to rural incomes or the relationship of fishing to other productive activities. The Secretariat of Fisheries' Program for Integrated Aquaculture Development for 1990-1994 includes the development of rural aquaculture in poor rural communities among its goals.<sup>53</sup>

#### The Failures of State Intervention

If rural poverty can be explained in part by a lack of federal attention and commitment to indigenous communities, campesinos, fishing cooperatives, and forest inhabitants, the failure of periods of high government spending and investment in the primary sector to improve rural living conditions merits further explanation. One of the most obvious explanations is that bureaucratic growth accounts for much of the budget increases in the 1970s and 1980s. For example, despite the considerable increase in the proportion of federal investment in agriculture during the

1970s and early 1980s, some 20% of agricultural development funding during 1980-83 remained in the Federal District.<sup>54</sup> In 1988, despite a renewed increase in federal investment, more than 27% remained in the Federal District.<sup>55</sup>

The haste with which projects were conceived and implemented during these periods has also generated a great deal of waste, especially when coupled with the discontinuity of development plans and programs between administrations. Many of Mexico's well-known "development disasters" were carried out under those administrations most committed rhetorically to rural development. Resettlement programs associated with these projects have suffered from centralized planning and failure to provide needed--and promised--infrastructure and social assistance.

Bureaucratic inefficiency has also reduced the effectiveness of federal development programs. For example, prior to its dissolution under the Salinas administration, BANRURAL agricultural loans to ejidos were directed primarily to covering short-term operating costs and were often delivered in kind, but inputs such as seeds and fertilizer frequently arrived late and were wasted or their contribution to output reduced.<sup>56</sup> Producers were also encouraged, through credit availability or other means, to adopt nontraditional crop mixes for which inadequate extension services were provided.

The growing involvement of state-owned enterprises in agricultural production suffered similar weaknesses. Enterprises formed to market export crops such as sugar, tobacco, cacao, and coffee have been described as "inefficient parastatal manufacturers with out of date capital stock, poor input delivery schedules and frequent labor disputes; these enterprises are only able to cover costs by offering a low price to the farmers who supply them. The primary producer thus receives no incentive to improve his operation and there is an all-round decline in productivity, accompanied by the erosion of quality standards..."<sup>57</sup> CONASUPO, the parastatal marketing enterprise, suppressed producer prices for staple and export crops, then covered production shortfalls with imports, which competed with domestic production.

Parastatal intervention in the forestry and fisheries sectors has offered a similar experience. Parastatal forestry enterprises, like their private counterparts, paid below-market prices to their ejidal and communal suppliers, bypassed requirements for forest inventories and replanting, engaged in illegal logging, and, in production associations with ejidos and communities, employed dual accounting systems in which large volumes of production were reported as "lost" and deducted from shared earnings. Furthermore, the parastatals prevented ejidal and communal producers from

selling to other buyers, thus preventing price competition and product diversification.<sup>58</sup>

Parastatal fisheries entities, like their counterparts in agriculture and forestry, failed to provide credits in time for the opening of fishing seasons and paid below-market prices for the cooperatives' catch, encouraging a thriving black market in reserved and other species. These parastatals are now being dismantled under the Salinas administration, leaving the majority of fishing cooperatives with enormous outstanding debts, aging fleets and equipment, and a lack of credits with which to enter the new season. . Despite modest official efforts to protect the cooperative sector, particularly in the shrimp fishery, most cooperatives remain vulnerable to an influx of private and foreign capital.<sup>59</sup>

Producer Organizations, Local Institutions,  
and Community Development

If the ability of ejidal and communal organizations to act as effective economic units has been limited by Mexican economic policy, their ability to act as institutions of self-governance and political representation has been limited by predominant patterns of interest articulation and state distribution. As the foregoing discussion suggests, the problem of local self-governance begins with the fact that ejidal, communal, and municipal institutions are easily subverted or coopted by local economic and political elites. Corruption and mismanagement by community officials has been

a widespread problem due to their dependence on outside interests for economic and other benefits.

At the aggregate level, peasant organization has until recently focused on the central issue of land reform. As long as the distribution of land continued to receive priority in government policy as well, the state-created CNC represented an effective vehicle of peasant mobilization and control by serving as the principal channel through which such distribution could be achieved. As late as the 1960s, independent movements could be effectively coopted and incorporated into this central organization through the promise of political spoils.

During the Echeverría administration, however, the role of the CNC began to wane as a result of its reluctance to support land invasions. When land reform was abandoned under Lopez Portillo, the CNC lost access to concrete resources for distribution, either land itself or services to support peasants in areas where land had already been distributed. The CNC not only typically adopted government policy platforms, but also remained underrepresented relative to the more powerful associations of private agricultural, forestry, and livestock interests. In 1979 the Confederation moved to incorporate landless labor, but its failure to support labor mobilization and its support for government encouragement of private investment in ejidal agriculture limited its ability to represent this sector.<sup>60</sup>

In the late 1970s and especially in the 1980s, therefore, independent organizations began to play an increasingly important role in direct action and political dialogue, helped in part by the state-fostered organization of the Echeverría administration.<sup>61</sup> Several independent organizations have developed, including the Coordinadora Nacional Plan de Ayala (CNPA), formed in 1979; the Central Independiente de Obreros Agrícolas y Campesinos (CIOAC) in 1976; the Union Nacional de Organizaciones Campesinas Autónomas (UNORCA) in 1985, the Union General Obrera Campesina y Popular (UGOCP) and the Central Campesina Cardenista (CCC).

Although some of the independent organizations, such as the CNPA, have continued to focus on land redistribution, most have attempted to address additional problems such as prices and credit, the conditions of rural labor, and human rights.<sup>62</sup> Organizations participating in UNORCA, for example, formed twelve autonomous agricultural credit unions between 1987 and 1989, and in 1990 created the National Association of Social Sector Credit Unions (Asociación Nacional de Uniones de Crédito del Sector Social, or ANUCSS), which by 1992 incorporated 23 credit unions.<sup>63</sup>

Recent years have also witnessed a number of successful local and regional attempts to gain control of natural resources and to improve local terms of production, pricing, credit, and marketing. For example, in the mid-

1970s, a union of ejidos in the Selva Lacandona region of Chiapas was organized with the assistance of students and church activists to contest efforts to evict them from land planned for commercial exploitation of mahogany and cedar. Once organized, the union successfully negotiated more favorable transportation and pricing arrangements with INMECAFE. In 1980 it combined with other unions to form the Union of Unions, which later formed its own credit union and negotiated with the Secretariat of Commerce to allow direct exports of coffee.<sup>64</sup> In the late 1980s, the Union of Unions was a key element in the regional organization of small coffee producers, which in 1990 created the National Confederation of Coffee Producing Organizations (Confederación Nacional de Organizaciones Cafeteleras, or CNOC). When plans were announced to dismantle INMECAFE as part of the federal privatization program, the CNOC was able to negotiate the acquisition or management of several of the parastatal's operations.<sup>65</sup>

Such movements have increasingly incorporated environmental and conservation themes, and affiliated with environmental organizations and research institutes, in order to further their demands. For example, in 1983, the CNPA incorporated the "struggle for the defense of community natural resources" as a key theme in their battle for land tenure security.<sup>66</sup> With the assistance of the National Indigenous Institute and research institutions, indigenous

organizations have also begun to incorporate themes of natural resource management and conservation in their demands for federal agricultural assistance, control over forestry and other resources, and participation in conservation programs.<sup>67</sup> This strategy has scored a number of significant successes. For example, the Union de Ejidos de la Selva of Las Margaritas, Chiapas, has sought the support of Mexican conservation agencies and external funding sources to take advantage of possibilities for direct exportation of organic coffee to Europe.<sup>68</sup>

A number of similar openings have occurred in forestry development. In Oaxaca, opposition to commercial forestry concessions on ejidal and communal lands began in 1967 when the community of Macuiltianguis initiated a strike, soon joined by thirteen other communities refusing to sell lumber to forestry concessionaires. Similar strikes persisted through the 1970s, coupled with isolated attempts to promote community forestry development. By 1979, some 18 communities had formed the Organization for the Defense of Natural Resources and Social Development of the Sierra Juarez (Organización en Defensa de los Recursos Naturales y Desarrollo Social de la Sierra Juarez, or ODRENASIJ) in order to press for the termination of commercial forestry concessions. In 1981, ODRENASIJ organized the Encuentro Nacional de Pueblos Forestales, with participation by 29

communities from Oaxaca, Morelos, Guerrero, Michoacan, Veracruz, and Chiapas.<sup>69</sup>

In 1982, the publication of a Presidential decree renewing the forestry concessions sparked severe protests by 20 communities, supported by a number of social, religious, and environmental organizations. A production strike lasting into 1983 prompted the revocation of the decree and the return of the forest concession to the control of 18 communities organized in three regional Uniones de Comunidades y Ejidales Forestales. These communities have now formed their own forestry production enterprises, undertaken capital acquisition and infrastructure development, hired their own technical experts, and undertaken reforestation activities and the establishment of forestry reserves, with support from local and international development and environmental NGOs.<sup>70</sup>

The reestablishment of community control over forestry resources in Oaxaca affected communities in a number of other states. The expiration of existing concessions in Quintana Roo led to the establishment of a community forestry program under the auspices of the Plan Piloto Forestal established by a technical agreement between Mexico and Germany. With technical assistance and training from the Plan Piloto, an increasing number of communities in Quintana Roo and Campeche are now undertaking infrastructure and productive improvements, product diversification, and

direct marketing.<sup>71</sup> The Ministry of Agriculture, Nacional Indigeno Institute, and the parastatal Industrial Woods of Nayarit (Maderas Industrializadas de Nayarit), with funding from PRONASOL, have undertaken to organize ejidos and communities for community forestry production.<sup>72</sup> Community forestry development has also been incorporated into the World Bank and Inter-American Development Bank (IDB) forestry development loans negotiated in the mid-1980s for Oaxaca, Guerrero, Chihuahua, and Durango.<sup>73</sup>

Rural forestry development suffers from its share of overwhelming obstacles. The transfer of production activities from parastatal enterprises to unskilled and inexperienced ejidatarios and comuneros is a doubtful proposition, while the debts contracted for infrastructure development and equipment acquisition will place enormous pressures on community producers to engage in rapid, unsustainable exploitation of their forestry resources in order to prevent bankruptcy. The government-sponsored projects in particular, including those funded by the multilateral development banks, fail to prevent the appropriation of the most valuable resources by private capital, to address existing local and regional power structures, or to prevent their recapture by traditional or new caciques. There are also ample indications that neither community consultation nor environmental impact studies have been conducted adequately if at all.<sup>74</sup> Nonetheless, the

recent emphasis on community-based forestry development represents a significant advance and an opportunity for further experimentation. Furthermore, as discussed in the following chapters, it is in these communities that wildlife management programs have been initiated in conjunction with broader forestry management activities.

Community development and the strengthening of local institutions has been rather less successful in the fisheries sector. Conflicts between artisanal fishermen and cooperatives and their private and parastatal counterparts have generally been resolved in the latter's favor. Overexploitation of fisheries has not yet attracted the attention of environmentalists, with a few notable exceptions, such as communication between researchers and fishermen in the Sea of Cortez.<sup>75</sup> Although the dismantling of several PROPEMEX facilities offers the opportunity for community acquisition and control over processing and marketing facilities, the precarious financial position of most of the sector will generally preclude such transfers.

Successful mobilization of fishing cooperatives, and alliances between producers and environmentalists, have primarily occurred in response to contamination of lakes and coastal zones rather than fisheries overexploitation. One such case involved the mobilization of residents of Patzcuaro to prevent the planned construction of a nuclear reactor which would have utilized water from the lake for

cooling.<sup>76</sup> Later mobilization in the same area against the release of untreated sewage into the basin prompted extensive government action to address the problem.<sup>77</sup>

Fishing cooperatives and campesino organizations have for the past decade allied with environmental groups to protest the contamination of the coastal zone of Veracruz by PEMEX oil development and the Laguna Verde nuclear plant.

Environmental impact by these facilities has long been denied by government agencies, and few communities have been indemnified for damages. In those cases where the government has responded, it has offered credits for the purchase of new vessels, either for increased exploitation of severely degraded fisheries or for the transfer of fishing effort to the high seas.<sup>78</sup>

#### The Future of the Mexican Countryside

In many respects, the neoliberal policies of Salinas de Gortari represent the abandonment of the official commitments which have governed Mexican politics since the time of Cárdenas. This is certainly true of the 1992 reforms of Article 27 of the Federal Constitution and of the Agrarian Code, which authorize the devolution of land titles to ejidatarios, complete with rights of sale, transfer, and use as collateral.<sup>79</sup> When coupled with the legalization and federal encouragement of production contracts and joint ventures between ejidos, communities, and private capital, and reductions in the amount of soft agricultural credits

available from BANRURAL, these reforms may well result in widespread dispossession of ejidal and communal tenants.

The reconcentration of agricultural land will be facilitated by other changes as well. Under the revised Agrarian Code, small agricultural landholdings remain limited to 100 hectares, with the exceptions of 150 acres for cotton cultivation and 300 hectares for banana, sugar cane, coffee, henequen, rubber, palm, grapes, olives, quina, vanilla, cacao, agave, nopal, or fruit trees. These limits are stated for irrigated land and can be multiplied by two in the case of rainfed land, four for high-quality pasturelands, and eight for wooded lands or pasture in arid regions. Limits on small forestry and livestock properties also remain unchanged: small forestry properties are limited to 800 hectares, while small livestock holdings are defined as the area required to maintain up to 500 cattle or the small-livestock equivalent, depending on forage quality. However, corporations, formerly prohibited from owning land, may now possess up to twenty-five times the limits on individual holdings; foreign capital, formerly excluded from agricultural, forestry and livestock investment, may hold up to 49% of these corporations.<sup>80</sup> Federal lands formerly intended for the creation of ejidos may also now be sold to individuals or corporations for agricultural, forestry, or livestock production.

The inefficiency of small-scale seasonal production in comparison with commercial production on large irrigated landholdings suggests that any productivity increases ensuing from these reforms will more often come about as the result of the displacement of small producers than of efficiency gains in that sector. Such displacement is likely to be aggravated by NAFTA, which is expected to increase Mexican imports of corn and beans from the United States, already substantial and increasing following recent liberalization measures. At the same time, the commercial fruit and vegetable crops which form the backbone of Mexican agricultural exports to the United States are expected to increase with the liberalization of U.S. import restrictions, including tariffs, marketing orders, and phytosanitary requirements. Mexican agricultural and livestock exports are also expected to become more competitive due to liberalization and investment in transportation infrastructure.<sup>81</sup> Furthermore, although Mexico is a net importer of beef products from the United States, exports of range cattle, presently about 1.2 million head annually, could increase as much as 100 percent with the elimination of U.S. import restrictions and Mexican export tariffs.<sup>82</sup> Trade liberalization may thus strengthen existing tendencies toward land acquisition by large scale private commercial interests oriented toward urban and export markets.

In addition to changes in land tenure, investment, and trade regulations, new forestry and fisheries legislation is likely to engender profound changes in natural resource use. In anticipation of a new Forestry Law of 1992, which promotes the development plantation forestry as a means of addressing Mexico's large trade deficit in wood, cellulose and paper products, several new projects were already underway in 1992. Twelve projects, including a eucalyptus plantation to be developed on ejidal agricultural lands in Veracruz,<sup>83</sup> were under consideration for plantation forestry on 219,000 hectares in the states of Mexico, Veracruz, San Luis Potosí, Chihuahua, Baja California Norte, Sinaloa, Chiapas, Durango and Oaxaca, while another six projects had been proposed on 327,867 hectares in Durango, Guerrero, Chihuahua, Michoacan, and Tabasco for intensive forestry development in association with existing landholders.<sup>84</sup> These initiatives have been widely criticized in Mexico because they propose the establishment of new forests in areas currently devoted to agricultural and livestock production or which are already forested, and because those projects involving foreign capital will supply export rather than domestic markets.<sup>85</sup>

Similar measures will affect fisheries development. Under a new Fisheries Law declared in 1992, exclusive fishing rights by cooperatives were eliminated, and limitations on foreign investment in fisheries exploitation

were relaxed, with foreign investment in fishing of up to 49% allowed as of December 1990.<sup>86</sup> An influx of domestic and foreign private capital into Mexico's high-value fisheries, particularly tuna, shrimp, and lobster, is likely to occur as a result, with consequently increased competition with and disruption of artesanal fisheries.

Liberalization in the primary sector has nonetheless been justified as a means of freeing rural producers from state control and permitting local initiative to respond freely to market conditions. Indeed, the Salinas administration has pursued a number of specific policies designed to promote such an outcome. For example, it has continued to support the formation of unions of ejidos, regional credit associations, and other producer organizations designed to reduce producer dependency on state inputs and assistance. These independent organizations were even granted rights to collective representation through the Permanent Agrarian Congress (Congreso Agrario Permanente, or CAP) formed in 1989, although official and independent organizations soon divided over the issue of agrarian reform.<sup>87</sup>

Recent reforms may also offer increased possibilities for campesinos to obtain needed capital and adjust production mixes more readily to market conditions. For example, production contracts with private capital, domestic or foreign, might provide a means by which needed credits

and inputs reached producers in a timely manner. NAFTA, as well as the independent trade liberalization measures of the late 1980s and early 1990s, will help to attract domestic and foreign investors to ejidal and communal lands by increasing the export potential of various agricultural and forestry products and decreasing the cost of imported inputs. Current government encouragement of associations of ejidal and communal producers associations may facilitate the collective bargaining needed to ensure fair pricing.

Rural assistance funding through PRONASOL also represents the decentralization of decision-making over the allocation of such funding through the formation of local Solidarity Committees. Despite an early emphasis on symbolic and obviously politically motivated projects, the program shifted toward productive projects, particularly in the establishment of revolving funds for marginal producers of corn and beans.<sup>88</sup> PRONASOL funding for rural development has also been granted to several promising and innovative community programs, including replanting of amate trees which support indigenous craft production and tourism forestry development in Chihuahua's Sierra Tarahumara.<sup>89</sup>

The administration has also continued to support policies favoring community forestry development, although this support is attended by a problematic emphasis on its stimulation by centralized agencies. Encouragement for local initiatives incorporating rational resource use and

conservation is also being pursued by a parallel program, the Secretariat of Agriculture's Tropical Forestry Action Plan (Programa de Acción Forestal Tropical, or PROAFT), which solicits and offers funding to sustainable resource development programs.

A significant commitment of federal resources to rural development also underlies the creation in 1992 of a new Secretariat of Social Development (Secretaría de Desarrollo Social, or SEDESOL). Within the Secretariat, a new General Directorate of Regional Development is charged with planning, coordinating, and implementing regional development programs with emphasis on indigenous communities, rural settlements in arid zones, and urban squatter communities. A General Directorate of Social Organization and a decentralized National Solidarity Institute are charged with promoting the organization and participation of indigenous, peasant, and other disadvantaged communities in development programs.<sup>90</sup>

While it is certainly true that the impact of economic liberalization on small rural producers can be considerably softened by effective producer organization and appropriate state intervention,<sup>91</sup> it remains to be seen to what extent current policy reforms offer meaningful protection for disadvantaged sectors. Producer organizations have had little opportunity to form or to respond to rapid policy changes, so that the ability of rural communities and

institutions to weather a number of drastic upheavals simultaneously will in most cases be severely constrained. Their ability to take advantage of reduced state assistance also depends on the degree to which this assistance represents a real, and long-term, commitment to the alleviation of rural dislocation, rather than a buffer against the political consequences of the federal government's reduced distributive capacity.

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CHAPTER 5  
MEXICAN WILDLIFE RESOURCES AND DEVELOPMENT

Introduction

The exploitation of Mexican wildlife resources is shaped by the same political and economic boundaries which determine patterns of exploitation and appropriation in agricultural, forestry and fisheries production. Wildlife resources with significant economic values, whether commercial or recreational, are generally controlled or appropriated either by privileged economic interests, domestic or foreign, or by the state itself. Those efforts to achieve sustainable exploitation systems which have occurred are designed to protect these interests. By contrast, the rural poor who form the majority of wildlife users are locked into unsustainable exploitation by their dependence on available wild species as a substitute or supplement to other productive activities or by their relationship to or competition with other wildlife users.

The present chapter introduces the subject of wildlife use and management in Mexico with an overview of available evidence on wildlife use for subsistence, domestic and international commerce, and sport. Special emphasis is

placed on the causes and consequences of widely divergent managerial and institutional frameworks governing wildlife use, the contexts in which have arisen efforts to achieve sustainability, and possibilities for increasing the effective participation of wildlife users in management and conservation. Where useful, additional examples from forestry and fisheries management are drawn upon to provide additional insights into the problems of resource use.

#### Contemporary Uses of Mexican Wildlife

A wide range of game species is exploited by Mexico's subsistence, commercial, and sport hunters.<sup>1</sup> In part because of their extensive distribution, white-tailed deer and collared peccary are the most heavily exploited species, being favored both by sport hunters and by subsistence hunters due to the quality of their meat and large biomass, which implies greater hunting yield relative to time expended and also to the cost of shells. Among subsistence hunters, the skins of peccary may also be consumed, and the bristles used for making brushes. Other large mammals are also heavily exploited within their respective ranges. The white-lipped peccary, found only in the southeast, is also an important game species, but yields are more sporadic because of the extensive movements of large herds, and because its concentration in herds has made it more vulnerable to hunting pressures, leading to its relative scarcity in much of its range. The tapir is a favored

source of protein in the Mexican tropics, but because of low population densities and sensitivity to overhunting and habitat degradation is now extremely rare. The small brocket deer, also limited to the southeast, remains abundant and is widely hunted for sport and subsistence.

Large ungulates are distributed throughout northern Mexico, which has contributed to the popularity of this region among national and foreign sport hunters. In addition to white-tailed deer, which attain a greater size in northern Mexico, are found mule deer, pronghorn antelope, and bighorn sheep. Populations of each of these species have been severely reduced by overexploitation by sport and subsistence hunters; the pronghorn antelope is now considered endangered, and the bighorn sheep threatened. Elk and bison, formerly found along the northern border, are now extinct in Mexico. Populations of white-tailed deer have recovered markedly in the last two decades as a result of their active management on private game ranches.

A variety of smaller mammals are exploited primarily by subsistence hunters. Armadillos, opossums, hares, rabbits, agoutis, pacas, coatis, kinkajous, raccoons, ring-tailed cats, squirrels, pocket gophers, and spider and howler monkeys may be hunted depending on cultural traditions, need, and the availability of other game species. Indigenous communities tend to exploit the widest variety, and the more exotic, of these species.

A number of mammals have also been exploited for their skins. The larger predator species, grizzly bears and wolves, now believed to be extinct in Mexico; black bears, coyotes, pumas, jaguars, and ocelots, have been intensively hunted both for their skins and to protect livestock and humans. The skins of deer, peccaries, foxes, bobcats, river otters, badgers, skunks, coatis, ring-tailed cats, pacas, opossums, howler monkeys, and small populations of beaver and muskrat also support limited commercial markets.

Among the game birds, the larger species are again preferred by subsistence and sport hunters. These include the wild turkey of northern and central Mexico and the ocellated turkey of the Yucatan peninsula. In central and southern Mexico, curassows, guans, chachalacas, and tinamous are widely hunted for subsistence. The several species of quail, pheasants and bobwhites distributed throughout Mexico tend to be exploited more by sport than subsistence hunters. Doves, particularly the white-winged dove, are popular among North American sport hunters and to a lesser extent national sport hunters, and may be hunted intensively for subsistence where abundant and easily captured. Migratory waterfowl (ducks, geese, and coots), distributed in wetlands along the Pacific and Gulf coasts and along Mexico's central plain, are heavily hunted by Mexican and U.S. sport hunters.

Several species of reptiles and amphibians are also hunted and captured for consumption. Among the most popular

edible species are the common, black, and striped iguanas distributed through central and southern Mexico. Several species of terrestrial and freshwater turtles are consumed, as are the meat and eggs of green, loggerhead, and olive ridley sea turtles and the eggs of leatherback and hawksbill turtles. Frogs are heavily harvested for their meat. The meat of boa constrictors, rattlesnakes, crocodiles, and caiman is also consumed in some rural areas. Domestic commercial markets also exist for many edible wildlife products as well as for skins and pets. Markets for game meat, formerly much more extensive, are now limited primarily to venison, peccary, guans and curassows. Iguanas, frogs, and freshwater and marine turtles, and marine turtle eggs are also frequently sold in domestic markets. The skins of spotted cats, crocodiles and caiman, marine turtles, rattlesnakes, and frogs are widely traded, with more limited trade in deer and other mammal skins.

Juvenile primates, coatis, kinkajous, ring-tailed cats, and spotted cats, freshwater turtles, snakes, and tarrantulas may be sold as pets when encountered, as are ornate and song birds ranging from cardinals to parrots and macaws. Birds of prey are also sold as pets or for use in falconry. Tortoiseshell and black coral handicrafts, and stuffed frogs, hawks, and owls, are sold as tourist curios.

Many of these wildlife products find their way into international markets as well. Most important have been

furskins; the skins of crocodiles, caimans, iguanas, and snakes; the skins, meat, and eggs of marine turtles; ornate and song birds; and tourist items. Although Mexico's reported wildlife exports have declined considerably since the early 1980s,<sup>2</sup> historical trade flows have contributed to the depletion of several species. Examples include the production of crocodile skins for export, totalling 1,009,583 tons between 1938 and 1965, with steady declines evident in this period and afterward due to overharvest.<sup>3</sup> Production of sea turtle leather rose with declining availability of crocodiles, and between 1976 and 1986 Mexico exported the skins of an estimated 310,650 olive ridley turtles to Japan alone.<sup>4</sup> There has also been high international demand for the skins of wild cats; between 1968 and 1970, Mexico exported the skins of 1280 jaguars and 15,481 ocelots to the United States alone, with total cat skin exports of more than 29,000 between 1976 and 1980.<sup>5</sup> Smaller and more sporadic exports of live tarantulas, iguanas, boa constrictors, and freshwater turtles, and the skins of iguanas and snakes, have also been registered.<sup>6</sup>

#### Wildlife as a Resource of Last Resort

Rural poverty and limited access to or income from agricultural, livestock, and forestry production have maintained peasant reliance on the collection of wild plants and animals to supplement cash incomes, protein consumption, and other needs. For example, collection of marketable

arid-zone plants such as lechuguilla (Agave lechuguilla) for fibers; candelilla (Euphorbia antisiphilitica) for wax; the spice oregano (Lippia graveolens); guayule (Parthenium argentatum) for natural rubber; and maguey (Agave spp.) for alcohol is often undertaken among the very poorest sectors of the population due to their low prices, which nonetheless provide some protection against crop failure and other disasters.<sup>7</sup> Low prices and severe need also encourage overexploitation, with depletion often evident in areas surrounding human settlements.

The proportion of the population which engages in hunting activity, and the volumes and variety of game taken, also tend to be highest in economically depressed regions. For example, a study of wildlife use in one community in San Luis Potosi, an area heavily dependent on lechuguilla extraction, found that 90% of residents hunted, with 78% completely dependent on wildlife exploitation.<sup>8</sup> In an indigenous community in Oaxaca, among the poorest states in Mexico, only 17% of community members reported eating domestic livestock at least once a month, but 85% of all families exploited at least 25 species of fauna.<sup>9</sup>

Hunting may also be a critical survival strategy of colonists and migrant laborers. Recent colonists in the Selva Lacandona region of Chiapas are often heavily dependent on hunting during the establishment of agricultural production and acquisition of domestic

livestock. Although this dependence tends to decline with the establishment of settler families, changes in wildlife use are also heavily influenced by family size and income.<sup>10</sup>

Wildlife use also tends to vary seasonally with agricultural, forestry, and fishing activity, with hunting highest in periods of low availability of other products. Studies of indigenous communities in Oaxaca and the Yucatan peninsula have found that subsistence hunting follows cycles of agricultural activity, and is particularly heavy during the period between planting and harvesting, when household income and consumption is lowest.<sup>11</sup> Hunting is also undertaken by commercial fishermen in the Yucatan during closed seasons for lobsters.<sup>12</sup> Throughout tropical southeastern Mexico, intensive subsistence hunting is conducted by teams of loggers, chicle extractors, and palm cutters (as well as military forces and petroleum exploration teams) during extensive stays in the forest, when only small stores of basic foodstuffs can be transported and access to markets is severely limited.<sup>13</sup>

Commercial markets for wildlife are also readily exploited when available, often by those who are also heavily dependent on subsistence hunting. In San Luis Potosí, for example, overexploitation of lechuguilla has led to an increase in wildlife commercialization, with 20% of residents engaged in commerce in ornate and song birds,

raptors, and rattlesnake skins and oil and the purchase and sale of wildlife from other regions of the country. The Oaxaca study found that 11.4% of resident families engaged in commercial exploitation, primarily of psittacines, iguanas, and armadillos, earning an average of US\$16.00 annually from wildlife sales. Subsistence hunters in the Yucatan peninsula also engage in opportunistic marketing of deer, peccary, and paca meat, spider monkeys bought as pets, and the skins of jaguars and ocelots; crocodiles were also subject to intensive commercial exploitation, but are now only captured occasionally due to reduced populations. Deer skins are also occasionally marketed by subsistence hunters in Quintana Roo and Tabasco, and iguana is intensively hunted in Tabasco for sale in regional markets.<sup>14</sup> Sea turtle eggs are an important source of cash income for subsistence users in poor coastal zones of Oaxaca. Colonists in the Selva Lacandona region are reported to engage frequently in commercial capture of macaws, and research underway in Tamaulipas suggests that immigrants and temporary laborers from outside the state often engage in the capture of parrots.<sup>15</sup> The sale of birds is also described as common in poor rural zones of Nuevo Leon, Veracruz and Tabasco.<sup>16</sup>

Consumer demand for wildlife products in domestic markets has ensured continued trade in a wide variety of species, although prices varying widely according to game

abundance, the availability of higher-income consumers, and the circumstances of the seller. Although in much of the neotropics game meat is less expensive than domestic,<sup>17</sup> in Mexico edible wildlife products are increasingly scarce and are generally priced higher than domestic livestock. In Mexico City markets, frogs are sold for \$10.00 per kilo skinned; freshwater turtles \$1.65 to \$10.00 each; sea turtle eggs \$1.00 each.<sup>18</sup> In the Yucatan, venison is sold for \$4.00 to \$5.00 per kilo or \$100 for an entire carcass; peccary \$6.50 per kilo, and curassow \$17.00 each. While in Oaxaca whole iguanas may be sold for as little as \$3.50, in Veracruz iguanas and armadillos may sell for \$17.00 each, venison or paca may sell for up to \$67.00 per kilogram, and river turtle for \$42.00 per kilogram.<sup>19</sup>

Skins are also widely demanded, especially in tourist centers. In San Cristobal, deerskin and armadillo handbags may be found for \$9.00, belts and wallets of crocodile and snake for \$10.00 to \$13.00. Wild cat skins are particularly valuable; puma skins from northeastern Mexico sell for some \$60.00,<sup>20</sup> while jaguar skins are worth up to \$665.00 to producers.<sup>21</sup> A survey of markets in Chiapas in 1985-1987 found skins of 25 mammal species, with prices ranging from 20 cents for squirrel skins to \$1.50 to \$6.00 for deer, \$5.00 for peccary, \$25.00 to \$90.00 for river otter, \$50.00 to \$90.00 for ocelot, and \$200.00 for jaguar.<sup>22</sup>

In the Yucatan peninsula, prices for small tourist items made of black coral or tortoiseshell range from \$5.00 to \$10.00.<sup>23</sup> Wildlife pets also bring high prices, for example, a juvenile otter was reportedly offered at \$100.00 in Veracruz in 1991,<sup>24</sup> and birds of prey sold for \$9.00 to \$23.50 in 1985.<sup>25</sup> Common ornamental and song birds, for which collector and vendor permits are granted, are domestically sold for \$13.00 to \$25.00.<sup>26</sup> In live animal markets in Chiapas from 1982 to 1987, small cats sold for \$11.00 to \$35.00, howler monkeys for \$9.00 to \$23.00, coatis for \$18.00 to \$48.00, pacas for \$30.00, and kinkajous for \$18.00.<sup>27</sup> Compared to a fixed minimum wage of US\$2.00 to \$3.00, even occasional sale of individual items represents a significant contribution to household income.

The Mexican debt crisis is likely to have contributed to the importance of subsistence and market hunting in rural economies. The crisis affected rural production strategies through declining wage incomes and purchasing power and a consequently increased reliance on nonmonetary incomes. The poorest households obtain roughly two thirds of their income from wages and non-wage monetary income, and nearly one third from nonmonetary sources. Faced with a cumulative decline in agricultural wage income of 36.7% between 1983 and 1988 and a decline in non-wage monetary income of 7.9% during the same period,<sup>28</sup> the rural poor responded with a partial retreat into the subsistence economy and reliance on

informal rather than formal market activities, as well as migration to urban areas and to the United States.<sup>29</sup> This return to subsistence is likely to have included not only household crop production but also hunting and the collection of wild plants for food and raw materials.

Such a conjecture is strengthened by declining production and per capita consumption of domestic livestock during the 1980s: poultry consumption per capita fell 9% from 1980 to 1989, while pork consumption fell 41% between 1983 and 1989.<sup>30</sup> Declining cash incomes was also likely to have increased pressures to harvest and market available wildlife resources. Although a documentable response of wildlife exports to these trends was prevented by a 1982 ban on commercial wildlife exports, small-scale wildlife smuggling may also have represented one component of the growing informal economy. It thus appears likely that the debt crisis accentuated the processes described in the preceding pages. Unfortunately, such a conclusion must remain speculative in the absence of either aggregate data or long-term case studies documenting trends in resource use within individual communities and regions.

#### Community Management of Wildlife Resources

Contemporary wildlife exploitation by small-scale subsistence and market hunters and harvesters is typically oriented toward achieving maximum output and productive efficiency rather than active management or conservation.

Furthermore, both the hunting and capture techniques pursued for the sake of efficiency often contribute to the negative impact of human uses on wildlife populations. Those hunting out of necessity hunt year-round without regard to reproductive seasons, age, sex, or species. In the dry season, when wildlife populations may already be severely stressed, hunters exploit their concentration at remaining water sources. Small mammals are often attracted with bait. Iguanas are captured in the reproductive season by locating and destroying their nests. Deer and peccary may be pursued in groups in order to drive herds toward waiting hunters. Deer may be hunted by locating fawns and lying in wait for the doe, or when available, by the use of artificial lights in night hunting. Fish are caught efficiently by poisoning ponds and streams. Aquatic birds are hunted by firing shotguns into flocks, wounding larger numbers than can be recovered. Live birds are captured by cutting down nest trees, a procedure which often kills the birds.

Documented attempts by small-scale resource users to achieve local self-management of faunal resources are rare. For example, only two cases of CPR regimes for fisheries have been documented. One involves P'urhepecha resource use in the Lake Patzcuaro basin, where the lake border has been distributed among some 700 fishermen belonging to 21 communities, with boundaries between plots demarcated by tule reeds.<sup>31</sup> The second is community management of a

spiny lobster fishery on the Caribbean coast of Quintana Roo, with production maintained through the division of individual fishing territories, construction of shelters for juvenile lobsters, and the local establishment and enforcement of closed seasons and gear restrictions.<sup>32</sup>

Territories can be bought, sold, traded, and inherited, and poaching can be punished by confiscation of fishing gear and banishment from the cooperative. This highly profitable fishery is contrasted with the overexploited open-access fishery at the northern end of the state, where rapid tourism development and population growth have prompted unlimited entry and unregulated competition. It is also threatened by tourism's southward expansion.

Indigenous practices which contributed to game conservation are increasingly rare. The Maya of Mexico and Central America often enhanced wildlife habitat by creating enriched forest fallows in which a large proportion of game is obtained.<sup>33</sup> Certain taboos may also offer protection to selected species, or during selected seasons, although these are again highly susceptible to cultural and economic change. Prior to the conquest, wild turkeys, whistling ducks, peccaries, and deer were frequently maintained in captivity for household consumption, but this practice is now limited to the occasional maintenance of captured juveniles.<sup>34</sup> A more recent adaptation is found among the Tarasco indians of Lake Patzcuaro, who were reported in the

1950s to establish their own duck hunting season--starting one month before the opening of the official season.<sup>35</sup>

Typically lacking are not only measures to regulate harvests, but also awareness by wildlife users of the impact on the resource posed by their activities. Subsistence hunters in particular tend to view sport and commercial hunters from outside the community as the causes of wildlife depletion, without acknowledging that depleted game populations are more susceptible to continued subsistence hunting as well. One example of this attitude is found in a study of hunting and egg collection of the black-bellied whistling duck (Dendrocygna autumnalis) along the Coatzacoalcos River in southern Veracruz.<sup>36</sup> Both activities are undertaken during the rainy season, when agricultural activity is highest; the rainy season is also the ducks' reproductive season. Nests are discovered as residents travel daily to the fields, and adult ducks shot. Half take between 1 and 5 ducks per trip, 35% take between 5 and 15, and 15% take more than 15. About half also collect eggs, with 37% reporting that they normally take 1 to 15 eggs per trip, 41% taking 16 to 30 eggs, and 21% taking between 31 and 50 eggs. Interviews of resource users revealed that although half believed that duck populations had declined due to overhunting, no interviewee agreed with the statement that hunting or egg collection was potentially damaging to the resource. Area residents did, however,

criticize sport hunters for shooting large numbers of ducks, many of which were not retrieved.

Recent local initiatives to regulate hunting have been documented only in one community, San Pablo Macuiliaguís in the Sierra Madre of Oaxaca. This community, described in the preceding chapter, is part of a local and regional network of independent organizations formed to gain control over forestry development, and has also been subject to the efforts of various local and external organizations to protect the tropical forest zone in which it is situated. The community responded to a severe forest fire in 1983 by declaring a five-year closed season for white-tailed deer, its most important subsistence game species.<sup>37</sup> Researchers from the Instituto Nacional de Investigaciones sobre Recursos Bioticos (INIREB) were also asked to provide population studies and technical assistance for purposes of local management and recuperation.

The research team, with funding obtained from the World Wildlife Fund, found that the fire had actually improved habitat quality for deer, but that deer and other game species had been severely depleted by year-round uncontrolled hunting. Recommended measures included the maintenance of the temporary closed season, restriction of hunting to adult male deer, prohibition of hunting with dogs, and active enforcement of regulations. Community and municipal authorities agreed to form a commission to promote

local awareness, provide enforcement, and to visit neighboring communities to solicit regional cooperation. A follow-up visit by the research team found that the closed season was not complied with or enforced, and none of the other measures had been undertaken.

More recently, Mexican environmental NGOs have taken advantage of local organization for community forestry development to stimulate local interest in sustainable wildlife management. In Quintana Roo and Campeche, several communities have established forest reserves as a condition for receiving technical assistance in community forestry development from the Plan Piloto Forestal created under an agreement between Mexico and Germany. Community control over successive stages of forestry production, and consequent improvements in community welfare, have stimulated interest in diversifying the benefits from forestry resources, including wildlife. NGOs have solicited and gained the acceptance of several ejidos for projects to assess local wildlife abundance and the impact of hunting, and to develop community awareness and self-regulation. These projects are still in the initial stages of implementation and their impact cannot yet be assessed.

Most NGO efforts to foster community wildlife management have attempted to develop the tourism rather than the consumptive potential of local wildlife resources. Nature-based tourism, or ecotourism, is relatively

undeveloped in Mexico due to the inaccessibility of many attractive habitats and species. In more accessible areas, hotels (often of foreign ownership) are likely to capture most of the revenue from accommodations, food and beverages, and even transportation and tours. Although large-scale tourism development does generate some employment opportunities, the difficulty of competing with such services precludes the organization of community-based facilities.

Perhaps the most successful case of local ecotourism development has been achieved through the efforts of a Mexican NGO, Monarca, which succeeded in persuading government agencies to allow local residents to manage and profit from tourism to Monarch butterfly overwintering reserves established on ejidal lands in central Mexico. Monarca, with the support of international NGOs, represented residents in negotiations with government agencies, winning authorization for the construction of tourist facilities and the assignment of tourism revenues to local municipalities, as well as the hiring of all reserve personnel from the ejido. This agreement has in turn served as a model for an ejidal tourism concession for whale watching in the El Vizcaino Biosphere Reserve in Baja California Sur.

#### The Dynamics of International Trade

Prices and exploitation rates tend to be particularly high for those wildlife species and products for which

international markets exist. However, as is true in most settings, the exploitation of more commercially valuable resources has generally fallen under the control of national elites or external interests, and the values generated diverted from local wildlife users. The mechanisms through which this occurs vary widely, but generally involve undercapitalization and underdeveloped technical skills and market access of those directly responsible for harvest. In many cases, the state has served as an intermediary or accessory to external exploitation of Mexico's biotic wealth and of the labor force involved in its extraction.

In the tropics, marketable wild products are often those demanded by international markets; these include tropical timber, chicle, rubber, and palm as well as animals. In the case of the ornamental chamaedorea palm, demand by ornamental plant wholesalers in Texas and Florida has since the 1950s encouraged extensive harvest in forested areas, first by specialized cutters hired directly by the transnationals, and later by the ejidos which came to occupy its habitat. Although more than 300 million leaves are exported to the United States annually,<sup>38</sup> the involvement of campesinos in production ends with the sale of leaves to intermediaries who transport them from communities to regional warehouses; neither intensive cultivation or replanting are undertaken, leading to low returns and the local depletion of the resource. The only attempts at

intensive cultivation have involved direct investment of transnationals in establishing small plantations. Palm cutting therefore continues to serve as only one component of highly diversified campesino production strategies, one which provides cash income because the value of the product draws outside buyers to inaccessible areas.<sup>39</sup>

Barbasco, a wild plant found in the states of Guerrero, Chiapas, Veracruz, Puebla, Oaxaca, and Tabasco, was traditionally used by fishermen to poison lakes and streams or as a drug to induce abortion. In the 1940s it was found to contain high levels of the hormone diosgenin, used in the production of steroid hormones. In the early 1950s, steroid hormone production based on barbasco was monopolized by a Mexican company, Syntex, with market protection from the Mexican government. Pressure from U.S., French, Italian, and Dutch pharmaceutical manufacturers soon opened the industry to foreign transnational corporations, which established subsidiaries in Mexico to purchase the raw material for export to processing facilities.<sup>40</sup> The subsidiaries, directly or through intermediaries, began paying Mexican campesinos for barbasco extracted from their lands, without benefit of contracts or government regulation.<sup>41</sup> Harvester prices were minimal, and as successive communities overharvested local stocks, their foreign buyers moved to new areas.<sup>42</sup>

The Mexican government in 1975 established the parastatal enterprise PROQUIVEMEX to foster the growth of a domestic pharmaceutical industry. PROQUIVEMEX raised harvester and sale prices for barbasco, but failed to capture a significant portion of the market. Additional problems included delays in compensating participating ejidos and failure to continue to adjust producer prices. The development of cheaper synthetic hormones in the 1970s quickly rendered Mexico's share of the steroid hormone drug market marginal, and by the early 1980s many of the parastatal's plants had closed.<sup>43</sup>

In those cases where the state has intervened to prevent continued overexploitation of native species, the result has often been a flourishing black market even farther removed from state control and further concentrated in the hands of local, regional, and even national elites. For example, there is an extensive illegal trade in wild cacti, of which Mexico hosts more than 600 endemic species, and which have been legally protected since 1940. Local and state offices of SARH continue to authorize exports of these cacti, particularly to the United States. Reported exports to the U.S. totalled more than 75,000 plants in 1989, but most trade is not reported, and the illegal export of seeds has increased rapidly in recent years as foreign propagation facilities increase their own production.<sup>44</sup> The size of this trade is suggested by confiscations such as one in May

1990, in which a single illegal shipment consisted of ten tons of wild-collected cactus from San Luis Potosí being transported to the United States.<sup>45</sup> The United States also re-exports seeds to Canada, which then exports plants to the U.S., and to Europe and Japan. Despite the growing international market for ornamental cacti, Mexico has few plant propagation facilities, so that this demand is being met with foreign production of Mexican species.<sup>46</sup>

Collection for sale and by tourists and collectors seeking rare specimens also threatens populations in the wild.<sup>47</sup> Neither sustainable harvest programs nor capacity for captive propagation have been developed.

Among fauna, the economics of the trade in birds has been the most thoroughly documented. Commercial use of terrestrial wildlife was prohibited in 1951, but the National Association of Breeders and Vendors of Ornate and Song Birds lobbied for an exemption, and in 1961 obtained legal authorization for continuation of the harvest, sale, and export of wild birds. Between 1974 and 1980, 461,512 ornamental and song birds were recorded as legally exported from Mexico.<sup>48</sup> In 1981, the trade in birds was estimated to involve more than 10,000 heads of households and generate more than US\$2 million annually.<sup>49</sup>

Beginning in 1971, calendars were issued specifying permissible species, seasons, and quotas, but virtually no research has ever been conducted to establish a scientific

basis for harvest and trade regulations.<sup>50</sup> Exports were prohibited in 1982 as part of a general crackdown on wildlife trade, but harvest and domestic commerce remain legal. Since 1984, the number of species subject to legal harvest has been more than doubled in an effort to dilute pressure on individual species. In the 1982-83 season, 627 capture permits and 699 vendor permits were issued,<sup>51</sup> with recorded capture totaling 138,000 birds.<sup>52</sup> By the 1987-88 season, the total number of permits had risen to 3,952.<sup>53</sup>

The calendars do not require the organization of harvesters or vendors, and no such organization currently exists to regulate the exploitation of wild birds.<sup>54</sup> Illegal capture and sale, and exploitation of protected species, remain widespread. There is also a flourishing illegal export trade; an estimated 25,000 birds continue to be smuggled annually into the United States alone.<sup>55</sup> By the early 1980s, and especially after the 1982 ban, most of these exports consisted of psittacines, for which prices in international markets justified smuggling them across the border in pockets, tires, or hollowed-out watermelons, or swimming them across the Rio Grande.<sup>56</sup>

A scarlet macaw (*Ara macao*) may bring less than US\$20 to the capturer, \$450 in Mexico City markets, and up to \$4000 in U.S. pet stores.<sup>57</sup> In 1986, harvesters of the yellow-headed Amazon (*Amazona ochrocephala*) and the red-crowned Amazon (*A. viridigenalis*) in Tamaulipas received

\$10.00 pesos and \$2.50 respectively, while prices in Mexico city were \$130.00 and \$57.00.<sup>58</sup> In 1989, harvesters in Tamaulipas received less than \$20.00 for the yellow-headed Amazon, but prices on the U.S. border reached \$250.00 and prices in the interior United States at least twice that amount.<sup>59</sup> In 1991-92, the yellow-headed Amazon still sold for under \$30.00 in domestic markets, but reached some \$800.00 in the United States.<sup>60</sup>

Rising prices for amazons reflect their increasing scarcity rather than increasing returns to harvesters; harvesters in Tamaulipas reported that while nest location involved two days of searching in 1986, by 1989 more than a week was required. Assuming only one bird per nest and harvester prices of \$20 in 1986 and \$30 in 1989, earnings over a two-week period would have declined from \$140 to less than \$60. While large-scale traders may compensate for depletion by shifting species and geographical concentration of suppliers, these prices remain high enough to ensure continued effort by harvesters to capture the few remaining birds, albeit at decreasing rates of return.

The economic and distributional dynamics of the export of olive ridley sea turtle skins from Oaxaca have also been well documented. A 1960s export boom for sea turtle leather led to the establishment of a private facility for processing and distribution and successive state efforts to rationalize the industry. State intervention included the

establishment of harvest quotas, to be distributed only to organized fishing cooperatives, which were granted rotating access to the fishery. However, the quotas were not only set high, but were not actively enforced, in part due to the involvement of local and even national political figures and personnel of the Secretariat of Fisheries.

When evidence of overexploitation became evident, the state responded with conservation measures designed such that the commercial industry would be preserved at the expense of those directly involved in resource exploitation. One measure was to prohibit the collection of sea turtle eggs on nesting beaches traditionally harvested by neighboring coastal populations, as this use potentially competed with the exploitation of the more commercially valuable adult turtles. Government personnel were stationed on nesting beaches to enforce this prohibition. The second measure was the legal requirement that fishing cooperatives participate in sea turtle conservation efforts by allowing a percentage to be subtracted from the price of sale to the processing plant. The revenues generated funded a joint program between the plant and state agencies to incubate turtle eggs, head-start hatchlings, and release them.

In 1982, after the plant's owner was charged in the United States for illegal trade in sea turtle meat, the plant was purchased by the parastatal PROPEMEX. PROPEMEX again served as monopoly purchaser of sea turtle harvests,

not only from the cooperatives to whom fishing rights were reserved, but also from illegal fishermen. By 1990, fishermen were paid \$6.00 per turtle (minus a donation to the Turtle Fund); the skins were then sold to tanneries at \$40.00 each and fashioned into leather products valued at several hundred dollars each. During the 1980s, five of the nine authorized fishing cooperatives attempted to alter this situation by purchasing the slaughterhouse and processing and refrigeration plant from PROPEMEX, then in the process of privatizing several of its facilities. The sale price of US\$50,000.00 was paid by reducing the fixed price for adult turtles to \$4.00. The sale was completed in 1989, and during the 1989-90 season fishermen received \$16.00 per turtle. Their investment was lost the following year, however, when the Mexican government responded to more than a decade of protests by environmentalists and the U.S. government by imposing a nationwide ban on the exploitation of adult sea turtles and their eggs. Protests by the fishing cooperatives were ignored, and their attempts to enlist the assistance of the national Federation of Cooperatives and its Fisheries Section were refused.

As the above examples suggest, the absence of effective organization and management of international trade in wildlife products represents a missed opportunity for national as well as local development. One interesting illustration of this problem is the Mexican leather

industry's reliance on imported rather than domestic skins. Much of this industry is concentrated along the border with the United States, primarily to feed the U.S. market for cowboy boots manufactured from exotic leather. In some cases, these enterprises are assembly plants established in Mexico by U.S. companies seeking to exploit lower labor costs. Many of the species exploited by the industry, such as crocodile, caiman, iguana, rattlesnake, and deer, are native to Mexico, but their commercial exploitation is illegal and in some cases not feasible due to depletion. Most of the leather used is therefore imported from Africa, Asia, South America, and the United States.<sup>61</sup> The exceptions are fish and shark leather, to which many Mexican tanneries have turned in response to bans on harvest of crocodiles and sea turtles, and for which no Mexican restrictions currently exist for exploitation and export.

The exploitation of sharks is also of interest here because it illustrates the difficulty of managing a resource which is both a resource of last resort to small-scale fishermen and one subject to periodic export booms. Shark exploitation shares many of the characteristics of the terrestrial wildlife discussed above, as it is often exploited when more valuable commercial fisheries are unavailable or during closed seasons for other species. It not only supplies an inexpensive source of protein meat to both rural and urban households, but has fed export booms

for liver oil used in vitamin A supplements in the 1930s and 1940s, for skins beginning in the 1970s, and more recently for fins for Asian seafood markets.<sup>62</sup>

The liver oil boom led to intensive exploitation for export to the United States in the late 1930s and 1940s, but by the late 1940s the development of synthetic Vitamin A forced the closure of a small domestic industry.<sup>63</sup>

Landings of sharks for direct human consumption nonetheless grew from 459 short tons in 1940 to 1920 in 1960, 23,904 in 1980, and 35,086 in 1991, making Mexico the world's fourth largest producer.<sup>64</sup> Its importance to the national economy is accentuated by the fact that some 70% of the catch is still carried out in small skiffs equipped with outboard motors.<sup>65</sup>

Market values for shark meat, however, have remained extremely low; whole, fresh carcasses are sold in markets for only US\$2.00 to \$3.50 per kilogram, and dried, salted meat for \$4.00 to \$5.00 per kilogram,<sup>66</sup> with producer prices a fraction of that amount. Salted skins are purchased from middlemen for only \$1.35 to \$2.00 per linear foot for small specimens and \$2.00 to \$3.50 per linear foot for larger specimens (\$14.00 to \$20.00 whole for large skins), although tanned skins are worth \$6.00 per square foot (an average of \$40.00 per large skin) and sharkskin boots sell for up to \$180 even within Mexico.<sup>67</sup> In areas where access to export markets is available, however, the

practice of finning--removing the dorsal fin from the live animal, which is discarded--has become widespread due to Asian and U.S. demand for shark fin, which may be sold for up to \$44.00 per kilogram in the United States and \$117.00 in Asian markets.<sup>68</sup> Although stocks are widely believed to be declining, efforts by producers to manage the shark fishery have been discouraged by the extremes of low prices for the majority of shark fishermen and competitive exploitation by those with access to export markets.

Beginning in the mid-1970s, the Mexican government attempted to encourage production of shark skins, fins, and other products with the establishment of PROPEMEX plants capable of complete processing of sharks as well as other species. By 1982, nine such plants operated in Guerrero, Baja California, Sinaloa, Oaxaca, Chiapas, Tabasco, Campeche, Yucatan, and Quintana Roo, with raw material purchased from fishing cooperatives. At its peak, however, PROPEMEX processed only about 17% of nationwide production, and did not significantly affect producer prices; most of these facilities were dismantled in the late 1980s with economic liberalization.<sup>69</sup> Propemex also assisted the cooperatives in the purchase of a series of aging shrimp boats adapted to the shark fishery, and in the early 1980s acquired ten large longliners, built in Japan and operated by the parastatal. The latter, however, were inactive during much of the 1980s, affected by the lack of operating

funds resulting from Mexico's economic crisis.<sup>70</sup> Despite a widespread perception that shark populations have declined significantly, no data are available on populations or trends, and no limitations have ever been placed on access to or exploitation of the fishery.

#### Profiting from Sport

The distinction between subsistence, commercial, and recreational hunting is often blurred by the fact that many rural and even urban residents may persist in hunting more from cultural tradition than need, but consume and market game as well. This group, however, is not readily identifiable either in descriptions of hunting patterns or in administrative terms, and a clear analysis of their activities cannot be made here. The term 'sport hunter' will therefore be assumed to include the small number of national and foreign hunters who actually obtain sport hunting permits and either belong to national hunting clubs or travel to Mexico to hunt. In contrast to subsistence and commercial wildlife use, sport hunting is typically conducted by national elites and foreign sportsmen, and sport hunting is virtually the only form of wildlife exploitation permitted under Mexican law. As discussed in the following chapters, the interests of sport hunters have also consistently been represented, through formal and informal channels, in government hunting policy.

In 1982-83, the last season for which such a breakdown is available, Mexican hunters were granted 51,509 hunting permits, and foreign hunters 11,360.<sup>71</sup> To obtain a hunting permit in Mexico, nationals must be members of a hunting club or association which is federally registered. By 1991, 1,142 hunting clubs had been registered in Mexico. Foreign hunters must obtain a visa for hunting tourism (with a US\$100.00 fee in 1991-1992)<sup>72</sup> and pay permit fees roughly twice those set for domestic hunters. As of 1988-89, foreign hunters must also contract the services of a federally-registered hunting outfitter or guide.<sup>73</sup> Outfitters, which include both independent agencies and private game ranches, numbered 100 in the 1990-91 season, while registered guides numbered 356 in 1987-88.<sup>74</sup>

Much of the revenue generated by sport hunting in Mexico is captured directly by the state in the form of permit fees, which generated nearly US\$23 million in 1988-1989.<sup>75</sup> Permit fees for jaguars were set at US\$1000.00 as early as 1969, and at \$709.00 for nationals and \$1773.00 for non-nationals in 1982.<sup>76</sup> Permit fees were not used for research and conservation, however, and no data were available on their populations. Concerns over their status led to the closure of jaguar hunts in Jalisco, Nayarit, Sinaloa, Tamaulipas, Quintana Roo, Chiapas, Tabasco, and Veracruz, and by 1983-1984 the jaguar hunt was restricted to ten special permits issued for Campeche. As a

result of currency devaluation, the cost of these permits declined to \$439.00 for nationals and \$1332.00 for non-nationals.<sup>77</sup> The jaguar was declared endangered in 1987, and its hunting prohibited,<sup>78</sup> but needed research and protection efforts have still not been undertaken by federal agencies.<sup>79</sup>

In selected areas, however, reasonably effective regulatory--and financing--systems have been developed by the state and hunting interests in response to opportunities for exceptionally high revenues from hunting, pressures from hunting and ranching interests, or both. One such program has been developed for sport hunting of bighorn sheep in northwestern Mexico. The bighorn sheep is one of the 'grand slam' species prized by organizations such as Safari Club International, and is Mexico's most exclusive game species due to the challenging terrain which it inhabits, and now also because of its small numbers.<sup>80</sup> As early as 1924, the then Department of Hunting was forced to declare a permanent closed season for the bighorn, but lack of effective enforcement led to continued population declines. In 1964, however, the closed season was lifted in order to create a planned system of utilization for the species, which has continued with modifications to the present.

In 1975, the program was expanded to include the creation of a corps of some 80 local inspectors to control illegal hunting, which appeared to result in a significant

decline in poaching.<sup>81</sup> In 1982, the number of permits issued annually was roughly halved, and the local inspectors hired during the hunting season were replaced by a smaller number of government personnel. A lottery system was established to distribute the permits, apparently in response to charges of favoritism and corruption and by sport hunters and by Safari Club International.

In 1986 the National Wildlife Council (Consejo Nacional de la Fauna) was created to assist federal environmental agencies, and in 1988 this organization assumed management responsibility for bighorn sheep hunts, with revenues deriving from permit fees and contributions from external non-governmental organizations such as the Bighorn Foundation. Some ten areas were open to bighorn hunts in Baja California, two in Sonora, and two in Baja California Sur. During the 1991-1992 season, a total of 13 permits were issued, 7 for Baja California Sur and 6 in Sonora. Ten of these permits were issued by lottery, with a quota of 60% for Mexican hunters and 40% to non-nationals. Mexican hunters paid a total of \$9000.00 for permits and services during the ten-day season, while non-nationals paid \$13,000.00. In addition, three 'special' permits were issued; special permits are granted to the highest bidders, usually non-nationals, with bids for bighorn sheep ranging from US\$28,000 to \$30,000. These revenues are managed by a special fund used only for research, enforcement and

management during the hunting season. Each hunter is also accompanied by an official inspector and by a guide employed from the area and paid a fixed salary, travel expenses, and optional tips. Cooks, carriers, and other personnel are also employed for the maintenance of base camps.<sup>82</sup>

The value of sport hunting by U.S. and Mexican hunters in northern Mexico has also prompted efforts by private landowners to increase resident game populations for the development of fee hunting. By the mid-1970s, some 280 ranches were involved in such efforts.<sup>83</sup> Interest in game ranching grew in the 1980s with the shrinkage of domestic and U.S. markets for cattle and beef, and in 1986 the National Association of Diversified Livestockers (Asociación Nacional de Ganaderos Diversificados, or ANGADI) was created to promote private game ranching and to lobby federal agencies for a favorable regulatory framework for their operation.

In 1988, annual hunting calendars began to allow for the licensing of enterprises described as extensive breeding facilities (criaderos extensivos), which could be registered upon the submission of detailed management plans including the contracting of qualified technical services, population censuses of the game species to be exploited, programs for habitat and infrastructure improvements, and the development of annual reports describing all management and hunting activities conducted in the previous year.<sup>84</sup> By law,

registration of game ranches is open to ejidal and communal landowners as well, but in practice, only private landowners have applied for and received such registration. By 1992, ANGADI's membership totaled 300, including 161 active operations, managed primarily for white-tailed deer.<sup>85</sup>

The benefit of legal registration to ANGADI's members is the distribution of hunting permits to the ranches themselves rather than to individual hunters, which helps to ensure that wildlife and habitat management will be compensated for by a more reliable flow of visitors. A smaller number of game ranches operate under registration as hunting organizers rather than extensive breeding facilities, but their clients are issued permits through normal channels.<sup>86</sup> ANGADI also processes permit applications for its members and receives permits directly from government management agencies. ANGADI is then responsible for distributing the permits equitably among its members on the basis of land area, with each member receiving a total of between six and thirty deer permits per season. Individual hunters are limited to a single deer per season, but some 80% come from the United States, and pay between \$1400.00 and \$2000.00 per deer permit, plus accommodations and services.<sup>87</sup> The organization is also active in developing international interest in hunting tourism in Mexico, and represents its members in international hunting fairs.

Hunting organizers and guides also organized in 1986 in the Federation of Mexican Hunting Organizers (Federación de Organizadores Cinegéticos Mexicanos, or FAOCIMEX). At the same time that regulations appeared for game ranches, similar regulations were issued for the registration of organizers and guides, which benefitted from the new requirement that organizers and guides be contracted by foreign hunters. The former were now required to develop conservation programs for hunted species and their habitats, and to establish agreements for the use of private, ejidal, and communal lands. FAOCIMEX was authorized to submit permit applications on behalf of its clients and to develop conservation activities on behalf of its members.

Government encouragement of the sport hunting industry has thus far offered few benefits to local communities or encouraged conservation on public or communal lands. Game ranches and hunting camps in northern Mexico are private, their existence reflecting the concentration of private landholdings and livestock production in this region. Interestingly, demand for sport hunting services by U.S. hunters has also brought about an inflation in their cost, so that Mexican hunters have been virtually excluded from northern Mexico. The external orientation of sport hunting is not only evident in the nationalities of consumers, for hunting camps for white-winged dove and aquatic game birds are often established with U.S. capital by Mexican citizens

acting on behalf of foreign investors. Access fees paid to nearby landholders by the clients of hunting camps are minimal, if they are paid at all. Although local hunting guides are employed in each of the management systems described here, the bulk of revenues generated accrue to the private owners and providers of infrastructure and facilities. There is also reason to expect conflict between sport and subsistence hunting needs, but no information is available on the relationship between sport and subsistence hunting in this region or any others.

State efforts to develop sport hunting on non-private lands have been virtually nonexistent. The only documented exception was reportedly initiated by Aguascalientes state agencies at the request of ejidos, ranchers and sport hunters concerned about a decline in white-tailed deer populations.<sup>88</sup> A three-year closed season was imposed in 1975 to allow deer recovery, after which experimental hunting seasons were opened to a limited number of sport hunters. Hunters were assigned to specific hunting zones with the permission of private, ejidal, and communal landowners, who were paid entry fees. Hunters were also required to employ local guides, who were paid a fixed daily wage and tips. Harvest was limited to adult males of four years or more of age, with personnel of government management agencies stationed in the area to check kills. Annual inventories of deer populations were developed on the

basis of hunter sightings, suggesting a 25% increase in deer populations from 1981 to 1985 alone. No further information is available on the distribution of fees and wages or the continued performance of the program.

Recently, one experiment has been initiated by a Mexican environmental NGO, Biocenosis, to develop sport hunting on ejidal lands in Campeche. Again, the project is located in a community working with the Plan Piloto Forestal and already benefitting from several years of institutional and forestry development. With technical assistance from Biocenosis and funding from the MacArthur Foundation, the ejido has undertaken surveys of game abundance, habitat improvements, and the construction of facilities for sport hunters.<sup>89</sup> Three experimental hunting seasons were held by 1992, with reports from participating hunters suggesting needed infrastructure and management improvements.<sup>90</sup>

The success of the program cannot yet be evaluated, since it has not yet moved beyond the experimental phase, and management of the sport hunting program has not yet been transferred from Biocenosis to the ejido. It does represent, however, an important movement in the incorporation of wildlife resources in community development, and has stimulated the interest of surrounding ejidos.<sup>91</sup> It has also served as a model for other areas, and Biocenosis is now collaborating with the National Indigenous Institute (Instituto Nacional Indigenista, or

INI) in the preliminary phases of a similar wildlife project in the Sierra Juichol of Jalisco, where community forestry activities are currently being developed with funds from a World Bank loan. The project, funded by the World Bank through Solidarity, contemplates the delineation of two distinct wildlife zones, one to support self-regulated subsistence hunting and the other to be set aside for sport hunting and nature tourism.<sup>92</sup>

#### Conclusion

Mexico's wildlife resources offer a number of potential benefits to local and national development in Mexico, ranging from protein supply and supplements to cash incomes for the rural poor to hard currency earnings from tourism and commercial exports. Yet one after another, these resources have been severely depleted by uncontrolled exploitation, a problem to which both resource users and the state have often failed to respond.

The cases presented above suggest some of the reasons for this failure. In the case of the rural poor, analysis is made difficult by the lack of successful cases of wildlife resource management. However, the illegality of subsistence and most commercial wildlife use, and the difficulty of limiting present consumption and of excluding outside users, undoubtedly present enormous barriers to efforts to prevent the depletion of wildlife resources. The expenditure of limited social--and financial--capital on

problems of wildlife management is also unlikely in areas marked by struggles for more critical resources.

Possibilities for generating significant economic values from wildlife resources might help to overcome this problem, but in most cases the harvesters of wildlife have been excluded in various ways from its economic benefits, and in Mexico there are not as yet any successful models of successful local wildlife management which would spark local interest in replication. Moreover, as the sea turtle case suggests, the problem of social capital may be especially critical when the economic stakes are high, given the vulnerability of local organizations to outside control.

Those who have appropriated the benefits of wildlife use have in many cases acted collectively to protect those benefits against incursions either by disadvantaged users or by the state. These cases also offer useful insights on the requisites for participatory management and conservation, because not all of them involve efforts to protect the resource itself. Those exploitation systems which offer the greatest likelihood of achieving both ecological and economic sustainability are those arising out of a compromise between wildlife interests and state demands for environmental performance.

Indeed, many of the economic interest groups which have been organized to pressure for appropriate regulatory systems have formed in to inadequate or threatening state

regulations. Favored organizations such as ANGADI and The National Association of Breeders and Vendors of Ornate and Song Birds are examples of this, although in the case of the latter no efforts were made to ensure the organization's collaboration in resource management. Such a response is also evident in measures by commercial fishermen to reduce the incidental capture of dolphins in the purse-seine fishery for tuna in the Eastern Pacific. In this case, state intervention was prompted in turn by the threat of a U.S. embargo against Mexican tuna imports under the U.S. Marine Mammal Protection Act, and part of a wider collective effort by tuna fishing nations to prevent the embargo. The Mexican industry itself, however, took action before state regulatory agencies. In 1989, after the possibility of an embargo was announced to Mexico, the National Congress of Fishing Industries (Camara Nacional de Industrias Pesqueras, or CANAINPES) established a Tuna-Dolphin Office to coordinate industry efforts to reduce dolphin mortality. The office not only helped to coordinate training courses for captains and crew, but also instituted requirements for gear inspection and continuous monitoring of dolphin mortality which were more stringent than existing Mexican legislation. In this case, neither industry nor national efforts to preempt the imposition of external conservation measures were successful, but the example does illustrate the ability of affected interest groups to act effectively

in response to a perceived threat to continued resource exploitation. It also reiterates the persistent tendency for successful collective action to vary with the socioeconomic context of resource users, because smaller-scale tuna fishermen organized into cooperatives did not respond independently to the threat of a U.S. embargo.

In Chapters 2 and 3, it was suggested that state action is not only needed to provide standards for resource conservation, but can also in many cases facilitate the representation and participation of disadvantaged resource users by providing forums for interest articulation and the resolution of conflicts among distinct groups of resource users, and by providing the information needed to gain the active and effective participation of resource users in management. As evident from this and the preceding chapters, the Mexican state does not perform these roles uniformly or even generally. Its failure to do so is not merely a question of scarce state resources for wildlife management, for the experimental hunting and conservation programs described above benefitted from extensive state support for infrastructure, research, and enforcement as well as willingness to experiment with regulatory design.

Although state agencies may be open to pressures from organized interests, they are unlikely to independently initiate regulatory and management reforms to favor an unorganized and poorly represented constituency. In this

context, the environmental NGOs again appear as the most probable agent not only for demanding state efforts to protect natural resources, but also for encouraging and assisting local wildlife resource management and development and for representing the interests of underprivileged resource users before the state. The case studies that follow examine more closely the role and influence of NGOs and other interest groups in this process and the response of state agencies charged with the management and conservation of Mexico's wildlife.

#### Notes

1. This discussion is based primarily on the classic work on Mexican game animals, A. Sarker Leopold's Fauna Silvestre de Mexico (Mexico, D.F.: Instituto Mexicano de Recursos Naturales Renovables, 1977), originally published as Wildlife of Mexico (Berkeley: University of California Press, 1959). Other references consulted are Gerardo Ceballos and Daniel Navarro L., "Diversity and Conservation of Mexican Mammals," in Latin American Mammals: Their Conservation, Ecology, and Evolution, ed. M. A. Mares and D. J. Schmidly (Norman: University of Oklahoma Press, 1992); Ignacio J. March M., "Los Lacandones de Mexico y su Relación con los Mamíferos Silvestres: Un Estudio Etnozoológico," Biotica 12, no. 1 (1987): 43-56; Gilberto Chavez León, Determinación de las Relaciones Hombre-Fauna Silvestre en una Zona Rural de Quintana Roo, Boletín Técnico No. 94 (Mexico, D.F.: SARH, 1983); Alvaro del Campo Parra Lara, Uso y Manejo Tradicional de la Fauna Silvestre y su Relación con Otras Actividades Productivas en San Pedro Jicayán, Oaxaca, Cuadernos de Divulgación INIREB No. 27 (Xalapa: INIREB, 1986); Luis Antonio Segura Tour, "La Fauna Silvestre en el Noreste de Mexico," Ciencia Forestal 11, no. 60 (July-December 1986): 62-74; Jeffrey Jorgenson, "La Cacería de Subsistencia de los Mayas de Quintana Roo," Boletín de Amigos de Sian Ka'an 7 (1990): 11-12; Eleuterio Góngoras and Marco A. Lazcano-Barrero, "La Cacería Tradicional en Campeche," Cultura Sur 2, no. 9/10 (1990): 21-24; Anelio Aguayo, "Aprovechamiento de los Mamíferos Marinos en America Latina," in Segundo Simposium Internacional de Vida Silvestre (Mexico, D.F.: The Wildlife Society and SEDUE,

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2. Based on author's review of raw data from the Mexican Secretariat of Commerce and from the U.S. Customs Service and U.S. Fish and Wildlife Service. For the latter, see Debra A. Rose, A North American Free Trade Agreement: The Impacts on Wildlife Trade (Washington, D.C.: World Wildlife Fund, 1991).

3. Oscar Alberto Flores Villela, "Reptiles de Importancia Económica en México," (B.S. thesis, Universidad Autónoma de México, 1980), 154-185.

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5. Steven Broad, "International Trade in Skins of Latin American Spotted Cats," Cat News 8 (1988): 24-31.

6. Debra A. Rose, A North American Free Trade Agreement; Uwe Dietrich, "El Comercio Legal e Ilegal de Productos de Fauna Silvestre entre México y Estados Unidos en los Años 1984 a 1989," in Memoria, VII Simposium de Fauna Silvestre (Mexico, D.F.: UNAM, Fac. Med. Vet. y Zool., 1989); Uwe Dietrich, "La Comercialización (Legal e Ilegal) de la Fauna Silvestre Mexicana al Nivel Internacional con Especial Enfasis hacia el Intercambio con la Comunidad Europea," in Memoria, VIII Simposium de Fauna Silvestre (Mexico, D.F.: UNAM, Fac. Med. Vet. y Zool., 1990).

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9. Alvaro del Campo Parra Lara, Uso y Manejo Tradicional de la Fauna Silvestre y su Relación con Otras Actividades Productivas en San Pedro Jicayán, Oaxaca, 21-22.

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11. Alvaro del Campo Parra Lara, Uso y Manejo Tradicional de la Fauna Silvestre y su Relación con Otras Actividades Productivas en San Pedro Jicayán, Oaxaca; Roberto Aviña Carlin, "La Cacería," in Sian Ka'an: Estudios Preliminares de una Zona Propuesta como Reserva de la Biósfera (Puerto Morelos: CIQRO and SEDUE, 1983); Jeffrey P. Jorgenson, "La Cacería de Subsistencia de los Mayas en Quintana Roo," Boletín de Amigos de Sian Ka'an 7 (1990): 11-12; Gilberto Chávez León, Determinación de las Relaciones Hombre-Fauna Silvestre en una Zona Rural de Quintana Roo.

12. Roberto Aviña Carlin, "La Cacería."

13. Roberto Aviña Carlin, "La Cacería;" Jeffrey P. Jorgenson, "La Cacería de Subsistencia de los Mayas en Quintana Roo;" Martha Patricia Ponce Jimenez, La Montaña Chiclera, Campeche: Vida Cotidiana y Trabajo (1900-1950), Cuadernos de la Casa Chata No. 172 (Mexico, D.F.: Centro de Investigaciones y Estudios Superiores en Antropología Social, 1990); Marcelo Aranda, "Mamíferos de Calakmul" undated report to Pronatura-Yucatan, Merida; Martin Castillo P. and Ignacio J. March, "Propuesta: Estudio Sobre la Utilización de Flora y Fauna Silvestres en la Explotación de la Palma Chamaedorea en la Selva Lacandona, Chiapas, México," unpublished manuscript, ECOSFERA, San Cristobal, 1991.

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CHAPTER 6  
CASE STUDY: HUNTING IN THE YUCATAN

Introduction

Despite recognition as early as the 1950s of the need to achieve self-regulation in subsistence hunting by the ejidos of the Mexican countryside, almost no environmental activity has focused on this critical component of resource conservation. The work of NGOs in the vicinity of the Sian Ka'an and Calakmul reserves, however, has been an exception. The following discussion, benefitting from an unusual amount of research conducted on hunting patterns among primarily Mayan inhabitants of the Yucatan peninsula, will discuss both the context of wildlife use and the efforts currently underway to guarantee its continued contribution to rural economies.

Quintana Roo

Quintana Roo represents Mexico's last frontier, having achieved statehood only in 1975. In the 19th and early 20th centuries, the tropical forests of southern Quintana Roo were exploited by foreign capital for the extraction of cedar, dyewood, mahogany, and chicle, while palm extraction became important in the late 1940s as resources in Veracruz, Tabasco, and other states became overexploited.<sup>1</sup> Early

colonial settlement had concentrated in the north of the peninsula, in what is now the state of Yucatan and the northeastern coast of what is now Quintana Roo, with the only significant Spanish settlement in the south in Bacalar, on the Caribbean coast near the border with Belize.<sup>2</sup>

In the 19th century the establishment of haciendas for the production of henequen, exploiting indigenous Mayan labor, brought about the Caste War of 1847-1901, and with it continued military presence in the zone to subdue the Mayan uprising. This period also witnessed the arrival of new Mayan settlers to the forests of southern Quintana Roo to escape military repression. When the uprising ended, the Territory of Quintana Roo was established and new forestry concessions granted in the south to American and British investors, while on the Caribbean coast small settlements were established for the production of copra.<sup>3</sup>

Beginning in 1928, the population of southern Quintana Roo grew quickly with the creation of ejidos.<sup>4</sup> In the 1930s and 1940s, extensive forested ejidos were distributed to chicleros, in part to secure the border with British Honduras, now Belize.<sup>5</sup> Northern Quintana Roo remained the domain of fishermen and scattered forestry and agricultural production until state-led tourism development created Cancun as a pole of urban growth and immigration.

The Sian Ka'an reserve was declared in 1986 with an extension of 528,417 hectares. When studies began in 1982

for the demarcation of a biosphere reserve in the central-eastern portion of the state, the area in question consisted of 99.8% federal lands and .2% private property. Bahia de la Ascención and Bahia del Espíritu Santo and the large expanse of mangrove swamps surrounding them were uninhabited, while the forested zone inland from the lagoons was inhabited by nine Mayan families residing on federal lands. Private lands were located only in the coastal zones between the two lagoons, owned by eight inhabited copra plantations and three that had been abandoned; the narrow stretch of coastal property on the northern border of the reserve, divided into small residential lots and small-scale tourism facilities; and the fishing community of Punta Allen on the southern edge of the lagoons. The inland boundaries of the reserve were formed by the ejidos Chunyaxché, X-Maben, Tulum, X-Hazil, Andres Quintana Roo, and Felipe Carrillo Puerto.<sup>6</sup> In the late 1980s, two new ejidos were created: Ejido Tres Reyes, located between the ejido X-Maben and the reserve boundary, and Pino Suarez, counterpoised between the reserve and the ejido Tulum.<sup>7</sup>

With the exception of Pino Suarez, ejidal residents are Mayan, native to the area or to elsewhere in the peninsula. Pino Suarez, located at the extreme north of the reserve, is an NCPE formed by settlers from Tabasco, Colima and Yucatan. The ejidatarios of Pino Suarez produce milpa crops (corn and other vegetables for subsistence) and

livestock, with more than half of the families relying on outside employment in tourism. The remaining ejidos produce milpa crops, fruit, honey, livestock, lumber, railroad ties, and chicle for export to Japan, Italy and South Korea.<sup>8</sup>

The principal non-governmental organization active in the reserve is Amigos de Sian Ka'an, which has received institutional and project support from The Nature Conservancy, World Wildlife Fund-U.S., the MacArthur Foundation, and the Mariah Foundation. The organization is now sponsoring research on lobster, shark, crab, snapper, and other fisheries; inventory and status of coral reefs; feasibility studies for captive propagation of crocodiles; use and management of non-wood forestry products; status surveys and public education for sea turtle conservation; and agricultural improvement. The NGO has also initiated a small ecotourism project within the reserve to generate funds for its projects.<sup>9</sup> Discussed below is another project underway in Sian Ka'an to survey hunting and game abundance and to work with Mayan communities to develop self-regulation of subsistence and commercial hunting.

#### Hunting in Sian Ka'an

The ejidos surrounding the reserve all depend to varying extents on subsistence hunting, usually on or within the reserve's limits.<sup>10</sup> Several hunting surveys have been conducted in the zone. One such study surveyed the entire zone of the reserve prior to its creation, finding

subsistence hunting to be most important to residents in the agricultural and livestock area of the northern portion of the reserve.<sup>11</sup> Hunting was primarily conducted in association with activity in the milpa or with cattle herds. Near the coast, hunting is a seasonal activity, carried out by fishermen during the summer when lobster is in closed season; during this season many are also engaged in agricultural activity. Farther inland, hunting takes place year-round. Subsistence hunting is also important for seasonal workers arriving in the fall to cut hardwoods for production of railroad ties. Subsistence hunters also reported occasionally selling game meat for extra cash income, and cats (jaguars, ocelots, margays, jaguarundi, puma) whenever encountered. The principal species hunted are white-tailed and brocket deer, white-lipped and collared peccary, paca (often lured with an opened coconut), pheasant, and ocellated turkey. Iguanas, chachalacas, doves, agoutis, coatis, armadillos, and manatees are hunted less frequently.

Sport hunting also occurs in the zone, usually by non-residents arriving to hunt at night on highways. Deer are pursued from pickup trucks with the aid of headlights, and wounded animals are permitted to escape without pursuit. The deer are also sold in Merida, Yucatan or Carillo Puerto, making the distinction between sport and market hunting rather ambiguous.

Market hunting tends to be sporadic and involves only mammals. As noted above, felines are taken whenever encountered and their skins used for household decoration, given as gifts, or sold. Deer, peccary, paca and agouti meat is commonly marketed, while deer and paca skins are only sold occasionally. Also occasionally marketed as pets are juvenile felines, deer, howler and spider monkeys, and coatis.<sup>12</sup> Pheasants, turkeys, and crocodile skins are now rarely sold due to their scarcity. In nearby Bacalar, in southeastern Quintana Roo, wildlife markets for a wide variety of species such as common wild turkey, great curassow, chachalaca, parrots, ducks, deer, armadillo, paca, agouti, spider monkeys, peccaries and crocodiles have now been limited to deer, peccaries, pacas, and occasionally cat skins, as a result of overexploitation.<sup>13</sup>

A separate survey of subsistence hunting by Mayan communities west of the reserve found that the most commonly taken species were coati, pocket gopher, paca, collared peccary, agouti, white-tailed and brocket deer, chachalaca, red-billed pigeon, rufescent tinamou, and great curassow.<sup>14</sup> Most of these species are taken in agricultural areas. From January to April, birds and pocket-gophers are harvested during clearing, and tinamou, curassow and turkey are hunted in the forest. In the summer and early fall, deer, peccaries, coatis, pacas, and agoutis are found in the fields. Chachalacas and pigeons are taken by roadsides or

in fallows, while pacas are hunted at night with headlamps. Excess meat may be distributed to friends or sold. Market hunting of parrots and toucans (worth one or two days' wages), and of the skins and teeth of felines (worth one to two months wages) is also pursued.

The author's own discussions with residents of the area confirmed these patterns. In the community of Uh-May, located in the ejido X-Hazil close to the border of the reserve, coati is the most abundant and most frequently hunted species. Other important game species include white-tailed deer, peccary, great curassow, ocellated turkey (taken during the mating season in spring and early summer by following their calls), howler and spider monkeys, paca, brocket deer, and freshwater and terrestrial turtles. Hunting takes place not only in and near agricultural fields, but also in the forest in association with chicle extraction and logging activities. Special hunting trips are also made to the forest and to the marshy coastal savannah within the reserve.

Market hunting is also important within this community. Residents frequently buy and sell deer, peccary, paca, and curassow meat within the ejido. Crocodile hunting, utilizing harpoons and canoes in the coastal lagoons, was also a widespread activity until the mid-1980s, with buyers coming to the community to purchase the skins, but is now only occasional due to restrictions within the

reserve and to scarcity. Commercialization of deer skins and antlers continues, with buyers from Yucatan paying roughly \$4.00 to \$6.00 per skin and \$1.65 for antlers.<sup>15</sup>

In San Andres, a small agricultural community also within the ejido X-Hazil but farther removed from the reserve, hunting takes place primarily in the milpa, with white-tailed deer, paca, coati, and peccary the most important game species. Deer skins are occasionally sold, but are more frequently given to dogs. Skins of peccary and paca are consumed after boiling and removing the fur.<sup>16</sup>

In the nearby community of Kopchen, in the ejido Kopchen, hunting is also most common in and around the milpa, where deer and coati are found. Special hunting trips are made to the forest for peccary and ocellated turkey. Although reluctant to report market hunting, residents report that deer, peccary and curassow are frequently sold along the highway by residents of the area, curassow at \$17.00 apiece, peccary for roughly \$6.50 per kilo, and deer for \$4.00 to \$5.00 per kilo or \$100.00 for the entire carcass, the latter sum representing a week's salary for the ejidatarios.<sup>17</sup>

Residents also reported an informal arrangement between the communities of San Andres and Kopchen. Residents of San Andres often hunt within the forested lands of the ejido Kopchen, while ejidatarios of Kopchen hunt deer

in the cleared lands and secondary growth of San Andres, which provide more suitable habitat for these species.

As in most of the reserves created to date in Mexico, the management plan drawn up for Sian Ka'an by SEDUE, the government of Quintana Roo, and Amigos de Sian Ka'an proposed controlled use of fauna within the reserve. The proposal suggested captive breeding of deer, doves, crocodiles, and butterflies; sport hunting, with hunters required to retain skulls to aid research by reserve staff; the granting of a limited number of permits to subsistence hunters for white-tailed deer, collared peccary, paca, agouti, coati, chachalaca, white-winged dove, and iguana, with ejidatarios favored over fishermen; and total protection for several species whose numbers had been diminished by hunting and habitat loss.<sup>18</sup> In actuality, however, there are no technical staff to conduct research and all hunting is prohibited. Forestry activity and hunting in surrounding zones has now also been prohibited indefinitely in order to allow regeneration following Hurricane Gilbert and a severe forest fire.<sup>19</sup>

Continuing past research on Mayan subsistence hunters on the western edge of the reserve, Amigos de Sian Ka'an initiated in 1991 a project to study game abundance and hunting patterns. Expanded to include game surveys in five ejidos and hunting surveys in twelve, the project was also conceived with the ultimate goal of assisting self-

regulation by the communities involved. The project incorporates assessments of game abundance and the administration of questionnaires and interviews to assess hunting pressures. The planned duration of the project is twelve to eighteen months, and is implemented by a single investigator with a local assistant responsible for distributing questionnaires.<sup>20</sup>

The project will confront a complex set of barriers in encouraging self-regulation. Traditional Mayan communities are often isolated from markets and thus from alternative sources of protein, and depend on year-round hunting to vary a basic diet of maize, beans, squash, and fruit, domestic livestock not being an important economic activity in much of the zone. Furthermore, subsistence hunters disregard species, age, sex, and breeding season, and many residents are unaware of current hunting regulations.

While it is universally understood that commercial hunting is illegal, Mayan communities consider themselves exempt from restrictions because they "hunt to eat." Although these communities note a decline in important game species such as peccary and deer, this decline is attributed to market hunting by persons not belonging to the community, and therefore is considered outside the control of the ejido. Existing studies suggest that this is not entirely true, but nonetheless the inability to control encroachments on ejidal lands does impede the imposition of community

restrictions. A further impediment is the closeness of individual communities and lack of social acceptance for community reporting. One resident, asked his opinion of the likely acceptance of internal hunting regulations, replied that anyone informing on his neighbor, even to ejidal rather than government authorities, could expect to have his house burned down. Official intervention to encourage regulation is even less likely to succeed; illustrative was a community inspection team formed at the request of the Director of the Sian Ka'an Reserve, which included three professional hunters among its ranks. This response is not necessarily related to a lack of awareness of the need to conserve natural resources, for the ejido in question had already created a forest reserve in which hunting as well as forestry activity were prohibited.

#### Wildlife and the Plan Piloto Forestal

The Plan Piloto Forestal was begun in Quintana Roo in 1983 at the initiation of the governor of the state and a joint agreement (Acuerdo Mexico-Alemania) between SARH and the Federal Republic of Germany. Initiating work in ten ejidos in southern Quintana Roo and later extended to include fifteen additional ejidos in the central Mayan zone of the state, the project's aim is to assist campesinos in community forestry development, based on community control and decision-making in the promotion of rational forestry development. In 1989, the state of Quintana Roo established

its own, similar forestry program, incorporating two more associations of forestry ejidos, and the Plan Piloto has now initiated activities in the state of Campeche.<sup>21</sup>

With the expiration of a forestry concession covering some 500,000 hectares from 1953 to 1983, the ten ejidos initially involved took control of production and marketing, the Plan Piloto providing technical assistance on the condition that selected ejidal lands be dedicated permanently to forestry production. Of a total area of 300,000 hectares, 120,000 hectares were selected for permanent forestry production. Logging is conducted on a 25-year site rotation, with replanting of cedar and mahogany. Forest inventories are conducted periodically by the ejidos themselves, trained by the technical personnel of the Plan Piloto, allowing community-based zoning and land use planning. In the second year of the project, many of the ejidos obtained credits to purchase their own extraction and transportation equipment. Over time the ejidos also achieved product diversification, reducing the volume of precious hardwoods and increasing production of other species; installed four sawmills and two carpentry workshops; achieved contracts for direct exportation; and in one carpentry workshop are moving toward production of handicrafts and industrial products. One of the ejidos, Tres Garantías, is also attempting to increase the economic

benefits of its forest reserve with the management and rational exploitation of wildlife.<sup>22</sup>

The Tres Garantías wildlife project is funded in part by the ejido itself, and in part by the Sociedad de Productores Forestales Ejidales de Quintana Roo (Society of Ejidal Forestry Producers of Quintana Roo) through a grant from the MacArthur Foundation, which also supports technical assistance by the Mexican NGO Biocenosis. Also collaborating in the project are the Plan Piloto and the National Indigenous Institute. The project consists of a feasibility study for a program of rational utilization of game species within the ejido, to be achieved through the establishment of hunting quotas for subsistence and the development of sport hunting and other recreational uses on ejidal lands to generate additional cash income.<sup>23</sup>

Game abundance was estimated with the assistance of four persons appointed by the ejido and trained by Biocenosis, with the results of suggesting significant abundance of white-tailed deer, brocket deer, white-lipped peccary, hocofaisan, jaguar and ocelot, now rare in other regions of Mexico. Questionnaires were also developed in order to assess hunting pressure, but due to a lack of continuous presence in the community by Biocenosis, ejidatarios were reluctant to report hunting activity. In forty-three questionnaires returned during the first year, community members reported hunting fifteen white-lipped

peccaries, eight white-tailed deer, seven collared peccaries, six brocket deer, five turkeys, and two pacas.<sup>24</sup>

In the first year of the project, the ejido installed artificial watering troughs and constructed camping facilities for visiting sport hunters.<sup>25</sup> As part of the feasibility study, three experimental hunting seasons were conducted in 1991 and 1992, with invited hunters asked to submit written comments on infrastructure, services, and fees. The hunters were solicited and conducted to the site by Biocenosis, paying a daily fee of \$100.00 for services, plus per-trophy fees ranging from \$100.00 for paca to \$335.00 for white-tailed deer.

Results from the first three hunting expeditions suggested that the time period open to sport hunting in the ejido is extremely limited. Despite the wider variety of game species legally hunted from October to December, October visits are negatively influenced by heavy rains, and none could be solicited in November or December. Greatest visitor interest is shown for the dry season months of March and April, during brocket deer and wild turkey seasons, but these are the two game species least abundant within the ejido, so that reintroductions or long-term habitat management would be required before these species could serve as significant attractions. Wildlife viewing and photography focused on jaguars and other spotted cats, tapir, howler and spider monkeys, and exotic birds are now

being explored as a means to give seasonal continuity to the project, and may eventually replace sport hunting as its chief component.<sup>26</sup>

Although the Tres Garantías project is only in the initial stages, it appears to offer considerable opportunity for increasing the economic benefits from the ejido's forest reserve. Significant obstacles yet to be overcome, however, include the need for costly infrastructure improvement necessary to attract high-income sport hunters, and the long-term restraint which must be exercised by subsistence hunters in order to maintain game populations at sufficient levels to attract hunters. The ejido may also experience difficulty in attracting visitors once the experimental phase has ended. Word of mouth advertisement may involve a considerable lag between infrastructure improvements and the development of a steady clientele, while other media may be beyond local capabilities. The same consideration applies to the possibility of registration as a criadero extensivo, which would require the external contracting of yearly population censuses. A final consideration involves the transferral of management and technical control to the ejido from Biocenosis, to date the initiator and implementer of the project.

Despite these obstacles, the Tres Garantías project has awakened considerable interest among other ejidos involved in the Plan Piloto, and among its technical staff.

In place of sport hunting, however, this interest is focused on the development of game meat production. The staff of the Plan Piloto are currently seeking funding to initiate commercial production, despite the fact that the commercialization of wildlife is still illegal in Mexico.<sup>27</sup>

Although the Biocenosis project takes place in Quintana Roo, it was initially conceived for application within the zone of influence of the nearby Calakmul Biosphere Reserve in the state of Campeche. Another unrelated wildlife management project is being carried out for Calakmul within the state of Campeche, which will be discussed below.

#### Campeche

The Calakmul Reserve was declared in 1989, covering 723,185 hectares in southeastern Campeche, extending north from the Guatemalan border. The reserve consists of two distinct zones, separated by the Chetumal-Escarcega Highway, with the northern section consisting primarily of low seasonal forests and the southern of moist tropical forest. The justification for the creation of the reserve was based on both its archaeological and ecological values. Calakmul provides important habitat for rare tropical species such as jaguars and other felines, tapirs, white-lipped peccaries, spider and howler monkeys, and toucans, and contains numerous archaeological remains, among them the Mayan ceremonial center of Calakmul and ten tributary cities.<sup>28</sup>

The reserve is bounded to the south by the Guatemalan Peten reserve and by the Belizean reserve, Las Milpas, leading to ongoing consultation between the three countries for the creation and joint management of a tri-national reserve. Problems with wildlife smuggling and illegal timber trade as well as the flood of Guatemalan refugees into southern Mexico and heavy military presence along this border led to the signing of a general agreement for protection of ecosystems and wildlife in 1988, but as of 1992 no concrete actions had been taken under the agreement.<sup>29</sup>

Due to uncertainty in property and territorial limits, the declared reserve included within its boundaries 19 ejidos and 25 private landholdings, with another 69 ejidal or other occupied landholdings located partially within or bounding the reserve.<sup>30</sup> While some of the ejidos, such as Nuevo Becal, Komchen, and Chunyaxché are formed of Mayan residents native to the zone, others have settled as a result of official colonization programs and the construction of the Chetumal-Escárcega highway, and the process is likely to continue with the completion of the Hopelchen-Xpujil highway, now being constructed through the northern nucleus of the reserve. Such is the case with Xcanha de los Chenes, with 157 members brought in the late 1980s from Chihuahua and other states and which has already solicited credits for cattle production in areas deforested by the new highway. Eleven of the ejidos have received

large land grants for forestry production, leaving much of the buffer zone uninhabited. Forestry activity includes precious and hardwood production, chicle and palm extraction, and apiculture. Non-forestry areas produce squash, chile, maize, and beans, and the majority of the new settlements engage in livestock rearing, including cattle, pigs, and goats. Some ten ejidos produce chicle within the reserve, with an annual production of over 70,000 kg in 1988-1989, although production has decreased steadily from the 1970s, partly as a result of overexploitation. Nearly all of the settlements also now engage in apiculture following its introduction by INI.<sup>31</sup>

Forestry production in most of the zone is controlled by private companies and federal entities, with ejidos selling standing timber or raw logs to private sawmills and exporters and with extensive corruption and illegal logging on unprotected federal or ejidal lands. Exceptions are found in a few of the Mayan ejidos, such as Alvaro Obregon, which after the contamination of their freshwater supplies by the Mexican Mahogany Company worked with the Unión de Ejidos Forestales and the Plan Piloto Forestal to acquire their own sawmill and to establish independent markets. The ejido has also established an 11,000-hectare forest reserve, part of which is completely protected.<sup>32</sup>

While the National Institute of Anthropology and History (Instituto Nacional de Antropología e Historia, or

INAH) and the University of Campeche are active in surveying and restoring archaeological sites within the Calakmul reserve, Pronatura-Peninsula Yucatan has been active in fostering basic and applied ecological research. With institutional and project support from the Nature Conservancy, World Wildlife Fund, and USAID, Pronatura is supporting floral and faunal surveys in the region<sup>33</sup> and has initiated resource management programs for wildlife, tropical hardwood, and honey exploitation in Mayan communities.<sup>34</sup> Pronatura, which in 1991 signed an agreement with SEDUE for cooperative management of the Rio Lagartos and Ria Celestun reserves in Yucatan, is now negotiating a similar agreement for Calakmul which would allow the NGO to contribute to staff salaries and infrastructure development.<sup>35</sup>

The Mundo Maya project agreed on by Mexico, Guatemala, and Belize to foster archaeological and nature tourism provides another potential means of contributing to economic development and conservation in the region, although considerable investment is again necessary, given a complete lack of facilities and the fact that much of the area is inaccessible during the rainy season. No NGO has yet begun a tourism project in the zone, although SECTUR, INI, INAH and the government of Campeche in 1991 developed a social assistance program hiring ejidatarios to assist in archaeological restoration following widespread crop

failures.<sup>36</sup> Initial research also suggests the need for careful planning of tourism activity due to high wildlife concentrations in some of the sites.<sup>37</sup> The National Indigenous Institute, with funding from PRONASOL, is also collaborating with Pronatura and the Acuerdo Mexico-Alemania to develop wildlife-based tourism in the Ejido 20 de Noviembre within the zone of influence of the reserve.<sup>38</sup>

#### Hunting in Campeche

Surveys of hunting patterns in Campeche are much fewer than in neighboring Quintana Roo. A survey of subsistence and commercial hunting in a traditional Mayan community in the western peten region of Campeche found deer and paca to be the most important game species, with collared peccary, armadillo, ocellated turkey, and chachalaca of secondary importance.<sup>39</sup> At the beginning of the rainy season, deer were hunted at night with lights in grassy areas or zones of secondary growth, while during the fall dry season, group hunting took place during the day. Group hunting is conducted in groups of ten to fifteen persons, divided into two sections, one to clap and beat brush to herd deer and other game, and the second to lie in wait for the pursued quarry. Individual hunting may involve lying in wait near freshwater sources during the dry season, and tracking during the rainy season. Crocodiles are also hunted with rifles or shotguns on the edges of coastal lagoons, and skinned on site for sale, with the rest of the carcass left.

Subsistence hunting has always been and continues to be important to Campeche's chicleros and loggers, who depend on turkeys, curassows and other game birds, deer and peccary for fresh protein, and sell jaguar and other feline skins when encountered.<sup>40</sup> In the area of Calakmul as well, subsistence hunting remains important to ejidatarios, loggers, and chicleros.<sup>41</sup> The most important subsistence game species are white-tailed and brocket deer, white-lipped and collared peccary, coati, paca, ocellated and common wild turkey, and great curassow. Sport hunters from urban areas also have a strong negative impact on jaguars, white-lipped peccary, and spider and howler monkeys. Calakmul is known for its popularity among sport and commercial hunters for jaguar, and this activity has benefitted from the clearing of logging roads.<sup>42</sup> Jaguars are attracted by obtaining deer, peccaries and monkeys for bait and suspending them from tree branches. A single hunter may establish up to ten bait stations, thus exerting considerable pressure on other species as well. Initial research results reveal an estimated total population of 220 to 270 jaguars within the reserve, with reports from residents suggesting population decline in recent years. Proposals to reinstate legal jaguar hunts to raise revenues for conservation and enforcement aroused strong protests from environmental groups and has not been acted upon.<sup>43</sup>

In 1990 a wildlife program similar to those described in Quintana Roo was initiated by Ecósfera, with funding from WWF through Pronatura-Peninsula Yucatan. The project was initiated in the Ejido Nuevo Becal, in the east-central zone of influence of the Calakmul Reserve. The ejido, which also collaborates in forestry projects with INI and the Plan Piloto Forestal, plans to create a forestry reserve of some 25,000 hectares, nearly half of the ejido's lands, for the production of cedar, mahogany, railroad ties, and chicle, and is also interested in the regulation of subsistence hunting for continued game production. The project was later extended to nearby Alvaro Obregon, which has also destined a forest reserve of 11,000 hectares, of a total landholding of 17,600 hectares.

Hunting surveys identified great curassow, wild turkey, ocellated turkey, chachalaca, collared and white-lipped peccary, white-tailed and brocket deer, agouti and paca as important subsistence game.<sup>44</sup> Ejidatarios also occasionally maintained in captivity peccaries, deer, spider monkeys, and agouti, while jaguars, ocelots, and puma were pursued and killed when responsible for livestock damage. The survey encountered frequent sport hunting on ejidal lands. Outside hunters, both Mexican and foreign, are normally brought by organizers or guides and establish camps for varying periods on ejidal lands or in the immediate vicinity. Although hunting organizers are required by law

to obtain permission to hunt on ejidal lands, no such permission is sought, and user fees are not collected.<sup>45</sup> Ejidatarios reported that the camps were occasionally responsible for forest fires, which the ejidos lack equipment to combat, and also hunted protected species such as jaguar, margay and tapir. Again, residents reported the use of deer, coati, peccary and monkeys as bait for jaguars. Cattle are also sometimes used, which ejidatarios protest increases the likelihood that uncaptured felines will raid their livestock. They also protest the large quantities of game taken by sport hunters, which they feel prejudices local subsistence hunting.

Based on the results of research in these two communities, Ecósfera is working with the ejidos to develop community regulation of subsistence and sport hunting and of predator control. Its investigator has proposed several measures, including the control or prohibition of hunting in watering holes during the dry season to reduce already severe stress on game populations, and habitat improvement through replanting of native fruit-bearing trees, some of which, such as the chico zapote, would also provide products directly to the ejido. Other recommendations include prohibiting the firing of shotguns into bird flocks, to prevent the wounding of a much larger number of birds than can be recovered. Land use zoning, with periodic rotation of hunting sites, is also suggested as a means of preventing

game depletion. Ejidos were urged to develop their own hunting calendars, publish guidelines and restrictions for sport hunters, and encourage the development of related services in order to capture greater economic benefits from outside hunting. Finally, it was recommended that ejidos provide a part-time salary to one of their members for game registration to provide continual assessment of harvest pressures, to monitor the activity of sport hunters, and possibly to enforce community restrictions.

Several additional measures have not been explored. Ejidos might levy fees for the right to hunt on ejidal lands, with efforts to encourage similar measures in surrounding ejidos in order to prevent displacement of sport hunting to other areas. Community monitoring of hunter entry could be assisted by official agencies, by using reports of unauthorized entry to urge the exertion of official pressure against organizers and guides presenting or renewing registration in the zone.

Unfortunately, the Ecósfera project suffers from many of the same shortcomings as its counterparts elsewhere in the peninsula. The project is only planned to extend for one year, and is implemented by a single researcher conducting periodic visits rather than residing permanently in the community, thus severely limiting possibilities for communication with the ejidos involved or of encouraging contact between project sites and surrounding communities.

No plans exist to continue technical support to the ejidos following project termination. No communication exists between this project and other NGOs or the Plan Piloto, and no effort has been made or is planned to enlist the support of official agencies. It is therefore unlikely that any of the project's recommendations will be pursued.

#### Conclusion

Currently, ejido-based wildlife programs are only to be found in Quintana Roo and Campeche. The experience of the projects described above, however, is gradually spreading to other areas of the country in connection with integrated community-based forestry development. The National Indigenous Institute, following its involvement in the Plan Piloto and Biocenosis projects, is now working with the Ejido 20 de Noviembre, also in Campeche, to develop a wildlife-based ecotourism project in its 16,000 hectare forest reserve. Although the project is still in the planning stage, its likelihood of success is greatly enhanced by its relationship to a broader community-led effort in forestry development, its proximity to archaeological sites undergoing restoration as part of the Mundo Maya project, and the availability of funding for infrastructure development from PRONASOL, negotiated by INI. Two similar projects are also under consideration by INI, one in the Sierra Huichol of Jalisco and another in

connection with the Inter-American Development Bank loan for integrated forestry development in Guerrero.<sup>46</sup>

While NGO-sponsored projects have been critical in prompting local and official interest in sustainable wildlife use, they have been less effective in addressing the underlying barriers to sustainable exploitation. Many of the project shortcomings noted above are their short duration, failure to include local participation in project initiation, lack of attention to long-term project sustainability, and failure to address important legal and policy constraints to community resource management. The ability of NGOs to contribute to local institution-building and to serve as links between rural hunters and government agencies will depend on their ability to establish closer links with local residents, facilitate project learning and the transfer of technical and other skills to local communities, and assist the establishment of viable communication channels between targeted communities and other sources of external, including official, support.

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CHAPTER 7  
CASE STUDY: SPORT HUNTING IN NORTHERN MEXICO

Introduction

Mexican wildlife managers have long advocated improvements in public education, professional training, and government regulation to enhance the economic and ecological benefits of hunting, and most have looked northward for appropriate models.<sup>1</sup> Participants in the First National Hunting Convention in 1964, for example, pointed to the millions of duly licensed hunters in the United States, generating millions of dollars of benefits through their expenditures on equipment, guides, transportation, and lodging and supporting a modern, efficient National Wildlife Service boasting the necessary resources to manage wildlife (and control hunters) for sustained use. Conference participants suggested a variety of measures to be adopted in Mexico: the simplification of permit and firearm registration, legalization of wildlife markets to spur rational use, the creation of a national wildlife agency, increased research and management efforts, and an increase in federal management budgets through higher permit fees and the sale of wildlife stamps. A few even advocated the

provision of education and training to Mexico's ejidos to allow improved community management of wildlife resources.<sup>2</sup>

Nearly thirty years later, few of these initiatives had been acted upon. Although income from permit fees reached nearly \$23 million annually,<sup>3</sup> research and enforcement effort remained inadequate, hunting remained largely unregulated, and several important game species had been severely threatened by overhunting.<sup>4</sup> In northern Mexico, however, significant changes have occurred. Spurred by the annual arrival of several thousand sport hunters, primarily from Texas and other parts of the United States, game ranches and hunting camps have succeeded in obtaining legal recognition for their activities in return for private contributions to research and conservation. While not without its shortcomings, organized sport hunting offers a number of distinct advantages over patterns of resource use in central and southern Mexico. The present chapter discusses the economic, ecological, and regulatory context of sport hunting and game ranching and its potential applicability to other regions of Mexico.

#### Regulation of Sport Hunting in Mexico

In 1982-83, Mexican hunters were granted 51,509 hunting permits, and foreign hunters 11,360.<sup>5</sup> The total number of permits authorized reached 96,000 in 1987-88 and 103,000 in 1988-89.<sup>6</sup> Regulations for sport hunting in Mexico are set forth in the annual hunting calendars. These

are divided into six listings, each including a different set of species and distinct regulatory requirements (see Appendix B).<sup>7</sup> Category I includes aquatic birds, listing 33 species of ducks and geese. Permit fees for this category in 1990-1991 were set at \$22.00 for nationals and \$44.00 for foreign hunters. During the 1988-1989 hunting season, 10,300 permits were issued for Category I species. Category II includes six species of dove, for which 31,300 permits were issued in 1988-89, at the same fee as Category I. Category III contains another twenty species of game birds: quail, bobwhites, chachalacas, blackbirds, cowbirds, snipes, starlings, caciques, blackbirds, and grackles. Permit fees in 1991-1992 were \$4.50 for citizens and \$22.00 for non-citizens, with 19,500 permits issued in 1988-89.

Category IV lists small mammals: squirrels, rabbits, hares, raccoons, armadillos, opossums, coyote, agutis, coatis, and paca. In 1988-89 28,000 permits were issued, with fees of \$4.50 for citizens and \$22.00 for non-citizens. Category V includes larger mammals and game birds: the exotics European boar and barbary sheep, grey fox, collared and white-lipped peccary, puma, lynx, brocket deer, white-tailed deer (other than the subspecies texanus), mule deer (outside Sonora), collared pheasant, ocellated turkey, common wild turkey, and wood partridges. In contrast to Categories I through IV, the number of permits in Category V is limited. In 1988-89, 11,076 limited permits were issued,

with fees ranging from \$5.50/\$11.00 for collared peccary and gray fox and \$11.00/\$21.00 for wood partridge, to \$50.00/\$98.00 for mule deer and \$65.00/\$128.00 for puma.

"Limited" and "special" permits were created by the Secretariat of Urban Development and Ecology (Secretaría de Desarrollo Urbano y Ecología, or SEDUE) in 1983 for species of high demand but limited abundance.<sup>8</sup> Category VI requires "special" permits for Sonoran mule deer; white-tailed deer of the subspecies texanus, found in the northern border states; and the bighorn sheep. These permits are distributed by lottery; in the case of white-tailed deer, an exception is made for permits distributed to registered game ranches. The permit lottery for bighorn sheep is administered by the autonomous National Wildlife Council. In 1988-89, 2331 permits were issued for white-tailed deer, 460 for Sonoran mule deer, and 50 for bighorn sheep, while in 1991-92 these permits totaled 2960, 250, and 13, respectively.<sup>9</sup> Permit fees in the 1991-92 season were \$65.00/\$130.00 for white-tailed and mule deer, and \$2395.00/\$4,794 for bighorn sheep. Both nationals and non-nationals requesting permits for Categories V and VI must present a log of their hunting activities and the conditions encountered during the expedition.

To obtain a hunting permit in Mexico, nationals must be members of a hunting club or association which is federally registered. As of 1988, 1,082 such clubs had been

registered in Mexico, concentrated in the Federal District, Mexico state, Michoacan, Veracruz, and Jalisco, which accounted for 354 of these clubs. The northern frontier states, Baja California, Baja California Sur, Sonora, Chihuahua, Coahuila, Nuevo Leon, and Tamaulipas, accounted for another 206.<sup>10</sup> By 1990-91, a total of 1,142 hunting clubs had been registered.<sup>11</sup> In 1988-89, SEDUE began to require that non-nationals contract the services of a federally-registered hunting outfitter. These outfitters, which include both independent agencies and private game ranches, numbered 117 in the 1987-88 season, with 44 located in Tamaulipas, 17 in Coahuila, 8 in Nuevo Leon, 16 in Sonora, 21 in Sinaloa, and 11 in the states of Baja California Sur, Campeche, Yucatan, Jalisco, and Durango.<sup>12</sup> CITES permits are now required for the export of trophies from species listed by that convention.

#### The Development of Game Ranching

Reflecting the conclusions of the First National Hunting Conference of 1964, game ranches were mentioned for the first time in the hunting calendars of 1965-66 and 1966-67, and in the latter year requirements for registration were set forth for organizers and guides.<sup>13</sup> Until this time, wildlife use on private lands had varied little from that found elsewhere. Ranch owners and their friends hunted intensively and indiscriminately, ranch employees supplemented their diet with game, and little effort was

made to prevent subsistence or market hunters from operating within ranch boundaries. Game became increasingly scarce, and by the 1960s white-tailed deer populations were considered to be severely depleted throughout much of northern Mexico due to overhunting.<sup>14</sup>

Recognition of overhunting and of the potential value of wildlife for sport-hunting, coupled with new official encouragement for improved management, led an increasing number of ranch owners to restrict or even prohibit hunting on their lands for varying periods to allow the recuperation of deer and other game populations. The number of ranches involved totaled some twenty between 1965 and 1970, increasing to 280 by the mid-1970s. Registration procedures and guidelines had still not been established at the federal level, however, so that game ranches operated legally as hunting organizers.<sup>15</sup> Federal requirements for such registration were minimal, and in most cases no research had been conducted to determine the status of deer and other game species.

By the early 1980s, some ranchers began to hire biologists and other technical personnel to assess game abundance and habitat quality. This development was stimulated by increased federal attention to wildlife conservation signaled by the creation of SEDUE in 1982, and by further administrative and personnel changes which took place in 1986 and 1987.<sup>16</sup> In 1986, the National

Association of Diversified Livestockers (Asociación Nacional de Ganaderos Diversificados, or ANGADI) was created, and took the lead in pressuring SEDUE to establish a regulatory framework within which game ranches could operate effectively and profitably. In 1988 SEDUE responded by creating the title of extensive captive propagation facilities (criaderos extensivos), which could be legally registered by submitting a detailed description of the ranch's location and facilities; proof that qualified technical services had been contracted; results of population censuses of game species by a research institution authorized by SEDUE; detailed proposals for habitat and infrastructure improvements; a description of the economic and ecological benefits expected from its operation; the submission of annual reports detailing all management and hunting activities conducted; and the payment of required registration fees, which total more than US\$1000.00 annually.<sup>17</sup>

By 1990, ANGADI had achieved the registration of 33 game ranches, with 141 pending, and by 1992 the organization boasted 300 members with 161 criaderos extensivos actively operating in Nuevo Leon, Tamaulipas, and Coahuila. Branches had also been opened in Sonora, Baja California, Guanajuato and Zacatecas, and ranches in these states were seeking registration.<sup>18</sup>

Those ranches which are members of ANGADI receive their hunting permits from that organization, which solicits some 700 per season from SEDUE. In addition to the permit fees, ANGADI is required to establish a fund to guarantee the permits, another deposit of guarantee against damage to fauna, and life insurance for each hunter receiving a permit. A smaller number of ranches operate without registration as criaderos extensivos. Instead, they continue to register as hunting organizers, and their clients are issued permits through normal channels.<sup>19</sup>

Livestock ranches in Mexico vary in size depending on habitat quality, since under Mexican law each proprietor can be authorized no more than the area required to support 500 head of cattle. In the arid scrubland that characterizes the northern borderlands, a "small or medium" landowner can actually control extensive landholdings. ANGADI reports that while some of the member ranches are as small as 700 to 800 hectares, most range between 1000 and 6000 hectares. While cattle require some 10 to 50 hectares per head in this environment,<sup>20</sup> deer require only 5 to 15,<sup>21</sup> allowing large populations to inhabit a single ranch. Further, habitat improvement on private ranches generally includes reducing the number of cattle to encourage vegetative regeneration.

ANGADI limits the number of permits issued to individual ranches to 7 per 1000 hectares, with member ranches thus receiving only 6 to 30 deer permits per season,

but the ranches charge from \$1400 to \$2000 per permit, including lodging, food, and guide services as well as the trophy. While white-tailed deer are the feature attraction of these ranches, permits are also issued for peccary and quail. Thus, even given the small number of permits issued, the revenue from game hunting is sufficient to cover not only operating costs for game ranching, but also a significant portion of the operating costs for domestic livestock. The profitability of these operations is due in large part to their ability to attract foreign hunters able to pay the high fees and other costs; some 80% of hunters visiting ANGADI members are U.S. citizens, with small numbers of visitors from South America, Europe, and Mexico. There is now increasing interest on both the demand and supply sides, for the use of these facilities for nature viewing and photography as well as hunting.<sup>22</sup>

Despite this apparent success, ranchers cite bureaucratic inflexibility as a limitation on their activity. Their legal registration was itself won only after several years of battling against bureaucratic resistance. Registration and other fees also represent a considerable expense, and none of the funds thus generated appear to return to the area, as federal agencies neither conduct related research nor engage in inspection and enforcement on private lands. Nor are needed amendments to the Federal Hunting Law forthcoming, such as a loosening of

restrictions on the hunting of female and juvenile deer. Habitat improvement and hunting controls on private game ranches have led to deer recovery to such an extent that many ranches are experiencing severe overpopulation, accompanied by the skewing of sex ratios resulting from the selective hunting of trophy bucks and the decline in trophy quality resulting from range deterioration.

Although the culling of females is a widely accepted management practice elsewhere, and despite the publication of domestic research pointing to the need for such measures in northern Mexico, federal agencies are hesitant to authorize permits for their hunting or for their destruction by ranch administrators. While some females are being relocated to underpopulated areas, relocation is expensive and is not feasible for the thousands of animals which need to be removed. Ranchers are also seeking the lifting of restrictions on commercialization of wildlife products, such as meat, skins, and antlers, which ANGADI argues would increase the profitability of game ranching.<sup>23</sup>

Game ranching has also stimulated interest in the importation of exotic species such as barbary sheep, blackbuck, axis deer, fallow deer, sika, argali sheep, and African antelope, which may compete for forage with recovering native species such as white-tailed and mule deer. While only a limited number of permits have been issued for such introductions, and strict measures are

required to prevent their introduction outside of private enclosures, significant numbers appear to have been imported illegally, increasing the possibilities for escape.<sup>24</sup>

Despite continued administrative difficulties, the ecological consequences of regulated game ranching appear positive on balance. The diversion of land use from livestocking to wildlife use and the related easing of pressure on natural vegetation is one obvious benefit. Another is the generation of funding for research on wildlife and habitat, as game ranchers increasingly contract students and faculty of state universities and personnel from Ducks Unlimited of Mexico (DUMAC). The demand for wildlife management services has led to the creation of formal consulting programs at several of these institutions. ANGADI has also established its own technical office, hiring graduates of local universities who are then able to gain valuable practical experience in the field. ANGADI conducted the first regional survey of white-tailed deer status from 1989 to 1991; prior to this study, regional estimates had been based on modified indices of habitat carrying capacity developed for cattle.<sup>25</sup> The number of academics and technicians now associated with this economic activity contrasts sharply with the lack of trained personnel in other parts of the country.

Partly because of increased contact between ranchers and natural scientists, landowners have shown interest in

the restoration of threatened, endangered, or extinct species on private lands. A growing number of ranchers have been persuaded to cease predator extermination.<sup>26</sup> Elk, long extinct in their Mexican range, have been relocated from Yellowstone to ranches in Coahuila, and different projects are underway to restore black bears, Mexican grizzly bears, and Mexican wolves on private lands.<sup>27</sup> Even in the absence of directed restoration, the large expanses of land thus protected provide benefits to other wildlife species; a survey of only 8 of the ranches in the states of Coahuila, Nuevo Leon and Tamaulipas found 8 amphibian species, 24 reptile species, 60 bird species, and 27 mammal species, including 7 endemic, rare, threatened, or endangered species. Another three ranches in the states of Sonora and Sinaloa found 165 species, including 14 that are endemic, rare, threatened, or endangered.<sup>28</sup>

#### Outfitters and Guides

Game ranching is not the only form of sport hunting to be encouraged in northern Mexico. While white-tailed deer provide the main attraction of the ranches, waterfowl and other bird hunting also draws thousands of foreign hunters. Ducks, geese, and white-winged dove are particularly popular among U.S. hunters. Sport hunters take roughly 150,000 to 200,000 ducks per year in Mexico, primarily in Baja California and Baja California Sur, Sinaloa, Chihuahua, Nuevo Leon, Tamaulipas, and the Yucatan. Only in the

Yucatan are the majority of sport hunters Mexican; in the northern states some 80 to 97% are U.S. citizens.<sup>29</sup>

The duck harvest is dwarfed by that of white-winged dove, again almost entirely by U.S. hunters. The major hunting state is Tamaulipas, due in large part to a destruction of nesting habitat in Texas, which led to a southern shift in nesting populations, and to efforts by the state government to promote sport hunting in response to the decline of agriculture and livestock production.<sup>30</sup> In 1983, the population of white-winged dove in that state was estimated at ten million, exploited by some 14,000 hunters, most of them from the United States.<sup>31</sup> The number of white-winged dove harvested in Mexico and transported to the United States through Texas border ports increased from 17,004 in 1963 to 888,686 in 1985.<sup>32</sup>

The popularity of Tamaulipas among U.S. hunters is also reflected in the number of guides registered in that state: in 1987-88, 44 organizers and 187 guides were registered out of a national total of 117 organizers and 355 guides. Sinaloa registered 52 guides, Yucatan 35, Sonora 32, Nuevo Leon 30, and Coahuila 10, with the nine remaining guides operating in the states of Baja California Sur, Campeche, Jalisco, and Durango.<sup>33</sup>

Hunting organizers and guides are associated in the Federation of Mexican Organizers and Guides (Federación de Organizadores Cinegéticos de México, or FAOCIMEX), created

in 1986. While ANGADI specializes in white-tailed deer hunts on private lands, the members of FAOCIMEX work primarily with migratory waterfowl and other game birds, whether on private, communal, or ejidal lands, as well as organizing sport fishing and hunts for deer and other mammals on private lands not registered as criaderos extensivos. By 1992, FAOCIMEX incorporated approximately 120 organizers and 800 guides, and their clientele included some 15,000 sportsmen.<sup>34</sup>

Hunting organizers and guides are also required by law to contribute to wildlife conservation. On behalf of its members, FAOCIMEX is currently involved in research programs for white-tailed deer, white-winged dove, peccary, and bobwhite, and is arranging the purchase of some 4000 hectares in Tamaulipas for the creation of a white-winged dove reserve.<sup>35</sup> Organizers who are not members of FAOCIMEX are required to develop their own conservation programs, which are again contracted out to the state universities, supporting faculty and students. These conservation programs may involve research on non-game species, printing public education materials, or sponsoring environmental education programs for school-age children.<sup>36</sup>

Research on migratory waterfowl and white-winged doves is also assisted by the 1988 agreement creating the Trilateral Commission on Wetlands and Migratory Birds among the United States, Canada, and Mexico. Under this

agreement, both the United States and Canada provide funding and technical assistance for Mexican researchers or pursue their own research programs within Mexico. The U.S. Wetlands Conservation and Management Act (WCMA) also benefitted northern Mexico by authorizing \$1 million in funding for conservation projects within Mexico. The requirement that such projects obtain matching funds from U.S. environmental organizations limits the amount actually spent in Mexico, but DUMAC, both because its principal objective is wetlands and waterfowl conservation and because of its affiliation with its parent organization, is well placed to receive these funds. As of 1992, WCMA funds, provided through the USFWS, are provided to DUMAC for harvest surveys of game birds throughout Mexico. This funding has made possible a reasonable assessment of the impact of legal sport hunting on game bird populations, although relatively little information is being collected on unlicensed hunters. In conjunction with the hunting survey, DUMAC is also conducting a "Hunting Ethics" program to encourage observance of hunting regulations by Mexican and foreign sportspersons. Other projects implemented by DUMAC with WCMA funds are a wetlands inventory and a diagnosis of the status of Laguna Madre, Tamaulipas, while the Universidad Autonoma de Tamaulipas is conducting surveys of the red-headed duck in that state.<sup>37</sup>

Independent organizers, as well as those associated with FAOCIMEX, may operate either on private lands or on ejidal or communal lands. Government hunting regulations require that organizers specify the area to be hunted, obtain written permission from ejidal or communal authorities, and submit a copy of the agreement as part of their permit application. Unfortunately, no data are publicly available on the number of ejidal and communal landholdings affected, concession fees paid, or the extent to which organizers comply with these requirements.

This system has its benefits, because ejidos and other landholders normally charge a per-person fee, usually US\$3.00 to \$5.00, for the right to hunt.<sup>38</sup> In the case of the white-winged dove, an agricultural pest, cultivators are also assisted by sporthunting on their lands; ejidos may even request guides to bring hunters to their lands.<sup>39</sup> In addition, seasonal employment is available to local residents as bird boys. FAOCIMEX estimates that during white-winged dove season alone, the organization hires some 28,000 bird boys.<sup>40</sup>

The imbalance between the number of organizers and the number of fixed hunting areas has, however, led to difficulties in controlling hunts led by organizers and guides. Organizers as well as criaderos extensivos are required to develop conservation activities, but these do not necessarily include population surveys, especially for

game birds, which may change their areas of geographic concentration from one season to the next according to habitat quality. Those operating in diverse areas often choose to fulfill the conservation requirement through public education rather than research or habitat improvement. In Tamaulipas, especially, the lack of a fixed hunting area makes regulation difficult. There are some 42 hunting camps in that state alone, but these generally serve only as bases from which guides conduct sport hunters to other private, communal or ejidal lands. Lack of fixed hunting areas may contribute to lack of interest by guides in encouraging compliance with bag limits; during the 1991 season, SEDUE reported enforcement measures against 80 white-winged dove hunters, 37 of them for exceeding the already liberal possession limit of 60 birds.<sup>41</sup> There are no limits as yet on the number of bird permits issued by these free-floating organizers, some of which merely operate as permit vendors on the U.S. side of the border.<sup>42</sup> While white-winged dove populations do not appear to be affected by this system, impacts on other game species are unknown.

#### Bighorns and Pronghorns

The apparent advantages of regulated hunting are further illustrated by status of bighorn sheep and pronghorn antelope. The bighorn sheep, one of the 'grand slam' species prized by organizations such as Safari Club International, is Mexico's most exclusive game species due

to its small numbers and the challenging terrain which it inhabits.<sup>43</sup> As early as 1924, the then Department of Hunting was forced to declare a permanent closed season for the bighorn, but lack of effective enforcement led to continued population decline. Originally, Mexico's three subspecies of bighorn sheep ranged across the northwest from Baja California to Coahuila, but by the 1950s the total population was estimated at between 2500 and 3000 individuals, with the only substantial populations found in Baja California, Baja California Sur, and Sonora, and with only small remnants left in Chihuahua and on the Chihuahua-Coahuila border.<sup>44</sup> Remaining populations remained subject to intense pressure from subsistence, sport, and professional hunters.<sup>45</sup>

In 1964, the closed season was lifted in order to create a controlled hunting program.<sup>46</sup> Experimental hunting seasons were established in Baja California in 1966 and in Sonora in 1969, continuing until 1974. No statistical data or program evaluations were available, however, to judge the success of this program. In 1975, the Secretariat of Agriculture instituted a new hunting program for Baja California, Baja California Sur, and Sonora. As part of the program, the Secretariat created a corps of some 80 local inspectors, which appeared to result in a significant decline in illegal hunting. A 1978 census found estimated populations of 1900 to 2300 individuals in

northern Baja California, 4000 to 4900 in the zone comprising lower Baja California and upper Baja California Sur, and between 2100 and 2700 in Sonora.<sup>47</sup>

In 1982, when SEDUE took responsibility for the program, the number of permits issued annually was roughly halved, and the local inspectors hired during the hunting season were replaced by SEDUE personnel.<sup>48</sup> A lottery system was established to distribute the permits, apparently in response to previous charges of favoritism within SARH and complaints by sport hunters. In 1986 the National Wildlife Council was created by decree, and in 1988 this organization assumed management responsibility for bighorn sheep hunts. Ten areas were open to bighorn hunts in Baja California, two in Sonora, and two in Baja California Sur. One of the areas in Baja California Sur lies within the El Vizcaino Biosphere Reserve, the only instance of legalized hunting within the boundaries of a protected area in Mexico. But in recent years the number of permits issued has been reduced further, and in 1991 the species was declared in closed season in Baja California due to state-federal conflict over management authority.

During the 1991-1992 season, a total of 13 permits were issued, 7 for Baja California Sur and 6 for Sonora. Ten of these permits were issued by lottery, with a quota of 60% reserved to Mexican hunters. Mexican hunters paid a total of \$9000 for permit and services during the ten-day season,

while non-nationals paid \$13,000. Three additional permits were distributed through a system of competitive bidding which favors non-nationals; in that year winning bids ranged from US\$28,000 to \$30,000. Permit revenues are managed by a special fund used only for research, enforcement and management during the hunting season, but the expenses associated with airborne and terrestrial surveys are such that the Council was only able to provide four personnel in Baja California Sur and three in Sonora, with sporadic assistance from SEDUE. With the closing of the Baja California Norte season to bighorn hunting, no enforcement personnel were directly employed in that state.<sup>49</sup>

A 1987 census of bighorn sheep populations showed a relatively stable estimated population of 9,500 animals. The apparent success of controlled hunting at slowing the decline of the bighorn must be qualified, however. While hunter success rates remain high--at 80% in Baja California Sur--researchers note a decline in the horn size of trophies in recent years, suggesting that hunting pressure, whether legal or illegal, may be excessive.<sup>50</sup>

The pronghorn antelope has experienced a rather different history from that of the bighorn sheep. The pronghorn was originally more abundant, with a range extending from Baja California to Tamaulipas and south to the state of Mexico. The first census, in 1923-24, estimated a total population of 2395: 600 in Coahuila, 700

in Chihuahua, 595 in Sonora, 400 in Baja California, and 100 in Baja California Sur.<sup>51</sup> A permanent closed season was declared in 1922 and in 1923 the Mexican government and the Permanent Protection Fund for Wildlife employed a special guard along the Arizona-Sonora border.

By the 1950s, informal surveys by various researchers in northern Mexico suggested that the population was declining rapidly in much of its range, and close to extinction in central Mexico. Like the bighorn, the pronghorn was still being actively pursued by subsistence and sport hunters, the latter reportedly from jeeps, automobiles and airplanes as well as on foot and horseback, despite some attempts by ranchers to protect their remaining herds.<sup>52</sup> Unlike the bighorn, however, no official census was conducted, and no experimental hunting season was opened. By 1973 the total population was estimated at 1000, and by 1984 the population was limited to 214 in Chihuahua, mostly on private ranches; 48 in a small portion of the Desierto de Vizcaino, in Baja California Sur; 33 in Sonora, located in Pinacate, the proposed site of a biosphere reserve on the Arizona border; and scattered individuals in northeastern Coahuila. By the late 1980s the species was considered in danger of extinction.<sup>53</sup>

Possibilities for an experimental hunting season similar to that created for the bighorn are minimal for the pronghorn due to much lower demand--and willingness to pay--

for the pronghorn. The pronghorn is also much more accessible to illegal subsistence and sport hunting, and such a solution is now ruled out by its precarious status.<sup>54</sup> As a consequence, funding for pronghorn conservation is to a much larger extent provided from the United States rather than Mexico. In the Vizcaino Reserve in Baja California Sur, SEDUE employed only two personnel for an area of some two million hectares, in which they were responsible for population censuses and protection of the grey whale in the reserve's lagoons as well as enforcement for other threatened and endangered species.<sup>55</sup> Piñacate, which has been under consideration for reserve status since the 1970s, remains unprotected, as does the rest of Sonora. Research and public education for the Sonora pronghorn are being carried out by the Centro Ecológico de Sonora with funding from the USFWS, the Nature Conservancy, the Arizona Department of Game and Fish, The University of Arizona, the Organ Pipe Cactus National Monument of Arizona, and Safari Club International. These and other organizations are now cooperating in defining conservation strategies for the pronghorn in the Arizona-Sonora border region.<sup>56</sup>

#### Conclusion

The above discussion makes clear the attractiveness of controlled legal hunting to many wildlife managers and conservationists as well as hunters and landowners. Recreational markets for a relatively small number of high-

demand species have generated funding for research and protection and incentives for habitat and wildlife management which benefit non-game species and wider ecological values as well. Mexico's first formal training opportunities in wildlife ecology and management also appeared in northern universities in response to ranchers' demand for wildlife managers.<sup>57</sup> Available data suggest that populations of northern white-tailed deer have recovered, and bighorn sheep stabilized, in response to the increased management efforts associated with legal hunting.

These examples also make clear the much greater tendency of private landowners--as opposed to ejidal and communal landholders--to respond to opportunities for sustainable and profitable use. The question necessarily arises whether the benefits of sport hunting and game ranching can be channeled to ejidal and communal landholders.

Ejidal and communal landholders do play a significant role in the sport hunting economy of northern Mexico, by providing both cheap labor and cheap game. Theoretically, they could complement the activities of private landowners by meeting domestic demand for sport hunting opportunities without having to compete with the infrastructure of private ranches. In reality, they receive minimal payment from organizers who fail to reinvest their more significant returns in habitat management. It is likely that they also

provide hunting lands and services to unlicensed hunters from both the United States and Mexico.

One observer has noted that, in contrast to game populations on private lands, "Lamentably the animals which inhabit ejidal lands continued to be driven off or exterminated principally for two reasons: subsistence hunting and the mirage of obtaining high and continuous income (without any investment) through the sale of hunting services."<sup>58</sup> Actually, no information is available to judge how high and how continuous this income is. Certainly, concession fees of US\$3.00 to \$5.00 per person would not appear to generate sufficient surplus for reinvestment in wildlife and habitat management, nor support investments in the infrastructure and services which would capture a greater proportion of hunting revenues. The benefits of sport hunting may be even more limited if it competes with subsistence hunting. Income from individual employment as guides or bird boys may be more significant, but being sporadic, it is more likely to encourage a "tragedy of the commons" than to stimulate collective wildlife protection and management.

Reference to the "tragedy of commons" is not meant to suggest differences in land tenure as a critical explanation for the absence of game ranches on collective landholdings, but rather the effects of outside markets on resource users with limited options. Land tenure should be viewed as an

intervening rather than a causal variable; to understand why it is necessary to refer to a number of external supports to private game ranching. Government protection of large landholdings and supports for livestock production on private lands in northern Mexico, discussed in Chapter 4, are only the first of these, helping to provide the capital needed to take advantage of sport hunting opportunities. Federal wildlife agencies also began to encourage game ranching in the 1960s, and in the 1980s responded to ANGADI's demands for a favorable regulatory framework. Regulation was in turn supplemented with the assignment of permit quotas for white-tailed deer to these private ranches; in 1987-88, 100% of the available permits for the popular texanus subspecies of white-tailed deer in Coahuila, Nuevo Leon, and Sonora were assigned to private game ranches.<sup>59</sup> Initial stock-building efforts benefitted from the relocation of excess animals from the United States, in many cases with assistance from the USFWS. Research and technical assistance provided by state universities and by non-governmental organizations such as DUMAC represent additional subsidies. Equivalent facilities have not been provided to ejidos, either by government agencies or by other sources.

As for southern Mexico, geography poses an additional limiting factor. Many of Mexico's most highly sought game species, such as bighorn sheep, pronghorns, black bear,

white-winged dove, and the exotic European boar, are found only in the north, where private land ownership predominates. Furthermore, other species such as white-tailed deer and peccary attain greater trophy sizes in the difficult arid environment of the north than they do in the tropical south. Geography also intervenes in the form of market concentration, in that the U.S. hunters which dominate hunting tourism to Mexico prefer to travel to the more easily reached northern borderlands.

Despite its geographic disadvantages, southern Mexico does possess significant attractions. The Mexican tropics boast, in addition to white-tailed deer, a number of game species not found in the north: brocket deer, white-lipped peccary, agouti, paca, curassow, crested guan, chachalaca, and ocellated turkey. These species are popular among Mexican hunters, whose interest may be augmented by the inflationary effects of foreign hunters on costs for lodging and other services in northern Mexico. Another is the jaguar, of which significant populations remain in Campeche, Oaxaca, Chiapas, and Quintana Roo. As discussed in Chapter 4, the jaguar was the subject of a controlled hunting program until 1987, but the revenues generated were not returned to the ejidos on whose land the jaguars were hunted, and the hunt did not give rise to the development of community infrastructure and services.

Southern Mexico is also the domain of the commoners because much of it is unsuited for agricultural and livestock production, limiting the generation of surplus income which could be channeled into wildlife management. Adoption of such measures as temporary hunting bans, creation of habitat reserves, rotation of hunting areas, and establishment of community hunting regulations, as well as the need for infrastructure development, contracting of technical services, and payment of registration fees, require the previous development of income-generating activities to offset investment costs and foregone opportunities for subsistence hunting. Government investment in infrastructure is also lower in southern Mexico, limiting the supply of passable roads and other amenities necessary for the significant development of hunting tourism. Thus, in Mexico as elsewhere, the search for sustainability has continued to focus on private lands.

#### Notes

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CHAPTER 8  
CASE STUDY: THE ECOTOURISM ALTERNATIVE

Introduction

Nature-based tourism is widely viewed as a means of linking ecological and wildlife conservation and local and national economic development. In the 1980s, growing worldwide interest in 'adventure' tourism, coupled with increased awareness of the lack of developing-country budgets for protecting natural areas, led to the incorporation of ecotourism as a key strategy in the generation of incentives for nature protection, either by enhancing the educational content and local economic benefits of existing tourism attractions or by developing new sites. Ecotourism projects have sprung up rapidly in developing countries as a result of their growing popularity among environmental NGOs and external funding sources.

Mexico has been no exception, and it is therefore worthwhile to consider both the possible benefits of ecotourism and the wider political and economic context within such projects have been developed. Ecotourism is particularly relevant here because some of Mexico's most prominent ecotourism attractions, such as the Monarch

butterfly reserves of Michoacan state and whale-watching in Baja California, are primarily wildlife-based.

Wildlife-Based Tourism in Mexico:  
Possibilities and Constraints

Tourism based on wildlife viewing offers a means of generating revenue for conservation and development through the non-consumptive use of wild species. In many cases, the potential economic benefits of tourism are much greater than those to be gained from consumptive uses such as hunting or commercial production, due to linkages with transportation, accomodation, food and beverage, guide, and other services.<sup>1</sup> Ideally, the tourism value of wildlife and habitat will foster local interest in preserving these resources, at the same time compensating local residents for the sacrifice of consumptive uses. Entrance fees and service concessions within parks and reserves help to generate revenues for protection, research, and infrastructure maintenance by government agencies, and increased environmental awareness among national and foreign visitors may even stimulate increased voluntary donations of funds for conservation activities.<sup>2</sup> Tourism facilities can be used to provide environmental education to local residents and visitors.

Nature tourism in developing countries often fails to achieve these goals, for a variety of reasons. Entrance fees to parks and other protected areas are often nonexistent or minimal, and no mechanism exists to return

revenues to the area. Transportation, hotels, and other infrastructure, which generate the majority of tourism-related revenues may be lacking in the area immediately adjacent to the site, and thus captured by communities other than those whose cooperation in maintenance is required. Infrastructural investments tend to be substantial and beyond the capacity of local residents, so that the required capital is often non-local, and its returns fail to stay within the area. Foreign tourists may arrive with package tours, in which case much of the value of the visit may remain outside the country. Managers, guides, and other employees may also be brought from outside due to the lack of trained personnel in local communities.<sup>3</sup>

The potential educational benefits of wildlife tourism are also often undeveloped. The failure of parks to generate budgetary revenue often means that visitor information centers, maps, or other information sources are not provided. Mechanisms are not established to return fees and concessions to the protected area, or to solicit and channel voluntary contributions. Research is rarely conducted on the impact of visitors, particularly in heavily-traveled areas, on wildlife and habitat, despite the potential for serious disruptions of reproductive and nesting patterns, foraging habits, and the like.<sup>4</sup>

Several promising measures have already been identified for increasing the economic and environmental

benefits of environmental tourism. First, visitor fees are often an insignificant portion of the overall cost of tourist visits, and could be raised substantially without affecting demand; differential fees for national and foreign tourists are often recommendable to avoid excluding national visitors. Concessions for lodges and restaurants can also help to generate the budgetary resources needed for infrastructure development and maintenance, research, and the hiring of personnel to control harmful visitor activities such as littering, starting forest fires, collecting wild plants, and disturbing wildlife. The training of local guides and other personnel can help to ensure that employment opportunities benefit local residents. Requiring that guides be certified following appropriate training and that visitors travel in small groups accompanied by guides can reinforce local employment creation and enhance visitor education while helping to control visitor activities.<sup>5</sup> Foreign language skills, often a priority for guide training, can be useful for the development of other employment opportunities. Both the training of guides and the solicitation of visitor contributions to fund such conservation activities fall outside the traditional activities of government agencies and are usually undertaken by non-governmental organizations.

Ecotourism in Mexico suffers from most of these limitations. Several parks located within easy traveling distance of urban centers are heavily visited and may have lodges or campsites and food and beverage services, but entrance fees are rarely collected, no visitor information facilities are provided, and problems with littering, contamination of water sources, and firewood cutting and visitor-caused forest fires are common.<sup>6</sup> Many of Mexico's protected areas were created on private and ejidal lands, for which residents have never been compensated, or are located near heavily populated areas, and therefore experience illegal settlement and resource exploitation.<sup>7</sup> Large, relatively pristine natural areas which still support significant wildlife populations usually remain so due to a lack of infrastructure, so that low-impact tourism is difficult to develop.

Another barrier to low-impact nature tourism in Mexico are official attitudes and strategies for tourism development. Tourism has consistently ranked among Mexico's three leading sources of foreign exchange for more than three decades, and its development is one of the country's foremost strategies for economic recovery during the 1990s. Tourism development is the responsibility of the Ministry of Tourism (SECTUR), which is active in promoting large-scale tourism development, often in pristine areas.

SECTUR and FONATUR, an arm of the ministry charged with attracting national and foreign investment, are principally involved in the attraction of U.S., Japanese, or European investment in "megaproyectos" consisting of large luxury hotel complexes, golf courses, restaurants, and night clubs. The employment generated by megaprojects in Los Cabos, Acapulco, Cancun, Huatulco, and Ixtapa creates a pole of attraction for unemployed or underemployed labor from throughout the country, keeping local employment opportunities and wages depressed. On the outskirts of such projects this relocated labor lives in shanties, often without electricity or running water, at least for the first several years. When construction slows, the newcomers often stay, finding work where they can.<sup>8</sup> In the Yucatan peninsula, many of them have turned to commercial fishing to supply restaurants, and the sudden entry of unskilled fishermen has resulted in the overexploitation of most of the valuable fisheries such as lobster, shrimp, and conch.<sup>9</sup>

Given FONATUR's choice of Mexico's most undeveloped and ecologically fragile areas as sites for these megaprojects, the environmental impact has been devastating as well. Projects in Acapulco, Cabo San Lucas, and Quintana Roo are well-known, for example, for the dumping of untreated waste into coastal waters.<sup>10</sup> Small, low-impact projects in nearby areas are often ruled out by megaprojects due to the appropriation of ejidal lands, as in Huatulco,

and increases in land values beyond the reach of any but the world's largest conglomerates, as in Cancun.

Increased NGO and international attention to SECTUR performance may, however, offer opportunities for change. For example, a recent proposal to develop a megaproyecto on the edge of the Montes Azules biosphere reserve in Chiapas, near the archaeological sites of Yaxchilan and Bonampak, has been temporarily halted due to intervention by Conservation International, which is conducting feasibility studies for the construction of rural lodges.<sup>11</sup> Mexico's megaprojects have also attracted the attention of the Organization of American States, which has offered planning assistance in order to minimize the environmental impact of tourism development.<sup>12</sup>

The involvement of the EEC in the Mundo Maya project agreed to by Mexico, Guatemala, Honduras, and Belize also offers some hope for more environmentally sensitive development. Publicized as a means of preserving the Mayan ruins dotting southeastern Mexico and Central America as well as local cultures and natural areas, the project is managed in Mexico by the SECTUR and FONATUR and is receiving \$1 million in technical assistance, in the form of market research, from the European Community.<sup>13</sup> Not only does the EEC require environmental impact statements for its overseas assistance projects,<sup>14</sup> but its technical assistance, in the form of market studies among European travelers, may

encourage small-scale projects, as European travelers to the region generally prefer the region's more rustic attractions and facilities. The program has also stimulated the interest of the government of Yucatan state, which now addresses ecotourism within its periodic training courses for tourism agencies and guides.<sup>15</sup>

Mexican and international NGOs have been instrumental in improving the local and ecological benefits of existing natural tourism attractions and in fostering new projects, many of them with local participation. The following sections discuss relatively successful efforts in ecotourism development in Michoacan and Baja California and newer experiments in national, local and NGO fundraising through wildlife-based tourism.

#### The Monarca Project

One of Mexico's best known natural phenomena is the annual arrival of several million Monarch butterflies from Canada and the United States to overwinter and reproduce in the mountainous oyamel fir forests of Michoacan and Mexico states. The discovery of these overwintering sites was made only in the 1970s as a result of research by the University of Toronto, Canada, and popularized by subsequent research by that institution and by the University of Florida. Investigators also discovered that while overwintering sites in Mexico state were relatively protected by difficult access, those in Michoacan were being rapidly deforested by

nearby communities for crops or by loggers to feed a growing number of legal and illegal sawmills.<sup>16</sup>

In 1980, a decree was issued declaring the protection of overwintering sites of the Monarch butterfly, and a non-governmental organization, Pro-Mariposa Monarca, A.C., was created to foster research and conservation. In 1983 an agreement was signed between SEDUE, Monarca, and communities bordering the Michoacan reserves, allowing Monarca to construct tourism facilities, and assigning income derived from visitor fees to local municipalities. In 1984, a Fund for the Protection of the Monarch Butterfly was created by SEDUE, the Secretariat of Agriculture and Water Resources (SARH), Monarca, and the government of Michoacan, and a Management Plan developed by Monarca and a consulting organization.<sup>17</sup> Monarca, with funding from WWF, also organized a Workshop for the Planning of the Monarch Butterfly Reserve in 1985.

As a result of this workshop, a new decree was issued declaring the overwintering sites as a "special biosphere reserve," consisting of five nucleus zones, to be subject to complete protection, with buffer zones in which were to be permitted limited development activities. The reserves were located on ejidal lands, with the exception of one private parcel, the site of a sawmill, which was purchased to create one of the nuclei.<sup>18</sup> A management plan adopted by SEDUE in 1986 considered eventual tourism development in three of the

reserves and rational forestry development in four of them.<sup>19</sup>

Thus far, only one of the reserves has been opened to visitors. El Rosario has been the recipient of considerable domestic and international assistance, beginning with the construction by SEDUE and Monarca of a visitors' center, ticket booth, guided trail, parking and sanitary services, and an ejidal store to sell refreshments and crafts to visitors. In 1987, with funding from the Canadian International Development Agency (CIDA), Monarca constructed and began to operate a nursery for the production of Christmas trees for local development, and for the production of oyamel seedlings for reforestation. Also in 1987, CIDA provided funding to construct and equip an audio-visual center to provide visitors with information on the reserve and on the Monarch. World Wildlife Fund also provided funding for the design and publication of an education packet for children, and for adult workshops to develop practical skills in woodworking and mechanics.<sup>20</sup>

The approximately 280 families of El Rosario engage in forestry activities and small-scale subsistence agriculture. By agreement with SEDUE, all of the employees of the reserve are selected from the ejido, which receives 100% of the revenue generated. Initially, SEDUE participated in the training of local guides and provided their salaries, but these functions have now been assumed by the ejido, with

assistance from Monarca. Each season, the ejido selects a rotating corps of 20 to 30 residents to be trained and employed as guides, maintenance and service personnel in the reserve, with their salaries covered by entrance fees. The number of visitors to the reserve has risen steadily, from 40,000 in 1987 and 75,000 in 1989<sup>21</sup>, to 90,000 in the 1990-91 season. With entrance fees of US\$1.75, revenues in that season reached some US\$150,000. Total revenues, including those from the sale of crafts, the ejidal store, the sale of Christmas trees, and the renting of vehicles to reach the reserve, reach an estimated US\$330,000 to \$500,000.<sup>22</sup>

According to the agreement with SEDUE, the remaining revenue may be used by the ejido for social and economic development projects.<sup>23</sup> The ejido has used these revenues for the construction of a social center, a community dining hall and a primary school, and for improvements to their church.<sup>24</sup>

Monarca notes that as a result of visible community benefits from the project, ejido members have begun to limit land clearing in the vicinity, and have in some cases reported illegal logging by other members.<sup>25</sup> Other observers, however, have noted continued extensive clearing and illegal logging.<sup>26</sup> During the 1991-92 season, a massive die-off of the butterflies was attributed by the Grupo de los Cien, a Mexican NGO, to a change in micro-climate resulting from forest clearing.<sup>27</sup> The blame was placed not only on illegal logging and clearing, but also on

legal forestry activities sanctioned by SARH. The solution called for was the cessation of all logging activities in reserve buffer zones as well as nuclei,<sup>28</sup> a proposal which threatens to undermine one of Mexico's few real attempts to incorporate local communities into reserve management.

The balance between forestry activity and habitat preservation is not the only troublesome issue demanding resolution. Another is the impact of some 90,000 visitors during the four month season (mid-December through March) on reproducing butterfly colonies, which remains unknown. Monarca provides training to the Mexico City tour agencies which bring the majority of the reserve's visitors, and local guards are stationed throughout the visitors' trail to prevent disturbance to the butterflies, but the visitors are notoriously difficult to control. Moreover, although SEDUE has determined that the visitors' season will begin in mid-December, the butterflies actually arrive in early November, and so do the tourists. The result is that an estimated 10,000 visitors arrive without paying entrance fees and without any monitoring of their activities.<sup>29</sup>

Nor is Monarca immune from the administrative problems noted elsewhere. All of the infrastructure, public education, and socioeconomic projects associated with the reserve are planned and initiated by the NGO, which also provides the ejido's accounting services. In cases where funding is solicited from other organizations, a 'wish list'

is drawn up by Monarca, with the funder selecting those consistent with its own strategies and feasibility evaluation. Although Monarca's initiatives may be influenced by its communication with and experience in the community, this is a far reach from community decision-making and control.

Still, ecotourism in the Monarca reserve provides one of the few examples in Mexico in which local residents have benefitted significantly either from tourism or from the creation of a reserve, and the NGO has been instrumental in gaining official cooperation in devolving its benefits to local communities. The sustainability of the program is aided by Monarca's commitment to a long-term presence and by the ability of the community to determine the use of tourism earnings, and this continuity provides the possibility of gradual development of local capacity and control. The Monarca project has also served as a model for local tourism management in Baja California, where ejidal concessions have been granted by government agencies without direct NGO intervention.

#### Whale Watching in Baja California

Tourism in Baja California is unique in Mexico because the peninsula is more accessible from San Diego than from most of the interior of Mexico. Previously home only to seasonal fishing camps established by mainland fishermen, the coastal zones of the peninsula benefitted in the 1960s

from a joint federal-state program for tourism development, including the construction of highways and the provision of electricity and running water.<sup>30</sup> More recently, tourism development has been assisted by loans from the Inter-American Development Bank and the World Bank, the latter providing \$290,000 for the protection of coastal, marine, and desert ecosystems, including the establishment of fauna protection stations.<sup>31</sup> Predominant among the area's visitors are residents of the United States arriving in cars, campers, and trailers to traverse the peninsula on the highway running from Tijuana to Cabo San Lucas in search of desert scenery, sport fishing, and whale watching.

Like the Monarchs, gray whales are winter visitors, arriving from the Bering Sea and returning in March and April. The warm lagoons on the Pacific coast of Baja California Sur are their destination, and in the months of January and February thousands concentrate in these lagoons with their newborn offspring. The lagoons were discovered by whalers in the mid-19th century, and between 1845 and 1874 some 3000 gray whales were captured in Bahía Magdalena and the San Ignacio and Ojo de Liebre lagoons. Between 1868 and 1885 three whaling factories operated in Punta Banda, Punta Santo Tomas, and Punta Eugenia, operated by Portuguese immigrants and responsible for an additional harvest of between 1400 and 2500 animals. The Mexican government also

authorized several concessions for whale harvest and export between 1882 and 1924.<sup>32</sup>

Mexico signed the International Whaling Agreement of 1933 and joined the International Whaling Commission in 1949, at which time Mexico's small whaling industry ended.<sup>33</sup> Laguna Ojo de Liebre was declared a zone of refuge for whales and their offspring in 1971, and protection extended to Laguna San Ignacio in 1972 and Lagunas Manuela and Guerrero Negro in 1980.<sup>34</sup> These lagoons were later incorporated into Mexico's largest biosphere reserve, El Vizcaino, created in 1988 with an extension of 2,546,790 hectares.<sup>35</sup> Bahía Magdalena, to the south of the reserve, remains unprotected.

Lagunas San Ignacio and Ojo de Liebre are located within the ejidos Luis Echeverría and Benito Juárez, with which SEDUE has signed agreements granting them exclusive concessions to operate tourism activities for an estimated 5000 foreign whale-watchers and probably comparable number of Mexican tourists.<sup>36</sup> Ojo de Liebre, within easy reach of the town of Guerrero Negro, is the most frequently visited of the lagoons. The ejido's 80 families engage in the cultivation of maize, tomatoes, melons, and grapes, and in extensive livestock production. During the whale-watching season, ejido members work in Ojo de Liebre park, which in 1992 consisted of a palapa for the collection of parking and camping fees; two outhouses; three skiffs to carry visitors

into the lagoon; and a palapa under construction for refreshments. SEDUE has also erected placards, albeit only in Spanish, to inform visitors of prohibited activities, such as swimming, kayaking, or operating private boats within the lagoon, approaching the whales too closely, or separating juveniles from their mothers. Sporadic enforcement of these regulations occurs due to the presence of SEDUE personnel in the lagoon to conduct population censuses during the season.

In addition to the US\$3.00 parking fee, the ejido charges US\$10.00 for a one-hour boat ride in the lagoon to visitors arriving in private vehicles or hotel tours. Visitors to both lagoons also arrive in foreign tour boats, most departing from San Diego, La Paz or Cabo San Lucas; these are required to pay entrance fees to SEDUE and to transfer to ejidal skiffs for whale viewing within the lagoon. In addition, two U.S.-owned operators offer camping trips at San Ignacio, with visitors flown in by hydroplane for a one-week stay at camps set up for the season. Two or three of these tours are run per month during the season, with approximately 15 visitors each.

Although officially biased in favor of local communities, the actual administration of tourism permits deviates somewhat from stated policy. For example, while the ejido Benito Juarez is required to limit its tours to the interior of Ojo de Liebre lagoon, a private hotel in

Guerrero Negro has received permission to operate high-priced tours near the mouth of the lagoon, where whales are more active and more spectacular viewing available. At least one of the North American tour operators in San Ignacio has also been granted permission to operate his own skiffs, rather than those of the ejido, within the lagoon. In the absence of enforcement personnel or even posted signs, private boats enter the lagoons frequently from the mouth of the lagoon.<sup>37</sup>

Whale-watching in Bahía Magdalena, located outside the reserve, is not subject to any restrictions, and is therefore more frequently visited than lagoons within the reserve, as visitors to Ojo de Liebre and San Ignacio complain that ejidal boat operators are not sufficiently aggressive in pursuing the whales. Many of the Bay's visitors are campers with their own boats for sport fishing, and are therefore free to engage in whale-watching as well, and kayaking is popular. Hotels and tour agencies from San Diego, La Paz, and Cabo San Lucas operate boat tours from these cities to the bay, and a number of local entrepreneurs hire boats for day trips. An unexplained shift in overwintering whales from Ojo de Liebre and San Ignacio to Bahía Magdalena has also increased the site's popularity.<sup>38</sup>

The 1982 transfer of authority over the protection of whale populations from the Secretariat of Fisheries (SEPECSA) to SEDUE did not signify an improvement in

management capacity. SEPESCA has full-time, staffed offices in Ojo de Liebre, San Ignacio, and Bahía Magdalena, and before the creation of SEDUE was charged with inspection and enforcement as well as research, through the Instituto Nacional de Pesca. SEDUE had only one office in Guerrero Negro, with a staff of two charged with carrying out annual censuses of whale populations and enforcement of visitor restrictions as well as protection of the rest of the enormous reserve. Unlike SEPESCA, the staff was not provided with vehicles, boats, or even telephone or mail service. As a condition of receiving a concession within the reserve, therefore, tour operators were required to assist the censuses by providing a boat and driver within Ojo de Liebre, and by providing inspectors with lodging and food in the case of San Ignacio. One-hour trips to Ojo de Liebre, and five-hour trips to San Ignacio, were made in aging vehicles donated by the Guerrero Negro salt works.<sup>39</sup> In Bahía Magdalena, research was still conducted by SEPESCA, but SEDUE was granted jurisdiction over protection and enforcement, with the result that there were no regulations, personnel, or enforcement.

Several obvious measures could be taken to improve the local benefits of whale-watching in the area and to reduce its ecological impact. One of the simplest is the provision of public information, in both English and Spanish, explaining existing regulations and the need to avoid

unnecessary harassment of the whales. Another is to raise permit fees for tourism concessions, currently set at US\$17.00 per person, with no discrimination made between foreign and domestic operators. The funding thus generated could be used to hire personnel for the whale reserve, freeing other personnel for activities in the rest of El Vizcaíno. Both concessions and permit fees could be biased in favor of, rather than against, local ejidos and cooperatives in order to minimize the impact of fishing and other activities during the whale season. In Ojo de Liebre, the ejido's earnings could be considerably increased by the acquisition of one or more vehicles to transport visitors from Guerrero Negro, a simple palapa in town to solicit visitors and arrange tours, and permits to allow at least one of their boats to conduct two to three hour trips through a larger area of the lagoon.

Interestingly, there are no NGOs or research institutions active in the area of El Vizcaíno. The Centro de Investigaciones Biológicas de Baja California Sur (Center for Biological Research of Baja California Sur), a state-run research center, was contracted by SEDUE for the development of a management plan, but this institution has not demonstrated interest in the area before or since.<sup>40</sup> There is therefore no active lobby for improvements in management practice.

The same management conditions are to be found on the Gulf side of the peninsula, where viewing of whales, sea lions, and marine birds attracts visitors during spring. In 1978, 52 islands in the Gulf of California were declared a "zone of reserve and refuge for migratory birds and wildlife." The islands support nesting populations of brown pelicans, terns, gulls, petrels, and cormorants. The region is also a popular site for whale watching, sport fishing, and boating, with many tourists landing on the islands. Researchers from UNAM, Conservation International, and the University of California have noted that whole colonies of nesting terns and gulls will flee the colony at the arrival of humans; in the few minutes that they are gone from their nests, several hundred nests may be destroyed.<sup>41</sup> For example, brown pelican nests are predated by western gulls or trampled by other adult birds, and Heerman's gulls react to disruption with intraspecific predation.<sup>42</sup> Despite this severe disruption of nesting colonies, no restrictions, public information, or SEDUE presence have been established for these areas.

#### New Initiatives

Elsewhere, locally-based ecotourism initiatives have experienced mixed success. Two local initiatives on the boundaries of the Montes Azules Biosphere Reserve have attempted to enhance local attractions and infrastructure, but necessary capital has been lacking. In one ejido in

Marques de Comillas, in the buffer zone of the reserve, an employee of the National Indigenous Institute (INI) encouraged ejido members to construct artificial nests for the military macaw in order to attract visitors to ejidal lands. Funds were provided by INI for the initiation of the project, but work was begun late in the year and all of the nests were used by other species, and funding was terminated before the new season began.<sup>43</sup> Another ejido in the same region has drawn up an extensive proposal to construct palapas and other facilities to attract visitors to the undisturbed tropical forest and Mayan ruins found on their lands, but is unable to locate funders. The project was sent to FONATUR, but two years later the ejido had received no reply.<sup>44</sup>

Environmental NGOs may often be helpful in soliciting the necessary capital for project initiation, but paternalism in project implementation is an eternal threat to long-term success. One example is an ecotourism project in Punta Laguna, Yucatan, the site of a colony of some 50 spider monkeys which has survived on ejidal lands. Punta Laguna was unknown to tourists and completely lacking in tourism infrastructure. Upon discovering the area, Pronatura's president decided to rapidly develop its wildlife-viewing potential. The NGO selected and provided a salary to one resident to serve as inspector, guide, and guard; solicited and obtained the agreement of the ejido to

protect a 400 hectare reserve; solicited funding from the INI to construct a palapa for visitors; solicited funding from the Dutch embassy to construct another palapa for carpentry and wood crafts; printed t-shirts, which are sold to the ejido at cost for sale to tourists; and distributed brochures to tour agencies in Cancun. The project received roughly 2000 visitors--nearly half of them Dutch--in its first six months.

In order to create another alternative source of income to encourage community members to protect the reserve, the NGO initiated an organic honey project. Placing an order for 300 kg with the ejido, the president put up the funding for an extractor and bottles, arranged with a friend to purchase, process, and label the honey, personally transported the honey to Merida, solicited buyers, subtracted expenses and funding to begin the next season's production, and turned over remaining profits to the ejido, handling all of the accounting within the organization. Despite the apparent success of these entrepreneurial efforts, the ejidatarios are described as distrustful of the project because they do not understand basic accounting procedures.<sup>45</sup>

External assistance may be more effective in enhancing the ecological and educational impacts of existing nature tourism, as in Pronatura's efforts to improve ecotourism in the wildlife refuges established in 1979 in Rio Lagartos and

Ría Celestun, Yucatan. A large colony of flamingos which breeds in Río Lagartos and feeds in Ría Celestun, as well as other aquatic birds such as the roseate spoonbill and overwintering ducks and coots, have long made these sites attractive to national and international visitors, and resident fishermen offer their boats for tours of the lagoons. Río Lagartos is also the only Mexican wetlands to be listed by the Ramsar Convention. Pronatura-Yucatan is now offering education programs to guides in order to discourage practices such as chasing the flamingos in order to watch and photograph them in flight.

Recent federal and state assistance projects may contribute to ecologically-sensitive tourism development by providing funds for infrastructure development. One positive example is a 1991 program by the state of Chiapas, the National Institute of Anthropology and History (INAH), and SECTUR to employ local residents in the restoration of archaeological sites in the zone of the Calakmul reserve following widespread crop failures.<sup>46</sup> Even more encouraging is a precedent-setting grant from PRONASOL to an ejidal tourism project in Chihuahua's Sierra Tarahumara, a region popular among tourists for its cultural interest and natural attractions.<sup>47</sup> Although government assistance programs are notorious for their lack of continuity, the grant offers an important precedent in providing funding for

local initiatives and may be useful in initial planning and infrastructure development.

In some cases, nature tours have been developed by environmental NGOs to provide educational benefits and funding for their research and conservation projects. One example is an ecotourism project initiated in the Sian Ka'an Biosphere Reserve by the NGO Amigos de Sian Ka'an, with initial funding from the Nature Conservancy. The focus of this project is admittedly primarily NGO fundraising, with the additional benefit of establishing an NGO presence within the reserve. The tours are day-trips in the organization's boats, through the reserve's coastal lagoons. Visitors are again solicited in Cancun; in the first year of operation, from November 1990 to October 1991, they carried 502 visitors, primarily North American, at a fee of US\$115.00 per person. Employment generation is limited to a boatman and a driver.<sup>48</sup> While of little direct benefit to resident communities, this project does suggest a means of establishing the financial autonomy so difficult to achieve in Mexico, while also contributing to public awareness, though mostly of non-nationals.

At least two organizations working for sea turtle conservation in southeastern Mexico are also incorporating public viewing components as an effort to raise funds for their conservation projects. The Museo de la Isla in Cozumel, Quintana Roo charges visitor fees of \$10.00 to

tourists (local residents pay no fees) for the opportunity to accompany conservationists to the beach to observe sea turtle nesting and the activities of employees and volunteers marking and relocating nests.<sup>49</sup> Pronatura-Yucatan also conducts public visits to the beaches at Celestun to view both sea turtle nestings and the release of head-started hatchlings. Both organizations offer educational slide presentations in connection with the visit. In neither case are local guides employed; instead, NGO employees conduct the tours themselves, often while simultaneously carrying out their conservation activities. This fact, and the lack of limits on group size, has made it difficult to control visitors, for example to prevent them from shining flashlights, which disturb emerging turtles and disorient released hatchlings.<sup>50</sup> Both programs cater primarily to non-residents, foreign tourists in the case of Cozumel, or to residents of nearby urban centers, in the case of Yucatan.

The recent establishment of Mexico's first 'ecotourism' agency, Ecogrupos, offers an opportunity for diffusing information about nature tourism sites in Mexico and to capture revenues from organized tours previously originating abroad. The agency's experiences also illustrate the difficulty of channeling tourism's benefits to local residents and resource users.

Based in Mexico City, Ecogrupos currently offers three tour packages. One involves whalewatching in the Gulf of California, with the sea voyage based in Guaymas, Sonora and including landings on Gulf islands to view nesting seabird colonies and sea lions. Food and lodging are provided on board, with no development spinoffs to the region. A second tour incorporates a two-day visit to the Monarch reserve near El Rosario. Although the tour brings additional visitors to the reserve and therefore creates revenue through entrance fees and refreshments, there are no lodging facilities in El Rosario, so that most tourist expenditures take place outside the direct zone of influence of the reserve. The third tour is a 15-day trip through the states of Chiapas, Campeche, and Quintana Roo for bird-watching and visits to archaeological and cultural sites. Included are visits to Xpuhil, on the fringes of the Calakmul reserve in Campeche; Sian Ka'an, where tourists are carried on the day-trip through coastal lagoons offered by Amigos de Sian Ka'an; and the ruins of Yaxchilan and Bonampak in the Selva Lacandona. Due to the absence of facilities in most of these sites, the tours often carry their own supplies and camp, again limiting local income generation from tourism.<sup>51</sup>

### Conclusion

Ecotourism appears to offer an obvious alternative to poverty and resource degradation by providing a low-impact

economic activity which promises to increase the welfare of disadvantaged human populations in sensitive ecological areas. Whether ecotourism can realistically be expected to fulfill this promise is not yet clear. On one hand, ecotourism initiatives in Mexico as elsewhere are constrained by the tendency of the state or outside interests to assume and maintain control of the more significant tourism resources. On the other, support for small-scale ecotourism comes primarily from NGOs and agencies more concerned with habitat protection than development, and is therefore easily undermined by evidence of resource degradation by residents or tourists. This positioning of the rural poor between privileged resource users and environmental interests is increasingly important in Mexican resource conflicts, and will be discussed further in the following chapters.

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PART III  
THE QUESTION OF THE STATE: DOMESTIC AND  
INTERNATIONAL DETERMINANTS OF MEXICAN WILDLIFE POLICY

CHAPTER 9  
THE POLITICS OF WILDLIFE CONSERVATION:  
GOVERNMENT AND NGO EFFORTS TO CONSERVE WILDLIFE

Introduction

The consequences of rural poverty for wildlife and other natural resources have not gone unnoticed by government officials or by concerned publics, and a number of governmental and NGO initiatives have been designed to address problems of wildlife depletion and habitat degradation. Generally, however, such initiatives have failed to address the causes of unsustainable wildlife exploitation, particularly by small-scale subsistence and commercial users. Often, their result has been further distortion in the distribution of benefits from resource use and discouragement of local management without an accompanying positive impact on the status of wildlife populations.

These policy failures must be understood as the result of both the structural constraints described in the preceding chapters and of political constraints to the development and implementation of environmental policy in Mexico. At the national level, these include top-down policy development in a centralized, authoritarian state;

political relationships among government authorities, technical experts, and public interest groups; and bureaucratic obstacles stemming from the lack of resources and trained personnel, corruption and personalism, and administrative fragmentation.<sup>1</sup> The effectiveness of environmental NGOs has in turn been limited by the nature of their relationship with the state. The present chapter traces the development of environmental protection and wildlife conservation efforts, and explores their relationship to the problems of wildlife resource use.

#### Environmental Politics and Policy in Mexico

Environmental policy in Mexico conforms to a general style of governance characterized by a unique blend of control and cooptation.<sup>2</sup> Broad policy directions, and often specific policies and programs as well, are formulated by presidential administrations, with much discontinuity between six-year presidential terms. The control of the governing PRI over the legislature, ministries, upper- and middle-level personnel of government agencies, and state governors assures the support of political elites for these policy directions.

The emergence of environmental protection on the Mexican policy agenda is consistent with this general description of political action. The passage of Mexico's first environmental legislation was not the result of growing domestic public awareness and demands for

governmental action, but was instead prompted by interested academics and government officials with links to the international scientific and policy communities. The U.S. passage of the National Environmental Policy Act in 1969, visits by Mexican officials to U.S. pollution monitoring and control facilities in 1970, and Mexican participation in the 1972 Stockholm Conference and hosting of a preliminary regional meeting in 1971, contributed to official interest in pollution control and to the enactment of the Echeverría administration's Federal Law for the Prevention and Control of Environmental Pollution in 1971.<sup>3</sup>

To implement this legislation, the administration in 1972 created the Subsecretariat for Environmental Improvement (SMA) within the Secretariat of Health and Assistance, reflecting an emphasis on urban air and water pollution. Environmental protection was never a high-level policy priority under Echeverría, however, and the SMA's activities were confined to training, data collection, public education, and participation in international conferences rather than actual regulation. Nor were new environmental initiatives forthcoming during most of the Lopez Portillo administration, with the exception of a series of bilateral agreements with the United States to manage transboundary environmental problems. Management of biological resources--forests, wildlife, and fisheries--remained under the jurisdictions of the Secretariats of

Agriculture and Fisheries, and received relatively little public attention.

Public concern over isolated environmental issues began to emerge in the late 1970s, however, in response to contamination of agricultural lands and fisheries by petroleum developments, worsening air pollution in Mexico City, and construction of the Laguna Verde nuclear energy plant.<sup>4</sup> This growing awareness prompted legislative revision in the 1982 Federal Environmental Protection Law (Ley Federal de Protección al Ambiente), in which pollution regulations were strengthened and reinforced by increased penalties, new chapters added to address marine pollution, radioactive hazards, noise, and food safety, and provisions for public complaints strengthened.<sup>5</sup>

Not until the administration of Miguel de la Madrid did environmental issues become prominent on the national agenda and in public debate. The incoming president elevated environmental protection to cabinet status under a new Secretariat of Urban Development and Ecology (Secretaría de Desarrollo Urbano y Ecología, or SEDUE), which was granted authority over not only urban pollution issues, but also terrestrial wildlife and endangered species protection and a coordinating role for forestry and fisheries with the Secretariats of Agriculture and Water Resources and of Fisheries. For the first time, an ecology section was included in the National Development Plan for 1983-1988, and

the government assumed a major role in environmental education and mobilization.

Environmental regulation improved little under de la Madrid due to the economic crisis which limited government budgets during his administration and increased official reluctance to aggressively enforce restrictions and penalties against pollution sources, and to the weakness of SEDUE against larger and better-funded ministries.<sup>6</sup> Natural resource protection, centered on land use zoning, the formulation of management plans for protected areas, conservation of endangered and threatened species, and newly established requirements for environmental impact assessments (EIAs) for activities of both public and private entities, encountered similar obstacles. The land use planning program under which management plans and EIAs fell only received half of the authorized budget during 1983-1988. Protected area management plans were seldom implemented due to budget shortages and were undercut by continued authorizations from SARH, PEMEX, and SECTUR for development activities. Environmental impact studies were also underfunded and often simply not undertaken; those completed had little impact on development activity.<sup>7</sup> Natural resource protection was also limited by small budgets for research and enforcement and by jurisdictional conflicts with other governmental entities, primarily the

Secretariat of Agrarian Reform (Secretaría de Reforma Agraria, or SRA), SARH and SEPESCA.

The period 1983 to 1988 did, however, witness rapid public mobilization on environmental issues. Environmental interest groups, limited to a handful of professional associations in 1980, numbered several hundred by 1984, and affiliated in national alliances such as the Mexican Conservation Federation (Federación Conservacionista Mexicana, or FCM), Mexican Environmental Movement (Movimiento Ecológico Mexicano, or MEM), Alliance of Mexican Environmentalists (Alianza de Ecologistas Mexicanos, or AEM), later to become the Green Party (Partido Verde), and the Pact of Environmental Groups (Pacto de Grupos Ecologistas, or PGE).<sup>8</sup> Public mobilization was further stimulated by the failures of governmental relief and assistance efforts following the 1985 Mexico City earthquake and by the nuclear accident at Chernobyl, which strengthened opposition to the Laguna Verde power plant. Public and NGO dissatisfaction with SEDUE's performance led in early 1986 to extensive administrative and personnel changes within the ministry.

The real influence of environmentalism on policy formulation and implementation has, however, been limited by political and organizational constraints. Many of the new NGOs were formed as a direct result of the government mobilization campaign, which included the incorporation of

environmental themes in the public forums held in connection with PRI electoral campaigns and the convocation of the First National Ecology Conference in 1984, as well as regional conferences organized by the House of Deputies for public discussion of environmental problems and policies.<sup>9</sup> These meetings served as escape valves for popular demands and symbolic demonstrations of official support for environmental protection as well as a means of governmental control over agenda formulation.

The official mobilization campaign peaked in 1984, after which a pattern of selective cooptation and control became more evident. The creation of SEDUE generated a number of employment openings which were filled in part by recruiting leaders of the newly formed NGOs. Limited options for organizational self-financing encouraged many groups to collaborate with SEDUE in short-term projects such as the organization of conferences or the publication of educational and informational materials, which served to moderate NGO criticism of official performance. The selective distribution of benefits was coupled with occasional harrasment and threats against less cooperative organizations.<sup>10</sup>

Widespread criticism of SEDUE's environmental performance continued, however, and during the 1988 presidential campaign was taken up by the challenging Party of the Democratic Revolution (Partido de la Revolución

Democrática, or PRD) and leftist parties cooperating with it in the National Democratic Front (Frente Democrático Nacional, or FDN) as well as the small Green Party. The FDN's linkage of environmental problems to wider issues of political and economic development attracted many of the new NGOs, a phenomenon which both resulted in the collapse of broad environmental alliances and threatened the PRI with the potential loss of leadership on environmental issues. The environment continued, therefore, to be an official priority under the incoming administration of Carlos Salinas de Gortari, aided by the passage of the comprehensive General Law of Ecological Equilibrium and Environmental Protection (Ley General de Equilibrio Ecológico y Protección al Ambiente) at the end of de la Madrid's term in office.<sup>11</sup>

Environmental initiatives under the Salinas administration have centered on the elaboration of implementing regulations and standards for control of air and water pollution and solid and hazardous waste disposal, and a multi-faceted program to address Mexico City's air quality problems. After 1990, active enforcement of pollution control standards increased markedly, with a nationwide wave of plant closings in 1991 and 1992, and in 1992 negotiations were finalized with the United States on the Border Environmental Plan. The administration has solicited funding and technical assistance from the United States, Japan, and multilateral banks for these programs.<sup>12</sup>

Several initiatives have also been made in the area of natural resource management, including approval of Mexico's first debt for nature swap, negotiated by Conservation International for the Selva Lacandona. The National Indigenous Institute has launched a campaign to study and preserve medicinal and other uses of native plant species by indigenous communities. The national Tropical Forestry Action Program, administered by SARH, was created to encourage integrated community forestry exploitation to alleviate problems of tropical deforestation and rural underdevelopment, and offers financial assistance to local sustainable development programs.<sup>13</sup>

Unfortunately, these initiatives threaten to be overwhelmed by the recovery of economic growth and the administration's modernization drive, coupled with continued weakness of official regulatory and enforcement capacity in rural Mexico. For example, an ambitious program of transportation development has included highway construction through protected areas in Campeche and Chiapas and through a recently established wildlife corridor in Puebla; integrated forestry projects are coupled with official encouragement of private, single-species plantations in many of Mexico's most important forestry areas; and PEMEX oil exploration is being intensified in the Selva Lacandon of Chiapas, a key focus of the president's environmental rhetoric. Indeed, these environmental initiatives may be

designed to distract attention from the environmental and development consequences of Salinas's economic agenda. Such an interpretation is reinforced by continued official cooptation and harassment of Mexico's environmental NGOs.<sup>14</sup>

In May of 1992, SEDUE was dismantled and most of its functions assumed by the National Institute of Ecology (Instituto Nacional de Ecología) within SEDESOL, the new Secretariat of Social Development. Four General Directions exist within the Institute: Ecological Planning, Environmental Regulation, Ecological Exploitation of Natural Resources, and Technological Research and Development. A new Federal Procurator of Environmental Protection within SEDESOL was also created to ensure the compliance of federal agencies and personnel with the General Law of Ecological Equilibrium, assist in inspection and enforcement, and receive and investigate public complaints and denunciations.<sup>15</sup>

The transferral of SEDUE's functions to these decentralized institutions offers in principle some possibility of greater coordination with economic and development planning and policy by the new Subsecretariats of Regional Development, Urban Development and Infrastructure, and Housing and Real Estate. Other coordination, planning, and evaluation units within SEDESOL are also specifically charged with incorporating environmental policy, programs, and performance into their

functions and with coordinating activities among and within secretariats. However, the fact that the National Institute of Ecology was not granted either Secretariat or Subsecretariat status is in reality likely to weaken its influence relative to other government bodies and agencies. Indeed, the dissolution of SEDUE has been widely criticized within Mexico as representing the subordination of environmental protection to economic growth.<sup>16</sup>

#### The Evolution of Mexican Wildlife Policy

Prior to the emergence of environmental concerns as an official priority in 1982, wildlife management was the responsibility of small staffs located within the various production-oriented ministries charged with agricultural, forestry, and fisheries development. Significant efforts to regulate wildlife use and provide for its conservation, and NGO participation in those efforts, began only in 1982, and have been troubled by the legacies of earlier administration as well as new problems stemming from the political and policy priorities of the 1980s and early 1990s. The development and limitations of past and present wildlife policy and are discussed in the following sections.

#### Federal Wildlife Management, 1916-1982

The history of governmental intervention in patterns of wildlife use began in earnest following the consolidation of the post-revolutionary state.<sup>17</sup> Article 27 of the Constitution of 1917 established federal authority over

land, water, and other natural resources, including wildlife. In 1916, a Department of Hunting and Fishing had been created within the Secretariat of Agriculture and Development, and in 1918 this department was reorganized as the Direction of Forestry, Hunting, and Fishing. The first national Fisheries Law was passed in 1925. Until 1940, however, no comprehensive legislation existed for the management and conservation of wildlife, and federal management of wildlife resources consisted of the issuance of presidential decrees or agency regulations to address specific issues. For example, complete protection was granted to pronghorn antelopes and bighorn sheep in 1921, and in 1924 a system of closed seasons and prohibition of commercial hunting were established for other species. In 1931, at the urging of the U.S. government, commercial duck hunting by the "armada" system (multiple cannons to which flocks are attracted with bait) was prohibited.

The federal regulation of hunting on public lands was authorized in 1932 with the entry into force of a new Civil Code. Under the Code, permit requirements and fees were set for commercially-hunted species, commercial hunting was restricted for selected species, and wage laborers and sharecroppers were granted the legal right to hunt for subsistence on the farmlands where they worked. During the Cárdenas administration, several administrative and conceptual advances were made in wildlife regulation. The

Department of Forestry, Hunting, and Fishing was removed from the Secretariat of Agriculture and made an autonomous organization, and the first hunting calendar was published. Mexico also convened the First National Convention on Sport Hunting and Fishing in 1935, and in 1936 entered into an agreement with the United States for the protection of migratory birds. The sale of deer hides was banned in 1936, but the ban was revoked in 1939 due to its unpopularity and unenforcibility. In 1940, the export of orchids and cacti was subject to propagation and permit requirements.<sup>18</sup> The Cárdenas administration also created 40 national parks, 34 forest protection zones and 8 forestry reserves and protected zones, including 5 wildlife refuges--out of the 99 federally protected areas existing today.<sup>19</sup>

In 1940, the Direction of Forestry and Hunting was again placed within the Secretariat of Agriculture, and the first federal Hunting Law was passed establishing wildlife as the property of the nation and granting management authority for hunting to the Secretariat of Agriculture, while jurisdiction over fisheries was transferred to the Secretariat of Oceans. In 1949 Mexico joined the International Whaling Commission, and in 1950 a new Federal Fisheries Law appeared.

The second Federal Hunting Law, which remains in force to this day, was passed in 1951 during the presidency of Miguel Aleman, an avid sport hunter. The Subsecretariat of

Forestry Resources and Hunting was created within the Secretariat of Agriculture and Livestock. The Federal Hunting Law, which came into effect in 1952, prohibited hunting except by sport hunting permits granted only to members of federally-registered hunting clubs.<sup>20</sup> No provision was made for subsistence hunting, and commercial hunting was prohibited, with the sale or export of animal products permitted only by foreign sport hunters transporting trophies. Hunting areas were to be fixed at the recommendation of hunting clubs, following appropriate studies by the Secretariat. Game species and bag limits as well as implementing regulations are set forth in the annual hunting calendars. The law also prohibited the taking of species not listed in the annual hunting calendars, hunting in parks and reserves, the taking of females and juveniles when identifiable, the taking of the nests or eggs of birds, and the use of unauthorized hunting techniques such as poison, traps, artificial lights, or calling devices.

In 1959, fisheries jurisdiction was transferred to the Secretariat of Industry and Commerce, where it remained until the creation of the SEPESCA in 1976. Also in 1959, the Directorate of Hunting was elevated to independent status within the Secretariat of Agriculture, with several biologists added to its staff. Research and experimental stations were created in San Cayetano, Mexico and Juitepec, Morelos, and wildlife refuges established in Isla Rasa, Baja

California; Isla Tiburon, Sonora; and Isla Contoy, Yucatan. In 1961, an exception was made to the Federal Hunting Law in the form of authorization to members of the National Union of Breeders and Dealers of Ornamental and Song Birds for the capture, sale, and export of native birds; annual calendars delimiting seasons and quotas began to be published in 1977-78. Also in 1961, the Consultative Council on Wildlife was formed of two official and three private sport hunting representatives for cooperation in setting hunting calendars and resolving hunter complaints. In 1964, experimental hunting seasons were opened for bighorn sheep in Baja California, and the First National Hunting Convention was convened. In the same year, the importance of nongame wildlife species was recognized in the name change from Directorate of Hunting to Directorate of Wildlife within the Secretariat of Agriculture and Livestock.

Few additional changes were made in the administration and regulation of wildlife use until 1982. However, a significant change in protected areas policy occurred in 1977 with the creation of Mexico's first Biosphere Reserves under UNESCO's Man and the Biosphere program. In 1977 the Mapimí and Michilía Reserves were established in the state of Durango, and in 1978 the Montes Azules Biosphere Reserve was created in Chiapas. These biosphere reserves were not only much larger in size than protected areas created previously, but also incorporated more isolated and

relatively intact ecosystems, thus increasing the potential benefits of Mexico's protected areas system for wildlife and biodiversity conservation.

Federal Wildlife Management, 1982 to the Present

Federal efforts to manage and conserve game and non-game species intensified in 1982 with the assumption of Miguel de la Madrid to the Presidency. The National Development Plan for 1983-88 included the conservation and rational use of wildlife resources among its ecological goals, stating that

It is necessary to expand the management of wild fauna, not limiting it to those species used exclusively for sport hunting, but extending it to include subsistence hunting and commercial capture for national and international consumption, under strict technical and scientific controls and with a social criteria.<sup>21</sup>

The National Development Plan for 1989-1994 similarly emphasized wildlife conservation as an important element of natural resources management. Among its goals were the consolidation of the National System of Protected Areas, including the diversification and rationalization of wildlife use within protected areas; the establishment of breeding and propagation centers and other research facilities for the recuperation of wild species; the development of inspection and enforcement for the protection of wildlife and natural habitats; and the elaboration of studies for the conservation of rare, threatened, and endangered species and for those subject to human uses.<sup>22</sup>

SEDUE's Directorate of Wild Flora and Fauna assumed management authority over terrestrial wildlife and non-commercial aquatic species until 1987, when the Secretariat was restructured and the sector transferred to the Directorate of Ecological Conservation of Natural Resources (Dirección General de Conservación Ecológica de Recursos Naturales, or DGCERN).

Several concrete actions were also taken during this period. Most commercial wildlife exports, including ornamental and song birds, were prohibited in 1982, and halting steps made toward accession to CITES. Efforts were also made to improve the hunting and bird calendars. Prior to 1982, seasons and bag limits were set in the hunting calendars according to four large geographic divisions, but by the late 1980s separate regulations were established by state, and in most cases by districts within states. The number of species on the ornamental and song bird calendars was also increased in an effort to diffuse pressure on individual species. Status evaluations of game and non-game species were initiated in 1983 and 1984, and protection extended to threatened species such as toucans and wolves.

Wildlife and biodiversity conservation received increased attention following the administrative changes of the mid-1980s, which were accompanied by extensive personnel changes and the appointment of an unusually dedicated administrator to head the DGCERN. Regulatory changes after

1986 included the removal of more species, including jaguars and black bears, from the annual hunting calendars, and restrictions in the numbers of permits issued for other game species, such as white-tailed deer. Enforcement effort was increased to curtail commercial hunting and illegal wildlife exports. The creation of protected areas accelerated, with four new biosphere reserves created between 1986 and 1989. In 1986 Mexico acceded to the Ramsar Convention for the Protection of Wetlands of International Importance, listing the wildlife refuge of Río de Lagartos, Yucatan. The National Commission of Ecology was created for planning and oversight, and in 1987 issued its "100 Necessary Actions," which included wildlife protection and control of illegal trade.<sup>23</sup> In 1987, The first national Biodiversity Conference was organized by SEDUE, the World Wide Fund for Nature, INIREB, and the Mexican Conservation Federation.

In 1988 appeared the General Law of Ecological Equilibrium and Environmental Protection,<sup>24</sup> which authorized a much more comprehensive federal role in wildlife protection than past hunting and fisheries legislation. The Law authorized SEDUE to establish closed seasons for terrestrial and aquatic flora and fauna, regulate international trade in wild flora and fauna, and permit commercial exploitation of captive-bred or artificially-propagated flora and fauna. The law explicitly prohibits the exploitation of rare, endemic, threatened, or

endangered species, and Mexico's first official list of protected species was issued under the law in 1991.<sup>25</sup>

The General Law of 1988 was implemented by several specific measures taken during the presidency of Carlos Salinas de Gortari. The National Program for Environmental Protection for 1989-1994 includes the protection of wild flora and fauna as one of four priority areas. Specifically addressed are the National Protected Areas System, Endangered Species, Sustainable Use of Natural Resources, Wetlands Protection, and Biological Corridors.<sup>26</sup> In 1990, a presidential decree established a total and indefinite ban on the capture, consumption, sale, or export of sea turtles or their products,<sup>27</sup> and nationwide sea turtle protection measures accelerated. Accession to CITES was finally achieved in 1991.

SEDUE also negotiated a World Bank loan totaling \$50 million for the period 1991-1994 for administrative restructuring and capacity building in policy analysis, pollution control, and natural resource conservation. Wildlife conservation programs included a biodiversity conservation program consisting of inspection and enforcement of international wildlife trade, the construction of rehabilitation centers for live wildlife specimens confiscated through improved enforcement, and the conservation of marine turtles, primarily through the construction of permanent facilities for research and

enforcement on protected nesting beaches.<sup>28</sup> A complementary grant of \$30 million from the Global Environmental Facility was also granted for the management of priority protected areas.<sup>29</sup> In addition to these measures, an inter-ministerial National Commission for the Understanding and Use of Biodiversity, headed by the President himself, was established in early 1992 to coordinate research and programs for the use and conservation of wild species.<sup>30</sup>

The dissolution of SEDUE in 1992, however, again fragmented authority for the conservation and management of wildlife. The National Institute of Ecology is responsible for research and the development of policies, programs, and criteria for the conservation, recuperation, reproduction, repopulation, and exploitation of wild fauna and flora and for the protection of biodiversity.<sup>31</sup> However, authority for the development of annual hunting and bird calendars is shared with SARH, and the General Directorate of Forestry and Wildlife Protection of SARH is now charged with permit authorization, control, and enforcement under these calendars. The new Fisheries Law of 1992 also granted authority to SEPESCA for determining and establishing those measures necessary for the conservation and protection of marine mammals, sea turtles, and other aquatic species.<sup>32</sup>

Wildlife Use in Public Policy

Despite a gradual shift away from exclusive attention to game species, official wildlife policy has continued--at least rhetorically--to recognize the human uses of plant and animal species and of the need to incorporate continued rural use into management priorities. Administration of wildlife resources has been plagued, however, by the inherent and persistent difficulty of designing and implementing regulatory policy for the exploitation of wildlife resources in a context of widely varying patterns of use in different ecological and socioeconomic settings.

Effective regulatory policy challenges the capacities of even developed countries due to technical complexity and uncertainty and overwhelming informational needs, the difficulty of designing compliance mechanisms for distinct target groups, and high administrative costs.<sup>33</sup> Regulatory policy is widely recognized as particularly weak in developing countries due to budgetary limitations, administrative fragmentation, vulnerability of government agencies to interest group pressure, and corruption. Mexico has been no exception to these problems, with the result that wildlife regulation is typically neglected until a problem emerges, at which time exploitation is legally prohibited, albeit usually without adequate enforcement.

These regulatory problems have been extremely evident in efforts to protect biodiversity through the creation of

parks and reserves.<sup>34</sup> In principle, the priority granted to the consolidation of the National System of Protected Areas and a strong legislative basis for participatory management of protected areas make this the most promising area for the rationalization of wildlife use and the incorporation of human needs in conservation. The General Law of Ecological Equilibrium provides for public participation in their establishment, administration, and development, and for the continuation of natural resource exploitation in protected areas, including biosphere reserves and wildlife refuges.<sup>35</sup> Furthermore, the General Law instructed administrative agencies to develop coordinating agreements with the inhabitants of protected areas for their management, and SARH to provide technical assistance to ejidatarios, comuneros, and small landowners in the development of productive activities.<sup>36</sup>

Additions to Mexico's network of protected areas have also increasingly taken the form of biosphere reserves, the stated goal of which is to incorporate human needs in conservation planning; the Sian Ka'an, Sierra de Manantlán, El Vizcaíno, Calakmul, Pántanos de Centla, and Lacan-Tun Biosphere Reserves were all created between 1986 and 1992. SEDUE increasingly involved research institutions and environmental NGOs in reserve planning and management. The newly created National Institute of Ecology is instructed to decentralize to the extent possible the administration of

protected areas to state and municipal governments, thereby increasing possibilities for greater participation by local government and state research institutions.

In practice, however, parks and reserves are typically created and planned without prior consultation with or indemnization of local residents and without local participation in the development, implementation, and evaluation of natural resource management projects. Under SEDUE policy, formal coordination with local communities began only following the development of a management plan, when local residents were informed of its provisions.<sup>37</sup> The management plan is thus based primarily on government records and other secondary materials, while consultation, when it occurs, involves official solicitation of a formal statement by resident communities of their willingness to further the goals of the already-finalized management plan. These management plans are generally not developed by federal agencies themselves, but instead contracted to research institutions or environmental organizations, only a few of which are involved in long-term research and conservation in the area. Management plans for protected areas normally include development of ecotourism and other productive activities, but these provisions are often not implemented due to lack of organizational presence or funding and personnel limitations. Inability to control resource exploitation leads instead to its prohibition.

The impact on residents of reserve creation has thus often been severe, for not only is hunting prohibited in protected areas and their buffer zones, but forestry exploitation and land clearing for agriculture are also often prohibited or severely restricted. In many cases, lack of alternatives to residents or active management efforts by state agencies have meant little probability of enforcement. In 1984, it was estimated that agricultural activity occurred in 55% of national parks and livestock raising in 64% of them, while logging is frequently reported in protected areas.<sup>38</sup> Biosphere reserves have similarly been affected by illegal logging, hunting, and grazing.<sup>39</sup>

Protected areas in Mexico have also been plagued by uncertain territorial limits and boundary conflicts inherited from the SRA or caused by the often accidental inclusion of private, communal, and ejidal lands within park and reserve boundaries. These problems continued after the creation of SEDUE, and were perhaps even aggravated by intensified efforts to create and manage biosphere reserves, which tended to be greater in size and more concentrated in marginalized rural areas, and to incorporate large human populations. In some of these, such as Montes Azules and the proposed Chimalapas reserve, efforts to create reserves without resolving existing territorial disputes have contributed to widespread local hostility toward both government agencies and environmental organizations.

Protected areas staffs are small and not provided with adequate facilities, equipment, or living expenses, while salaries are often not paid for six months or more into each year. In some areas, management and enforcement personnel have reportedly engaged in wildlife exploitation or other economic activities in order to supplement meager salaries. Under these conditions, neither enforcement nor the establishment of positive relationships between government personnel and residents have been possible. SEDUE also proved powerless to stop new developments in protected areas, such as mining, oil exploration, and highway construction, and it is not clear whether the National Institute of Ecology or the Federal Procurator of Environmental Protection will perform better than their predecessor. Although EIAs for such activities are required, funds and personnel are not available to adequately perform them or even to ensure that EIAs are submitted when required. Even in cases where EIAs are conducted and adverse impact clear, SEDUE was unable to influence powerful interests such as PEMEX or the Secretariat of Communications and Transport.<sup>40</sup>

If problems of wildlife exploitation in protected areas have been neglected, they have suffered from greater neglect elsewhere. As an increasing number of species become threatened, state management of wildlife resources is increasingly dominated by efforts to tighten and enforce

ineffective restrictions on hunting and commerce and to establish and implement emergency protection measures for endangered species. This pattern has, as in most of Latin America, been particularly evident in the regulation of commercial wildlife use.

The legal basis for commercial wildlife use in Mexico is extremely ambiguous. The Hunting Law of 1951 and the annual hunting calendars issued under it prohibit commercial use, despite which the domestic sale of ornamental and song birds has been authorized by special regulations and capture and marketing calendars, and bird exports remained legal until 1982. The exploitation of wild birds still does not benefit either from research to determine sustainable harvest levels or from enforcement of the quotas and seasons established in the annual capture and vending calendars. The marketing of other wildlife products continued openly until the 1980s, with enforcement efforts increasing in 1982, 1986, and again in 1988, when the General Law of Ecological Equilibrium repeated the prohibition of commercial wildlife use and export. Sporadic enforcement succeeded in driving much of it underground, but the impact of enforcement has been highly uneven given the shortage of field personnel; in 1989 there were only 25 wildlife inspectors nationwide.<sup>41</sup> Most affected have been highly visible urban wildlife markets, while the sale of illegal wildlife products in dispersed commercial establishments,

smaller rural markets, or along roadsides remains common. Government enforcement efforts have also concentrated on two issues receiving high levels of domestic and international publicity, the commerce in sea turtle products and the smuggling of parrots into the United States. Thus, for most species, wildlife commercialization remains uncontrolled.

An additional obstacle to the control of wildlife markets is posed by bureaucratic turf battles. SEDUE encountered persistent difficulties in controlling commerce in forestry and fisheries resources formerly under the jurisdiction of SARH and SEPESCA, which resisted the transfer of control over protected species. For example, SEDUE's attempts to enforce the ban on wild cactus exports were undermined by continued permit authorizations from state offices of SARH.<sup>42</sup> This problem was particularly evident for fisheries species, as SEPESCA not only continued to authorize permits for harvest and sale of protected species such as black coral, but also resisted SEDUE's efforts to impose new restrictions, such as controls on the capture of dolphins for sale to aquariums and efforts to increase protection of marine turtles.<sup>43</sup> Jurisdictional conflict also prevented cooperation in enforcement. Authority for research and conservation of marine species such as sea turtles and gray whales continued to be shared between SEDUE and SEPESCA, leading to lack of coordination and communication among distinct regions and projects.

These problems may be aggravated by the division of authority following the dissolution of SEDUE.

Mexican regulation of sport hunting has in most cases not fared much better. Sport hunters are required to hold memberships in federally registered hunting clubs and associations, and the annual sport hunting calendars were recently amended to require that clubs should contribute to the conservation of wildlife through specific actions of "diffusion and orientation." However, lack of more specific requirements for conservation measures, and the lack of defined and regulated hunting areas or enforcement, has discouraged their active involvement in wildlife management. Some 103,000 permits were issued in 1988-89,<sup>44</sup> but this figure represents considerable overlap among individual hunters and geographical concentration in northern Mexico, and it is generally accepted that the majority of Mexican hunters do not obtain permits. Those who do are generally subject to low permit fees; more than three-fourths of the permits issued in 1988-1989 were issued for unlimited hunting of small mammals and game birds, fees for which range from \$4.50 to \$22.00 for citizens. One observer, noting that in the 1989-90 hunting season in Quintana Roo only 21 persons solicited permits for unrestricted species and 26 persons for limited permits (again with considerable overlap, and generating total revenues of US\$500.00), concluded that the permit system was neither a tool for

wildlife management nor an adequate means of statistical recording.<sup>45</sup>

The weakness of federal management capacity has created a vicious circle in which the evasion of permit requirements contributes to a lack of information on hunting pressure and its impact on wildlife populations. The inutility of permit registrations as a source of data is aggravated by the lack of revenues to fund field research to determine the effects of exploitation on wildlife populations. Not only is hunting information lacking, but in most cases, hunting calendars are set without previous population censuses and surveys.<sup>46</sup> Instead, hunting seasons and limits have been set through negotiation between state management agencies and representatives of sport hunting clubs and associations, although in some areas researchers and NGOs have begun to participate in this process.

Increased federal effort in the 1980s and 1990s to protect wildlife has not translated into increased research on wildlife populations and hunting impact. Indeed, from the 1960s until 1982, while authority for wildlife management remained under the various ministries of agriculture, governmental interest in research on human exploitation of wildlife was somewhat greater than at present. Although the shortage of financial and human resources for these efforts made systematic evaluation

difficult, the decentralization of agricultural and forestry field stations made long-term observation possible, and sporadic efforts were made by individual personnel to assess hunting patterns and the link between hunting and wider socioeconomic development.<sup>47</sup> With the expansion of wildlife and other management functions under SEDUE, these efforts all but ceased in the face of budgetary limitations, administrative centralization, and bureaucratic and jurisdictional conflict between SEDUE and SARH.

Although research on species status was a priority during the early 1980s, only a tiny fraction of the SEDUE's budget was assigned to this task. Thus, the handful of studies conducted by SEDUE personnel on the status of endangered and game species consisted primarily of summaries of previous biological research, most of which concluded that no meaningful data were available.<sup>48</sup> The capacity of SARH for field research was not exploited by the administrative changes of 1992, which granted authority for permit authorizations, but not for research or the establishment of technical standards, to SARH.

Some of these problems were addressed by the regulatory changes of 1988 creating new requirements for hunting organizers and game ranchers. The revised hunting calendars now require not only independent support for research on game populations, but also detailed reporting of hunting activity and of game and habitat quality. These

provisions, however, are geographically limited due to the concentration of both activities in northern Mexico. They also target the activities of foreign hunters rather than the much larger number of national hunters, as it is the former who are overwhelmingly represented among the clientele of both organizers and game ranches.

Regulatory weakness is also both cause and consequence of a failure to address the continued importance of subsistence hunting and collection. The Federal Hunting Law, taking as its model wildlife management in the United States, reflects not only an effort to address the negative effects of commercial hunting, but also the influence of sport hunters in federal regulation and the premise that subsistence hunting is a backward and inefficient use of a resource that can generate greater and more sustainable benefits through sport hunting.<sup>49</sup> Subsistence hunting is therefore not legally recognized and no provisions are made for its regulation. Wildlife managers are of course aware of the fact that subsistence hunting persists, but it has been at best merely ignored. Legislative revision has never been adopted as a political or administrative priority, and existing regulations for sport hunting are not easily adapted to the requirements of local hunters.<sup>50</sup> While fishing for household consumption is not subject to permit requirements, hunting permits are universally required and subject to fees, and can only be obtained from government

offices located in the federal or state capitals. Permit fees, although perhaps too low for sport hunters, are prohibitive for subsistence hunters. Special permits are also required for the use of dogs, a common practice among subsistence hunters. Furthermore, many species of importance to subsistence hunters are not included in the official lists of game species and cannot be legally hunted.

Wildlife professionals in government agencies and research institutions have long recognized the need to address the persistent fact of small-scale subsistence and commercial wildlife use. As early as the First National Hunting Convention of 1964, uncontrolled subsistence hunting was recognized as the most critical problem facing wildlife management.<sup>51</sup> A 1969 study by the General Directorate of Wildlife of the Secretariat of Agriculture and Livestock on the economic value of wildlife reported that the most important use of wildlife was rural consumption, with an estimated cash value of US\$107 million, compared to \$66 million for tourism and \$3 million for permit fees.<sup>52</sup> A 1984 SEDUE review proposed increased research effort to explore potential wildlife uses and establish sustainable harvest rates for rational resource development in rural communities.<sup>53</sup> SEDUE's 1987 annual report stated that "Regulations are currently being designed to expand the operation of commercial breeding facilities to generate jobs, especially in rural communities, with alternatives for

production diversification."<sup>54</sup> Nonetheless, little effort has been made to assess the context or impact of small-scale hunting, and no effort has been made to involve these resource users in policy and regulatory decisions. Nor have efforts been made to involve local communities in the potential benefits of sport hunting.

There are several possible explanations for the failure to address non-recreational hunting. One is suggested by experiences of local participation in wildlife management in Africa and comanagement systems in North America. Chapter 3 described these systems as benefitting from unusually well-funded and effective wildlife management agencies capable of supporting the additional research needs and assistance to participating communities needed to implement cooperative management. However, it is also noteworthy that the actual initiation of local participation was a response of otherwise effective management agencies to enforcement failures, failures which in turn threatened broader management goals. In other words, decentralization of management authority presumes prior efforts at management and enforcement, with experiments in local participation gaining importance on the agendas of management agencies only after those efforts have proven ineffective. That such systems have not been initiated by Mexican agencies charged with wildlife management might thus be attributed to the budgetary limitations which generally hinder the development

of government capacity to protect resources and to identify specific management problems.

The shortage of budgets and personnel for wildlife management and conservation in Mexico is certainly a critical problem, and one which has contributed to the inability to achieve sustainable resource exploitation. Between 1983 and 1988, for example, budgets for wildlife and protected areas totalled an estimated US\$150 million, or 11% of the budget of SEDUE's Subsecretariat of Ecology; in every year except 1987, expenditures were less than budgeted revenues, with some 25% of revenues budgeted for wildlife cancelled due to implementation problems.<sup>55</sup> Nonetheless, as the preceding chapter began to suggest, this shortage does not in itself adequately explain the failure to address the resource needs of the rural poor, because government inattention to wildlife resource problems is not universal. Additional explanations must be sought for the allocation of those funds and personnel which are available.

One partial explanation is the tendency of government agencies to focus on concrete and highly visible actions which can easily be used to demonstrate effective performance and thus gain political support. This tendency is probably exaggerated when poorly-funded environmental agencies are expected to perform a rapidly increasing number of functions, and particularly when those functions are exposed to close public scrutiny. Thus, faced with a choice

between long term regulatory experiments with uncertain future results and relatively simple technical activities, SEDUE and other agencies have focused on the latter. In the 1980s, for example, domestic and international criticism of Mexico's failures to control illegal wildlife trade prompted construction of wildlife rehabilitation centers rather than efforts to increase research and personnel. International concern for the status of sea turtles in the late 1980s similarly led to an expansion in the number of research camps rather than efforts to address human uses of these species. In the early 1990s, a U.S.-led campaign to protest high incidental mortality of dolphins in Mexico's tuna fishery prompted the announcement of Mexican plans to construct a dolphin aquarium for research and public education, as well as the development of a "Living Museum of the Sea Turtle" and the expansion of research and conservation for the endangered vaquita in the Gulf of California. Between 1983 and 1988, 70% of SEDUE budgets for protected areas and wildlife were expended on the construction of infrastructure and the operation of reserves and wildlife stations.<sup>56</sup>

Similarly, general efforts to address the decline of wildlife populations have focused on captive breeding rather than protection in the wild. This is true not only of endangered species, although a considerable proportion of federal budgets for wildlife conservation has been devoted

to endangered species recovery plans centered on captive breeding of species such as the Mexican wolf, volcano rabbit, and Morelet's crocodiles. SEPESCA also developed egg incubation programs for sea turtles and aquaculture facilities for crocodilians and freshwater turtles in response to uncontrolled trade in these species. In the early 1980s, SEDUE wildlife budgets were dominated by the establishment of stations for intensive production of game and commercial species such as white-tailed deer and white-lipped peccary.<sup>57</sup> In 1984, 99% of the budget of the Directorate of Wild Flora and Fauna was absorbed by infrastructure development, primarily the construction and improvement of wildlife exploitation stations, and the publication of hunting calendars, while only 1% of the budget was destined for studies of wild populations.<sup>58</sup> Between 1983 and 1988, SEDUE created two centers for confiscated wildlife and eight "wildlife exploitation stations;" between 1988 and 1991, two confiscation centers and two wildlife exploitation centers were added.<sup>59</sup> Existing breeding and rehabilitation centers are, however, widely acknowledged as failures due to the shortage of technical skills and equipment,<sup>60</sup> and in most cases no information has ever been made public on the number of specimens housed, produced, or released.

Intensive production of wildlife is also commonly proposed as a technical solution to the seemingly

uncontrollable problems of subsistence and commercial hunting and wildlife trade. The Federal Hunting Law and the General Law exempt captive-bred or artificially propagated specimens from the ban on wildlife commercialization, provided conditions of sustained reproduction and the release of required numbers of reproduced specimens to the wild. In addition to experimental farming by SEDUE and SEPESCA, commercial crocodile farms have been established in Cancun, Cuernavaca, and Villahermosa, but both private as well as government facilities have been plagued with technical and sanitary problems and none have achieved commercial production.<sup>61</sup> Some facilities for the production of ornamental cacti have begun operating, but only a few have obtained permits for commercial distribution.<sup>62</sup>

Despite the failure of both private and government efforts to achieve intensive wildlife production, wildlife farming has also been a central focus of wildlife conservation strategies aimed at subsistence and community resource users. Farming has been emphasized in official conservation strategies and legislation,<sup>63</sup> efforts to develop alternative economic activities for the rural poor in protected areas,<sup>64</sup> attempts to divert pressure from endangered to underexploited species or to supply existing commercial markets,<sup>65</sup> and of community and regional development programs.<sup>66</sup> Again, however, these goals have

been used to support the construction and development of captive breeding centers rather than efforts to develop community-based wildlife programs. The available financial and human resources devoted to wildlife conservation--by zoos, NGOs, and research institutes as well as federal agencies--have thus been channeled into solving the numerous technical problems associated with intensive wildlife production. Most of these efforts have been undertaken without communication with local communities to assess local interest in the project, management capacity, or potential conflicts with existing production strategies; without market studies to determine economic feasibility of the project; and without consideration of the likelihood that needed capital and equipment inputs can be supplied. Consequently, none have ever been implemented.

If budgetary limitations and a focus on simple and highly visible conservation measures help to explain the general failure to develop sustainable wildlife use, the preceding discussion also suggested explanations for the neglect of disadvantaged wildlife users in those sporadic efforts which have been made to address problems of wildlife exploitation. The efficient use of scarce state resources to maintain political control and support leads, in environmental policy as elsewhere, to reactive responses by state agencies to pressures by organized interest groups.

As discussed in Chapters 3 and 5, interest articulation by rural wildlife users is virtually nonexistent. Subsistence and small-scale commercial use of wildlife is rarely viewed as a primary economic activity, instead serving as a means of supplementing consumption of crops and livestock or as a temporary escape valve in the case of shortages of more basic goods. In those cases where available species generate significant economic values, these values are captured in the cities or countries in which luxury demand is generated; harvesters capture a tiny proportion of this total value, of which they may not even be aware. The relative lack of importance of hunting compared to such issues as land tenure, credit availability, and infrastructure and social services makes collective pressure for regulatory change highly unlikely.

Furthermore, local depletion is often not immediately detectable, and when acknowledged, is frequently seen as the consequence of activities by sport and market hunters from outside the community. A sense of powerlessness over control of wildlife resources is reinforced by a long history of state intervention and the illegality of both subsistence and market hunting, which prevents efforts to enlist official assistance in excluding outside users. This is especially true for ejidal and communal landholders due to the high cost of exerting pressure on a bureaucratic system characterized by centralization, personalism, and

arbitrariness. The incentives for self-management of wildlife thus tend to differ somewhat from forestry and fishery resources, where resource users have frequently organized to protest threats to their livelihoods.

In contrast, federal agencies have been highly susceptible to pressures from more advantaged interest groups such as bird and sea turtle traders, game ranchers, and sport hunters. The success of ANGADI, for example, can be attributed to the very attributes lacking for most wildlife use systems. High market values for sport hunting facilities and services and access to capital for infrastructure investments, coupled with secure land tenure, generated a willingness to invest time and resources in the creation of ANGADI and in lobbying activities. Association members were able to provide funds to pay for initial research on wildlife populations and habitat quality, hire lawyers, and travel to the capital for meetings with SEDUE officials. Cattle ranchers were not only perceived as possessing the managerial capacity necessary to manage wildlife operations, but were also supported by the National Livestock Confederation.

State agencies have also proven sensitive to the demands of environmental organizations, and their critical collaboration has been achieved in the exceptional cases of effective participatory wildlife management, namely ecotourism in the monarch butterfly and grey whale reserves

and game ranching in northern Mexico. These exceptions tend to prove the rule, for in the case of ecotourism interest articulation was undertaken by an influential intermediary, in this case an NGO with international support and funding.

In the Monarch butterfly reserve, an agreement permitting local residents to manage and benefit from tourism to the area was possible due to the intervention of Monarca, an NGO formed specifically to foster the protection of the reserve. Because the monarch butterflies migrate between Canada and Mexico, and the Mexican overwintering sites discovered and studied by Canadian and U.S. researchers, the local NGO was provided with extensive assistance, support, and funding by a number of Canadian and U.S. organizations. Monarca also collaborated with at least one external NGO supportive of incorporating human needs into conservation planning, the World Wildlife Fund. Both the local NGO and external supporting organizations were influential in negotiations with SEDUE leading to an agreement allowing Monarca to assist local residents to undertake the necessary infrastructure development. An ecotourism project also had the advantage of quickly generating revenues for the participating community and thus generating interest and capacity for habitat protection. The initial success of this model provided the basis for state initiation of a similar project in grey whale reserves in Baja California Sur.

The Monarca case supports the suggestion of a considerable potential role by outside catalysts-- researchers, professional associations, and NGOs--in providing information to and stimulating interest in local communities, assisting in capital acquisition, serving as interlocutors between resource users and government agencies, and pressuring for reorientations in official management policy. However, if Mexican environmental NGOs and other intermediaries can tip the scales toward the more adequate representation of local interests in wildlife management policy, a number of organizational and political barriers have in most cases prevented them from fulfilling this role. The following section examines more closely their influence on wildlife management and conservation.

Wildlife and the Public Interest: The Role of Mexican Environmentalists in Wildlife Management

Given the newness of Mexico's environmental movement and the severity of Mexico's urban environmental problems, only a handful of Mexican environmental organizations have demonstrated interest or professional expertise in the area of wildlife conservation. Many of these are popular, public-interest oriented organizations engaged primarily in information diffusion, environmental education, and denunciation. Most are urban-based, with little capacity for independent research and with little or no contact with rural communities. In the absence of generally available information on wildlife and its uses, such organizations

rely for information either on government agencies such as SEDUE, which regularly provided information on confiscations to the press; and the publications of international NGOs, whose information on Mexican wildlife is generally limited to illegal trade and other threats to endangered or threatened species. Demands for action by these groups thus tend to reinforce the official focus on enforcement and captive breeding of endangered species and encourage negative public opinion toward consumptive wildlife use.

One of the most influential of Mexico's environmental NGOs, the Grupo de los Cien (Group of 100), falls within this category. Its members are well-known artists and intellectuals who are able to contribute their own resources and to denounce government policy with relative impunity. In collaboration with scientists and informants, the Grupo de los Cien, and particularly its president, Homero Aridjis, has played a key role in publicizing pressing environmental issues. These publications have generated extensive national and even international controversy because of the Grupo's unusual daring in criticizing the role of government agencies in environmental problems. For example, a series of newspaper articles on government involvement and corruption in the illegal harvest and trade in sea turtles was influential in the decision to close the fishery, high mortality of overwintering butterflies in the Monarca reserve in 1992 was attributed to the failure of SARH to

restrain authorized and illegal logging, and the Grupo is the only Mexican organization which took a public stand to urge the ending of the incidental mortality of dolphins by Mexico's tuna fleet.<sup>67</sup>

However, rural resource users themselves have also come under attack, and dramatic accounts of illegal logging, fishing, and wildlife trade have also influenced public attitudes toward natural resource use. Thus, although the Grupo has played a critical role in denunciation and public awareness, the public and official attention generated by their publications has often encouraged the imposition of complete bans on resource exploitation.<sup>68</sup>

There are also relatively few universities and research institutes with capacity for wildlife research, and fewer which have developed multidisciplinary programs for the study of environmental and natural resource issues. Many of the published studies currently available on rural hunting and wildlife use were conducted by the Instituto Nacional de Investigaciones sobre Recursos Bióticos (INIREB), which has been dissolved, but many of the conservation programs developed during its existence centered on captive breeding and rural wildlife farming. Several universities in northern states have developed consulting services for wildlife research and management, but their clientele is limited to private landowners. Basic research by institutions such as UNAM's Institute of

Ecology, Institute of Biology, or Faculty of Veterinary Medicine, and the autonomous Institute of Ecology in Veracruz, is often undertaken in connection with protected areas creation and planning and frequently includes observations on the threats posed by overhunting or excessive harvest. However, this research is usually accompanied by demands for strengthened protection and enforcement rather than socioeconomic studies or field-based programs designed to address them.

The number of organizations currently involved in field-based wildlife management and conservation is thus quite small. In a few cases, public universities and research institutes have begun to undertake community development activities as part of long-term research and conservation efforts, particularly in connection with protected areas management. Most, however, are independent, non-profit environmental organizations. In addition to Monarca, these include Ducks Unlimited of Mexico, Biocenosis, Ecósfera, Amigos de Sian Ka'an, Pronatura, and Conservation International.

Like Monarca, all of these organizations were created in the 1980s and are highly dependent upon institutional and project funding from U.S. and other external organizations. Ducks Unlimited is involved in wetland and waterfowl conservation, primarily in northern Mexico, and has provided research and technical support to ANGADI and other sport

hunting organizations and initiated an education and conscientization program for sport hunters. Amigos de Sian Ka'an was created to provide support to the Sian Ka'an Biosphere Reserve and is involved in several research and education programs for sustainable resource use. Pronatura is based in Mexico City with chapters in several states, with the largest found in Yucatan. The NGO has a long history of sea turtle conservation, the Mexico City office working on the Pacific coast and the Yucatan office on the Yucatan peninsula. The Yucatan branch is also working in ecotourism development in the Ria Lagartos and Ria Celestun reserves and in a community reserve in Yucatan state, and in research and management of the Calakmul Reserve of Campeche.

The U.S.-based Conservation International recently opened an office in Mexico and has centered its activity on the Montes Azules Biosphere Reserve of Chiapas and the region of the Gulf of California. Biocenosis is a consulting organization formed of wildlife and natural resource professionals and performing a wide variety of environmental impact studies, ecological assessments, technical assistance, and other services for federal and state agencies and for other non-profit organizations. Biocenosis has, for example, developed management plans for Los Chimalapas and the Calakmul Biosphere Reserve, and been contracted by Conservation International to conduct ecotourism feasibility studies in the Montes Azules

Biosphere Reserve. Ecósfera is an association formed by former researchers of INIREB and is active primarily in southeastern Mexico.

The Monarca ecotourism program discussed above represents only one of several examples of recent NGO efforts to address the human dimensions of environmental protection and natural resource conservation. In most cases, including ecotourism in the monarch butterfly and gray whale reserves, such efforts have centered on species already threatened or endangered, and the wildlife components of such projects typically include efforts to gain the cooperation of local residents in the protection of endangered species, rather than to resolve wider issues of wildlife exploitation.

In the Mapimí Biosphere Reserve, for example, researchers from the Institute of Ecology have attempted to discourage local harvest of the endangered desert tortoise. One instance in which residents apprehended and drove off outside poachers, and released the tortoises they had captured, is judged an important success of the program.<sup>69</sup> Another such project was initiated by the FLORUTIL project created by U.S. and Mexican researchers to protect rare arid-land plants in the border region. A nursery for threatened plants was initiated on ejidal lands in Tamaulipas in an area characterized by frequent plant extraction by foreign collectors. Part-time employment in

the nursery is offered to residents, some of which had been assisting the illegal collectors. Community education on the value of the plants and their threatened status has reportedly contributed to reduced local cooperation to outside collectors.<sup>70</sup>

A number of socioeconomic programs have also been added to the The Black Sea Turtle Recovery Program assumed in 1982 by researchers from the University of Michoacan. Initially, the cooperation of local fishermen was sought in poaching reduction, beach protection, and the relocation of eggs to hatcheries. Local development activities were initiated in 1986, beginning with a program of environmental education and the promotion of local native handicrafts. Ecotourism based on the sea turtles was initiated in 1989, with revenues going to a local fund for community improvements. The development of alternative food sources was begun in 1985 with a pilot project to promote family vegetable gardens with the assistance of local schoolteachers. In 1988, research was also initiated for a pilot project for captive breeding of green iguanas, locally depleted by overhunting. Although still in the research stage, the goal of the project is to release iguanas for repopulation in the wild, with surplus to be provided to residents for subsistence consumption. Research on the black iguana has been initiated more recently due to its greater popularity among local consumers.<sup>71</sup>

To date, most of the NGO, university, and other programs oriented toward consumptive wildlife use have attempted to foster intensive production of wildlife. As early as 1968, for example, the Instituto de Historia Natural of Chiapas, with funding from WWF-US, began experimenting with crocodile farming for purposes of bolstering wild populations.<sup>72</sup> Other captive breeding programs have since been undertaken by INH, INIREB, and the Tuxtla Gutierrez Zoo for peccaries, agoutis, pacas, and ocellated turkeys.<sup>73</sup> Conservation International and Biocenosis are currently exploring options for farming freshwater turtles in Chiapas and butterflies in los Chimalapas, Calakmul, and Montes Azules.<sup>74</sup> No intensive production programs have yet, however, been implemented at the community level.

Only recently have non-governmental organizations begun to address the problems of extensive wildlife management by local communities. As discussed in Chapter 6, three such programs are currently underway. In the Sian Ka'an Biosphere Reserve, the NGO Amigos de Sian Ka'an has initiated research on traditional hunting and wildlife status in twelve Mayan communities in an effort to determine and improve the sustainability of subsistence hunting in the zone. Pronatura-Yucatan and Ecósfera have initiated a similar program in a single ejido in Campeche. Biocenosis, in cooperation with the Plan Piloto Forestal and with

funding from the MacArthur Foundation, has provided technical and managerial assistance to another ejido in Campeche for the purpose of establishing hunting quotas and other management measures and to develop recreational hunting and wildlife-based ecotourism. Although these programs are still in the early stages of implementation, they have succeeded in generating interest both within targeted communities and elsewhere. For example, several additional ejidos associated with the Plan Piloto have expressed interest in initiating wildlife management programs, and the National Indigenous Institute now plans to cooperate with Biocenosis and Pronatura in hunting and wildlife tourism programs in other forestry ejidos.<sup>75</sup>

The future success of these programs and their ability to generate an impact outside a handful of individual communities depends, however, on several factors. One is the ability of NGOs to successfully formulate and implement the pilot programs themselves. The other is whether, and the extent to which, NGO efforts can either contribute to wider policy changes or serve as a substitute for government involvement in wildlife management.

Initial experience with community wildlife projects highlights a number of shared administrative and implementation problems which must be addressed if projects are to have any lasting impact. One of the most fundamental of these is that all the wildlife projects described above

have been developed and implemented by biologists, zoologists, and other natural scientists lacking experience in community development issues. Projects by NGOs and research institutions continue to be conceived and designed without significant input from targeted populations. In the consumptive wildlife projects in particular, research has tended to emphasize problems of wildlife abundance and ecology rather than the socioeconomic aspects of exploitation. Typically, only one or two non-resident personnel are available to implement the program, limiting possibilities for ongoing communication with residents and the development or adaptation of community institutions for the implementation of project recommendations.

Contributing to these shortcomings is the short duration of many wildlife programs, even those developed by organizations with an established presence in a given area. The Amigos de Sian Ka'an project, for example, was planned for only twelve to eighteen months, while that conducted by Ecósfera extended for a single year. The Biocenosis project was planned for two years, but was extended in 1992. The short-term nature of many of these projects is critical due to the role of NGOs in project management and the difficulty of devolving management responsibility to local communities. The first two projects, for example, leave no technical capacity within the community, and the sport hunting

component of the Biocenosis project is dependent on NGO solicitation and transportation of sport hunters to the site.

Another consistent problem is a failure to address the regional and national contexts of local hunting. While programs oriented toward endangered and threatened species include anti-poaching efforts, those addressed to consumptive wildlife use have made little attempt to assess the impact of outside hunters, despite evidence in all three of incursions by sport and market hunters. Time and personnel limitations prevent project modifications when such problems become apparent and prevent the expansion of project goals to include cooperation with surrounding communities, other wildlife users, or state agencies. There has thus been no effort to enlist the assistance of government agencies in enforcing local restrictions and excluding outside hunters, or to establish cooperation with surrounding communities to jointly regulate or enforce local and outside wildlife use. More general efforts to influence government hunting policies are similarly absent.

These administrative problems have been aggravated by a lack of communication or cooperation between individual NGOs and projects, in turn a result of differences in strategy and competition and conflict over funding and authority. For example, Pronatura and Biocenosis compete for government recognition in the management of the Calakmul reserve, while Ecósfera has been excluded from many

conservation activities in Chiapas by the entry of Conservation International, precluding communication between two community wildlife projects in the same state. There is also no cooperation between Ecósfera and Amigos de Sian Ka'an, the director of which is also a member of Biocenosis.

The ability of NGOs and research institutions to compensate for weak government capacity in wildlife management is thus limited even within the handful of communities now targeted by programs on sustainable wildlife use. Despite apparent community interest in such programs, the critical requirements of community participation have been left unaddressed. Recommendations for community management are not based on a thorough understanding of local wildlife use or its relationship to other productive activities, local institutional and technical capacity have not been developed, no effort has been made to address the exclusion of outside hunters, and no communication or cooperation has been established with federal agencies.

These problems stem from several general constraints on the development of environmental NGOs in Mexico. One problem affecting a number of NGOs is that a widespread perception of government ineffectiveness, fear of cooptation, or simply the difficulty of working with federal and state bureaucracies leads them to minimize contact with government management agencies. Thus, community wildlife projects dealing with subsistence and sport hunting have not

attempted to enlist government assistance through changes in regulatory or permit requirements or assistance in controlling outside hunters.

A related limitation on NGO activity is the dependence of field activities on continued government approval and cooperation. Federal permits are required for all research activities and for entry and activity within protected areas. Authorization for these activities, as in other regulatory activities, is subject to the arbitrary rule of a few high-level personnel in Mexico City, and conflict with government agencies is quickly translated into refusal to grant necessary permits. In cases where species or habitat conservation is highly politicized, NGOs enter the fray only at high risk to present and future activities. Thus, for example, most of Mexico's NGOs have been silent on the controversial issue of incidental mortality of dolphins in the tuna fishery, and Pronatura's socioeconomic research on sea turtle exploitation ceased when the closure of the fishery became a national and international issue.

These problems are aggravated by the dependence of environmental NGOs as well as universities and research institutions on government support and contracts to support organizational and program continuity. On the one hand, the development of organizations contributing to the conservation of specific protected areas has been fostered by the dependence of government agencies on decentralized

institutions to manage these areas and the consequent availability of government funding for the development of management plans and other activities. The activities of Monarca, Pronatura, Conservation International, Biocenosis, Amigos de Sian Ka'an, and the Instituto de Ecología are thus centered on protected areas management. Again, however, reliance on government support leads to susceptibility to government priorities and constrains the ability of such organizations to criticize governmental policy and performance. The focus on protected areas also by nature creates a bias toward research and protection rather than resource development.

Dependence on government funding, permits, and goodwill thus tends to encourage NGOs to work within existing constraints rather than to actively confront problems of government policy and performance. This is especially evident in the case of Pronatura and Conservation International, the largest and most active NGOs working with wildlife in Mexico. Their influence stems from different but highly effective strategies. In the case of Pronatura, many of Mexico's outstanding industrial and commercial leaders have been involved in the creation of the organization and serve on its board of directors. The organization has worked closely with federal and state environmental agencies, signing cooperative agreements with SEDUE which allow it to support salary and equipment needs

for government personnel in protected areas, and its tenth anniversary was celebrated in 1991 at the home of Mexico's President.<sup>76</sup> Pronatura was also the first Mexican NGO to negotiate a debt-for-nature swap of up to \$3 million for institutional and project support, although the swap has not yet been implemented.<sup>77</sup>

Conservation International is a U.S.-based NGO which recently opened an office in Mexico City after concluding a \$4 million debt-for-nature swap. The swap supports CI's organizational and program budget, but also provides infrastructural support to a number of state institutions, including UNAM's Centro de Ecologia, Chiapas' Institute of Natural History, the Monterrey Institute of Technology, and the Center for Biological Research of Baja California Sur, in the form of Conservation Data Centers and rehabilitation of the Chajul research station in the Montes Azules reserve.

Other organizations depend mostly on short-term grants from external donors. Project continuity is therefore highly susceptible both to the interest of outside organizations in funding individual proposals and to direct suggestions that specific activities be undertaken. As discussed further in the following chapter, this has in many cases encouraged Mexican organizations to work more closely with communities and residents. It has also, however, contributed to general failures to develop long-term

institutional capacity to address problems of human development and resource exploitation.

Not only is project continuity difficult to achieve, but few organizations have hired permanent personnel trained either in social sciences and development or in wildlife management. In the latter case, outside researchers or organizations are temporarily contracted for the implementation of specific projects, rather than developing experience in a given region and being available to provide continued technical and planning assistance. Biocenosis, with some five permanent members, is one of Mexico's most experienced organizations in the field of wildlife conservation and management, but is hired only on a consulting basis for wildlife projects as well as the development of protected area management plans, ecotourism feasibility studies, and other programs. Conservation International has relied on Biocenosis and other outside researchers for the development of its ecotourism, butterfly farming, and river turtle programs. Pronatura has contracted outside researchers for wildlife studies in the Calakmul reserve, and with Ecósfera for the one-year project to study subsistence hunting. In other cases, socioeconomic research and community development programs have merely been temporarily added to the responsibilities of normal natural science staff.<sup>78</sup>

Currently, then, universities, research institutions, and NGOs involved in the field not only possess limited capacity and autonomy to foster sustainable wildlife exploitation, but have also been reluctant to undertake the type of political involvement which is needed to achieve significant modifications in official policy. The functions of public advocacy have instead been assumed by researchers and organizations oriented toward the absolute protection of wildlife, contributing to the tendency of federal agencies to address the technical and infrastructural requirements of wildlife preservation rather than the social and economic causes underlying widespread problems of wildlife overexploitation.

#### Conclusion

The importance of wildlife resources to the rural poor, and the need to incorporate human uses into conservation planning, have been recognized rhetorically by management agencies but have not been reflected in agency budgets or activities. The common reference to weak state regulatory and management capacity in developing countries offers an inadequate explanation for this neglect, for it ignores the fact that the state channels those resources at hand toward selective interests. Sport hunting and large commercial interests have traditionally been the beneficiaries of state research, management, and regulatory effort. The environmental lobby represents a newer but no

less privileged interest group, one which has reinforced a focus on protected areas, zoos, and captive breeding facilities as the necessary mechanisms of conservation.

Only in a few isolated cases has the environmental lobby used its newfound influence to link wildlife conservation with rural development. The extent to which these NGO initiatives create policy openings for underprivileged resource users is presently limited, however, due to mutual mistrust among the state, resource users, and environmentalists. The following chapter examines whether the representation of rural development needs in conservation policy and planning has fared any better at the international level.

#### Notes

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76. "PRONATURA, A.C., X Aniversario," Boletín Extraordinario I, no. 1 (1991): 1-8.

77. "PRONATURA: Primera Asociación Conservacionista en Obtener un Swap," Ocelotl VIII, no. 3 (July-September 1991): 1-2; Hans Hermann, Director, PRONATURA, Mexico City, interviewed 20 March 1992.

78. Many of these weaknesses and constraints are reiterated in another external review of NGO performance in incorporating local residents in conservation and management of buffer zones surrounding protected areas. An evaluation of projects conducted by Amigos de Sian Ka'an concluded that

The Amigos de Sian Ka'an's rural development activities are small and recent...Plans for expansion, even if successful, would still be too small to change the surrounding communities enough to affect the

reserve. Amigos de Sian Ka'an is working with local communities, but has not developed a strategy for building local institutions. Amigos de Sian Ka'an's relationship to the reserve is unclear; the Mexican government has demonstrated little interest in encouraging local participation or nongovernmental organization involvement in reserve management. Staff turnover is high and has undoubtedly affected progress. (Michael Wells and Katrina Brandon, with Lee Hannah, People and Parks: Linking Protected Area Management with Local Communities (Washington, D.C.: World Bank, WWF, and USAID, 1992), 95.)

Evaluation of Monarca's progress revealed similar problems:

Monarca, A.C.'s major accomplishments have been its successful lobbying for the creation of the overwintering reserves and promoting tourism. Its rural development activities have not led to predicted results, however, in part because the scale is too small and Monarca lacks the socioeconomic information needed for project planning and implementation. Although local people receive some tourism revenues, which have been increasing, the revenues have not provided sufficient incentive to halt deforestation. Local people have not been involved in decision-making and no local institutions have been established to manage the tourism. That Monarca, A.C. maintains offices only in Mexico City--to lobby the government and to conduct public relations on the butterflies and fund-raising--complicates its work in rural areas. The nursery program has had technical problems and has not been able to produce seedlings at expected rates. Threats to the reserves are extremely high and have not been affected by the project. Virtually none of the integrated rural development plan prepared by the government was implemented, and the government has not had any significant role. Monarca, A.C.'s relationship with the government on reserve management is unclear, but often strained. (Michael Wells and Katrina Brandon, with Lee Hannah, People and Parks, 92-93.)

CHAPTER 10  
WILDLIFE POLITICS AND POLICY:  
INTERNATIONAL DIMENSIONS

Introduction

Decades of nationalism and inward-looking economic development policies long limited the development of cooperative relationships between Mexico and the developed world, particularly its northern neighbor. During the 1980s and 1990s, however, the need for increased trade, investment, and assistance to permit economic recovery led to a reversal in Mexican foreign as well as domestic policy. Accession to the GATT in 1986, the restructuring of Mexico's external debt under the Brady Plan, and negotiation of the NAFTA with the United States and Canada have succeeded in rapidly promoting the interest and confidence of foreign investors, multilateral development banks, and trading partners in Mexican development.

Mexico's opening to the outside world comes at a time when international attention is focused on the ecological consequences of trade, aid, and investment. Pressure from environmental groups has achieved significant and ongoing reforms of the World Bank's environmental policies and performance,<sup>1</sup> and contributed to the creation of funding

mechanisms for environmental protection. The United States and the European Community now require environmental impact statements as requirements for their support for development assistance projects. The perceived role of the debt crisis in reducing government budgets for environment and encouraging unsustainable natural resource-based export industries has fostered the growth of debt-for-nature swaps as a mechanism for the financing of conservation activities. Trade sanctions have also been urged, and employed, against destructive fisheries technology and forestry practices,<sup>2</sup> while pressures are building to incorporate trade-environment linkages and conflicts within the framework of the GATT.<sup>3</sup>

Bilateral and multilateral assistance organizations have responded by incorporating environmental components into assistance packages, and in a growing number of cases offer assistance exclusively for the alleviation of environmental problems in the developing world. The World Bank, for example, has expanded its loan portfolio to include a number of programs to enhance the capacity of governments in developing countries to manage and protect environment and natural resources. The Bank, together with the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP), also serves as the administering body for the Global Environment Facility, a multilateral environmental assistance mechanism which will

provide more than US\$1 billion in grants or concessional financing to reduce global warming and ozone depletion, address land degradation, conserve biodiversity, and protect international waters.<sup>4</sup> The GEF was also designated as the interim financial mechanism for administering the climate change and biodiversity conventions drawn up at the 1992 United Nations Conference on Environment and Development (UNCED), as well as increased bilateral funding announced during UNCED.<sup>5</sup>

Mexico's outward-oriented drive for economic growth and development is therefore occurring in a context which both requires demonstrations of environmental commitment as a condition for trade and assistance and rewards such commitment with ever-increasing levels of assistance for environment itself. Mexico's economic opening has indeed been accompanied by growing participation in international efforts to address problems of transboundary pollution, ozone depletion, global warming, and biodiversity loss. Mexico acceded to the 1987 Vienna Convention for the Protection of the Ozone Layer, was the first nation to ratify the 1987 Montreal Protocol on Ozone-Depleting Substances, and has participated actively on the Intergovernmental Panel on Climate Change.

Particularly important for environmental protection efforts in Mexico has been renewed lending for environment as well as development by the multilateral development

banks, and the process of negotiating free trade with the United States. Negotiations on NAFTA has subjected Mexico to the United States' non-trade agenda as well, on which environment features prominently.<sup>6</sup> Several cooperative agreements on transboundary pollution and hazardous substances control were signed in the 1980s, but these issues came under closer scrutiny in the late 1980s. Although both governments were reluctant to incorporate critical environmental issues in official trade negotiations,<sup>7</sup> sub-national interest groups in both countries pursued the issue and forced official attention to environmental problems on both sides of the border.<sup>8</sup> Specific concerns have focused on environmental pollution in the borderlands, differential environmental standards for traded goods, and the potential erosion of domestic environmental standards as a result of the harmonization of trade standards.<sup>9</sup>

Official sensitivity to these pressures is revealed by a number of actions taken in both countries. These include the negotiation of the Border Environmental Plan, with Mexico planning funding of \$640 million over three years and a commitment of nearly \$250 million from the United States for 1993 alone<sup>10</sup>, and the establishment of a permanent Environmental Protection Agency presence within the U.S. Embassy in Mexico City. President Salinas has also attempted to demonstrate his commitment to environmental

protection with a series of permanent or temporary closures of industries failing to meet environmental standards and a promise that regulatory and enforcement improvements would prevent Mexico from becoming a safe haven for polluting industries relocating from the United States.<sup>11</sup> Mexico has solicited U.S. and other foreign assistance in addressing urban and industrial environmental problems and increasing transfers of pollution-control technology.<sup>12</sup>

Mexico's proximity to the United States has long encouraged U.S. interest in shared wildlife conservation problems, an interest which increased with the rise of U.S. NGO activity in the 1980s. The negotiation of NAFTA and increased NGO attention to cross-border environmental issues has also boosted both official and NGO assistance for natural resource management and biodiversity conservation due to Mexico's priority status among U.S. donors. To a lesser extent, the NAFTA has also encouraged Canadian environmental assistance to Mexico.<sup>13</sup>

Ideally, these events should increase both the importance of environmental issues, including biodiversity and wildlife conservation, on Mexico's official policy agendas and the availability of funding and other resources for the implementation of appropriate policies. Actual results, however, are conditioned by several additional considerations. One is the extent to which policy influences and funding reflect Mexican problems, needs and

priorities rather than merely the outcome of political processes within donor countries and organizations. It also matters whether policy changes reflect real political and institutional commitments rather than temporary responses to short-lived publicity campaigns.

Also of particular importance to natural resource and biodiversity issues is the nature of the assistance provided. The World Bank and its affiliates, for example, have been widely criticized for funding ill-conceived development projects with highly negative human and environmental costs.<sup>14</sup> Environmental projects funded by the World Bank and the regional development banks have not been immune from these problems; a recent internal evaluation found a 150 percent increase in the number of 'problem projects' over the last decade, now totaling 42 percent of agricultural projects, 43 percent of water supply projects, and 30 percent of environmental projects.<sup>15</sup> The Bank's performance as GEF administrator, and suitability for administering funding under the new UNCED conventions, has also come under attack. Among the key problems faced are the dominant role of Bank staff and developed-country donors in strategic and project planning, continued emphasis on "funding large-scale 'projects' that are developed and managed in large part by expatriate 'experts' in a limited time frame,"<sup>16</sup> the continued weakness of local

participation and capacity-building, and the exclusion of NGOs from project planning and implementation.<sup>17</sup>

The performance of the NGOs themselves has not been evaluated, despite their growing involvement in implementation of bilateral and multilateral funding programs.<sup>18</sup> NGOs have also been charged with implementing a large portion of official U.S. assistance for biodiversity conservation. Although U.S. bilateral environmental assistance has not been subject to the intense scrutiny faced by the World Bank, the political motivations of wildlife conservation assistance to Mexico have been challenged in recent efforts to resist U.S. tuna and shrimp embargoes. Both the politics of U.S. assistance and its effects on NGO implementers thus merit closer examination.

#### Influences from the United States

As one observer put it, "For Mexico, the global economic system is, in large measure, the United States."<sup>19</sup> Much the same could be said for the 'global conservation system.' Indeed, one of the oldest and most consistent influences on Mexican wildlife management and conservation policy has been the experience of wildlife conservation in the United States. In many cases, this experience has been transmitted through formal and informal cooperation between wildlife agencies, research institutions, and non-governmental organizations, particularly in the border region. For example, the landmark work on Mexican wildlife

remains that published in 1959 by an American zoologist from the University of California. U.S.-based institutions and networks such as University of California at San Diego, the University of Arizona, the University of New Mexico, the University of Texas, the Arizona-Sonora Desert Museum, and the FLORUTIL Conservation Program continue to share and develop extensive contact and research collaboration with Mexican state universities and research and conservation institutions such as the Center of Ecology of UNAM and the Center of Ecology of Sonora.

Mexican wildlife managers have long looked to the U.S. Fish and Wildlife Service (USFWS) as their model of a modern, effective management agency, and to U.S. sport hunting management as the means of generating revenues with which to build such an agency.<sup>20</sup> One of the earliest expressions of this influence is indeed the Federal Hunting Law, with its exclusive authorization and regulation of sport hunting. The United States has also engaged in direct attempts to influence Mexican hunting and conservation practice in an effort to protect species native to, and often migrating between, the two countries, including the pronghorn antelope and migratory birds.<sup>21</sup> In the 1950s, the U.S. penchant for predator control to prevent threats to domestic livestock and boost game populations was transmitted to Mexico in the form of USFWS assistance to

Mexican government efforts to reduce coyote and wolf populations in northern Mexico.<sup>22</sup>

U.S. concern over the status of migratory waterfowl led in 1936 to a more formal attempt to influence Mexican protections through the signing of a Treaty for the Protection of Migratory Birds and Game Mammals.<sup>23</sup> In most respects, the treaty is similar to migratory bird agreements negotiated with Canada, Japan, and the former Soviet Union. The treaty prohibited commercial trade in migratory waterfowl by both parties and sport hunting of those species listed under the treaty, whose numbers were expanded under a 1972 exchange of letters (see Appendix D). The treaty also, however, contains an agreement to require valid hunting permits for the transportation of hunting trophies across national borders. Although wildlife conservation was not a high government priority during this period, significant efforts were made in Mexico in the 1930s and 1940s to enforce this prohibition against a significant domestic commerce, and to curtail the export of ducks from Mexico to the United States.<sup>24</sup>

The passage of the U.S. Endangered Species Acts of 1969 and 1973 encouraged cooperative efforts for wildlife conservation by authorizing the USFWS to provide training, education, and research assistance for wildlife conservation abroad, and specifically under the 1940 Convention on Nature Protection and Wildlife Preservation in the Western

Hemisphere. Support to Latin American wildlife conservation includes the individual fellowships, training materials, and short-term training seminars for Latin American wildlife researchers and managers. Seminars were at first held in the United States, but were transferred to Latin American sites beginning in 1986. Between 1980 and 1989, 28 Mexican biologists and administrators attended these seminars.<sup>25</sup>

The USFWS, along with WWF-US, the German Academic Exchange Service, Jessie Smith Noyes Foundation, and the Organization of American States (OAS), also provides funding for Latin America's first graduate program in wildlife management, established by the Regional Wildlife Management Program for Mesoamerica and the Caribbean at the National University in Costa Rica, in which Mexican students have enrolled, and for a related regional wildlife documentation center.<sup>26</sup> The USFWS, with Ducks Unlimited of Mexico, the Institute of Technology and Higher Studies of Monterrey and the Mexican government, also sponsors the annual training seminar RESERVA, or "Management and Conservation of Protected Areas in Latin America," initiated in 1988 and focusing on problems of protected areas management. Between 1988 and 1991, five courses were held with the participation of seven Mexican professionals, six of which were personnel of SEDUE.<sup>27</sup> Regional workshops, training seminars, and conferences on protected areas management are also sponsored by the U.S. National Parks Service and the U.S. Forest

Service, and the National Parks Service recently established a Mexican Affairs Office to coordinate expanded cooperation in training and the establishment of cross-border reserves.

In 1975, the U.S.-Mexico Joint Agreement on Wildlife Conservation was signed, and the USA-Mexico Joint Committee on Wildlife Conservation created to coordinate research and conservation efforts. The Joint Committee meets annually to agree on activities to be undertaken jointly, usually involving U.S. funding for Mexican or collaborative research on individual species. Generally, cooperative projects have involved basic research on species migrating between or native to both countries, particularly sea turtles and migratory waterfowl and other game birds. Much of the funding, totaling roughly \$175,000 in 1991-92, is also focused on endangered mammal, bird, fish, and plant species of the border region (including the now-endangered Mexican wolf). In some cases, research has been linked to efforts to bolster U.S. populations of species abundant in Mexico, such as wild turkeys and bobwhite quail, or to transfer animals such as pronghorn antelope, white-tailed deer, and desert bighorn sheep to Mexico.<sup>28</sup>

The U.S.-Mexico Joint Committee has also served as a forum for discussion of problems in wildlife trade control,<sup>29</sup> and in 1988, the Joint Committee signed an Accord for the Control of Traffic in Wild Species of Flora and Fauna stipulating procedures for information exchange,

trade documentation, and return of confiscated specimens. The USFWS provides training seminars and informational materials on wildlife identification, law enforcement, and inspection to Mexican personnel.<sup>30</sup> The Joint Committee also served as a channel for U.S. pressures for Mexican accession to CITES and for training and assistance in its implementation.

A series of recent agreements and legislative initiatives have also expanded U.S. participation in migratory bird conservation in Mexico. The United States and Canada have long cooperated in migratory bird conservation under the 1915 Migratory Bird Treaty, and in 1986, the North American Waterfowl Management Plan (NAWMP) was signed by the two countries to maintain and increase waterfowl populations through management and conservation of birds and their wetland habitats. Among the goals of the plan is an increase in sport hunting opportunities from 1.8 million hunters and 14.9 million ducks in 1982 (80 percent of which were harvested by U.S. hunters) to 2.2 million hunters and 20 million ducks in the year 2000. The agreement specifically encourages the participation of NGOs and joint ventures between private and governmental organizations to finance conservation activities.<sup>31</sup>

The NAWMP recognized that because many of the migratory birds to be protected under the plan also depended on seasonal stays in Mexico, wetlands protection programs were

needed in that country as well. Furthermore, although commercial hunting had largely been controlled and sport hunting of migratory waterfowl is much less intensive in Mexico than its northern neighbors,<sup>32</sup> sport hunting by U.S. citizens in Mexico is responsible for a significant harvest. However, no data were available on Mexican waterfowl harvests, potentially undermining U.S. and Canadian harvest management programs. Although Mexico does not participate formally in the NAWMP, informal collaboration was established in 1988 when the United States, Canada, and Mexico signed a tripartite agreement to encourage and coordinate the conservation of migratory birds and wetlands in North America.<sup>33</sup> Mexican participation in the NAWMP is likely to be proposed at the 1995 review of the NAWMP.<sup>34</sup>

The 1988 Tripartite Agreement recognized Mexico's need for assistance in training, infrastructure development, habitat conservation, and "implementing alternative productive projects for rural communities compatible with the conservation and management of wetlands and wintering sites." The U.S. North American Wetlands Conservation Act (NAWCA) of 1989 required that at least 50 percent and not more than 70 percent of U.S. funding under the NAWCA be directed to projects in Canada and Mexico. Projects in these countries must be provided with matching funds by U.S. non-federal sources.<sup>35</sup>

In order to aid implementation of the agreement, Mexico submitted in 1991 a priority list of wetlands of importance to waterfowl. Projects were initiated in 1989 in four of these areas, with 1990 projects expanded to include twelve wetland areas. In 1991, USFWS announced that funding to Mexico would increase to some \$1 million annually. The USFWS and now the CWS conduct aerial surveys of domestic and overwintering waterfowl, and USFWS funding under the Joint Committee has recently been authorized in conjunction with the Tripartite Agreement for the initiation of waterfowl harvest surveys in Mexico, which will provide needed and presently unavailable information on sport hunting in Mexico. Surveys already completed in Sinaloa and Yucatan found that 2,485 hunters, more than 90 percent of them from the United States, harvested 32,890 waterfowl in Sinaloa in 1989-90, compared to 480 hunters, only 15% of them Americans, taking 5,225 waterfowl in Yucatan.<sup>36</sup> The Canadian Wildlife Service (CWS) has also allocated some \$30,000 to \$40,000 annually to projects in Mexico under the Tripartite Agreement, with five projects initiated or planned by the end of 1991.<sup>37</sup>

U.S. assistance for other wildlands and wildlife conservation activities in Mexico has increased rapidly in recent years, in large part a result of a 1983 amendment to the U.S. Foreign Assistance Act. Section 119 directs federal agencies to contribute to the conservation of

biological diversity in developing countries by offering development assistance for habit and wildlife management and conservation. To guide this effort, USAID was directed to collaborate with other federal agencies in the preparation of a biodiversity conservation strategy, presented in 1985, and in the submission of annual reports to Congress on federal implementation of the law. The U.S. Congress' Office of Technology Assessment was also directed to prepare a report on biodiversity conservation strategies, which was released in 1987.<sup>38</sup> In 1986, a new Section 118 was added to require greater attention to the conservation of tropical forests, and \$2.5 million in new funding was earmarked for the initiation of biodiversity projects, with emphasis on the management of wildlife refuges and protected areas, anti-poaching measures, and the scientific study of plant and animal species, to be carried out by non-governmental organizations in consultation with local residents.<sup>39</sup>

In 1987, USAID funding for biodiversity totaled \$4.89 million, including new funding of some \$3.52 million for 21 projects, many of them expanded through matching grants. An additional \$56.2 million was channeled to tropical forestry conservation and management.<sup>40</sup> Funding for biodiversity conservation increased to \$12.3 million in 1988 and \$17.9 million in 1989, with tropical forestry projects receiving \$50.2 million and \$76.8 million, respectively.<sup>41</sup> Part of this funding was channeled through the WWF-US Wildlands and

Human Needs Program. The 1990 Foreign Assistance Appropriations Act earmarked \$10 million for biodiversity activities, \$2 million of which is to be channeled through the Nature Conservancy's Parks in Peril program.<sup>42</sup>

The environmental mission of USAID was further expanded in 1990 by a Congressional mandate to address global climate change and the earmarking of \$15 million of the FY1990 budget to address greenhouse gas emissions and the destruction of tropical forests in "key" low and middle income countries, including Mexico.<sup>43</sup> Total agency funding for biodiversity reached \$53 million in 1990 and \$71.6 million in 1991, while tropical forestry received \$109 million and \$125.1 million. Funding for conservation in Mexico and Latin America was channeled not only through the Parks in Peril program, but also through a \$500,000 grant to the U.S. National Fish and Wildlife Foundation to establish a project for the conservation of neotropical migratory birds.<sup>44</sup> At the 1992 UNCED, President Bush committed the United States to increasing forestry assistance from \$150 million to \$270 million in the following year.<sup>45</sup>

Mexico has been a major beneficiary of USAID biodiversity and other initiatives. A legislatively-directed focus on tropical forests and biodiversity, as well as the need to work through NGOs already active in the relevant fields, all point to cumulative investment in tropical southern Mexico. Eight priority wildlands have

been selected for funding: Ría Celestun and Ría Lagartos in Yucatan, Calakmul in Campeche, Sian Ka'an in Quintana Roo, El Ocote, El Triunfo, and Montes Azules in Chiapas, and the Chimalapas in Oaxaca. With the exception of the Chimalapas, all of these sites are established protected areas. USAID funding is to be channeled to these areas through the Nature Conservancy's Parks in Peril Program, Conservation International, and the Biodiversity Support Program coordinated by WWF-US with participation by the Nature Conservancy and the World Resources Institute.

Despite the multiplicity of U.S. assistance programs for wildlife conservation in Mexico, the dominant issues on the bilateral agenda in the 1990s have been the protection of sea turtles and the incidental capture of dolphins in the purse-seine tuna fishery in the Eastern Pacific Ocean. Following an extended domestic conflict over the required use of turtle excluder devices (TEDs) by shrimp trawlers, the U.S. in 1989 passed legislation mandating shrimp embargoes against nations failing to implement effective sea turtle conservation policies. In 1990, Mexico responded by declaring a legal end to its Pacific coast sea turtle fishery and expanding nationwide research and protection efforts for nesting sea turtles, which had been ongoing for several years with assistance from the USFWS. A national program of research on TED use and design was also begun in earnest in the 1990-91 season, with gear and training

provided with funding from USAID. High-level diplomatic conflict has continued, however, because the threat of an embargo remains if Mexico does not institute a program of mandatory TED use by 1993, and U.S. NGOs have sued to obtain an earlier embargo declaration.

A similar conflict arose in the Eastern Pacific tuna fishery when in 1988 the U.S. passed legislation mandating tuna embargoes against nations lacking dolphin conservation programs comparable to those of the U.S. Successful NGO litigation forced a U.S. embargo against Mexico in 1990. To resolve the dispute, Mexico issued a ten-point program for the conservation of marine mammals and the reduction of incidental dolphin mortality in the tuna fishery, with a commitment of \$1 million for gear research alone.<sup>46</sup> As part of the program's implementation, USAID has offered assistance in the training of on-board observers by U.S. National Marine Fisheries Service (NMFS) personnel.

#### NGO Programs in Mexico

Despite the rapid growth in official U.S. assistance for biodiversity conservation in developing countries, a recent survey of U.S. biodiversity funding reported that non-governmental sources actually provided more assistance. While the U.S. government provided \$23,137,285 to developing countries, foundations channeled \$21,365,612 into biodiversity conservation, NGOs an additional \$9,821,291, and other sources such as universities and zoos \$543,984,

with an additional \$8,068,241 in foreign assistance supported by multiple donors. Furthermore, the majority of programs focused on habitat and species management are funded by NGOs and private foundations.<sup>47</sup>

Much of this non-governmental assistance continues to be provided either for basic research or for specialized technical training. Such assistance is offered to Mexico, for example, by Wildlife Preservation Trust International, Smithsonian Institution, the U.S. National Zoo, the New York Zoological Society, and the Wildlife Conservation Society.<sup>48</sup> Several U.S. and international NGOs have, however, begun to implement programs aimed at the human and management dimensions of wildlife and habitat conservation.

One example is World Wildlife Fund's Wildlands and Human Needs Program (WHNP), targeted specifically toward protected areas in the tropics and partially funded from 1985 to 1993 by a matching grant agreement with USAID. The WHNP in turn provides funding and technical and managerial assistance to local NGOs or research institutions for research, project design, and implementation of sustainable resource development programs for communities surrounding protected areas. In Mexico, WHNP funding has supported researchers from the University of Guadalajara in research and project initiation for rural development in the region of the Manatlán Biosphere Reserve, and the NGO Amigos de

Sian Ka'an working in the Sian Ka'an Biosphere Reserve.<sup>49</sup>

In the latter case, WHNP funding has been used for research on human exploitation of fisheries and wildlife, including a project to survey Mayan hunting in the vicinity of the reserve and to suggest wildlife management activities to be undertaken by local ejidos.

The goals and strategies of the WHNP are reflected in other WWF assistance projects in Mexico. These projects include the Pronatura wildlife project in Calakmul and Monarca's efforts to organize a reserve planning workshop which eventually led to collaboration with SEDUE in ecotourism development. Later assistance to Monarca has included funding for the publication of educational materials for local school children and for adult workshops on practical skills such as woodworking and mechanics. Funding from WWF-US also supported the University of Michoacan program to develop economic alternatives for coastal communities in connection with the Black Sea Turtle Recovery Program, feasibility studies for ecotourism development in the Chiapas reserve of El Triunfo. WWF-US has been active in proposals to establish a biosphere reserve in Los Chimalapas, Oaxaca, and has provided support to Biocenosis for socioeconomic surveys and the development of a management plan for the zone. In 1991, WWF and SEDUE agreed to a pilot debt-for-nature swap to support conservation planning in Oaxaca and Chiapas and to provide

technical assistance to SEDUE in the regulation of international wildlife trade.<sup>50</sup>

The John D. and Catherine T. MacArthur Foundation's World Environment and Resources Program has also emphasized sustainable development activities supporting biodiversity conservation in the tropics. From 1986 to 1989, \$4,463,000 in grants were made to a variety of U.S. and Mexican organizations, including Monarca, A.C. for protection of Monarch butterfly overwintering sites, Amigos de Sian Ka'an for sustainable development programs in the Sian Ka'an Reserve, and Biocenosis for the preparation of a conservation program for the Calakmul Biosphere Reserve.<sup>51</sup>

Most of MacArthur's grants to Mexico have been provided in two rounds under the "Maya Forest" Program. The first round of grants, approved in 1989, was channeled primarily through WWF and Conservation International (CI) for distribution as seed grants to local organizations working in Quintana Roo, Chiapas, and Oaxaca, but included a direct grant to the Sociedad de Productores Forestales de Quintana Roo. The second round, approved in late 1992 and totalling \$3,155,000, emphasizes direct support of local organizations.<sup>52</sup> Three-year grants have been awarded to the Plan Piloto Forestal and to the Organización de Ejidos Productores Forestales de la Zona Maya, with which the Plan Piloto is working. Another cluster of grants have been awarded to CI and UNAM's Centro de Ecología for research,

planning, and development activities in the Montes Azules Biosphere Reserve, and to the Union de Ejidos la Selva for organic coffee production in the region of the reserve. In Oaxaca, the Foundation is supporting WWF programs and the development of a conservation and development plan by the U.S.-based Synergos Institute as well as the development of an environmental data center by the Instituto de la Naturaleza y la Sociedad en Oaxaca and the production of vegetation and land-use maps by the Sociedad para el Estudio de los Recursos Bióticos de Oaxaca. The Foundation is also providing financial support to the Unión de Ejidos Alfredo V. Bonfil in Tenosique, Tabasco.<sup>53</sup>

The Nature Conservancy's International Program has also targeted the Maya Forest region in projects for institutional strengthening of local conservation organizations and in the "Parks in Peril" program emphasizing development of infrastructure and management capacity. Training and small grants for institutional development and fundraising are provided to Pronatura-Yucatan, Amigos de Sian Ka'an, the Instituto de Historia Natural and its affiliate NGO FUNDAMAT in Chiapas, and the Centro de Ecología in Sonora, while the Parks in Peril program focuses on the Sian Ka'an and Calakmul Biosphere Reserves, the El Triunfo and El Ocote reserves in Chiapas, Ría Celestun and Ría Lagartos in Yucatan, the Piñacate

desert, and the la Encrucijada coastal wetland of Chiapas.<sup>54</sup>

The Nature Conservancy also supported the development of an environmental survey of Baja California, Chihuahua, and Sonora by Biocenosis in connection with CI's activities in the region.<sup>55</sup> Through the Mexico Borderlands Program, the TNC has also assisted U.S. and Mexican organizations in funding protection programs and habitat acquisition for endangered and threatened wildlife such as the pronghorn antelope and the ocelot.<sup>56</sup>

Mexico's first debt-for-nature swap was arranged by the U.S.-based CI. In February 1991, CI signed an agreement with Mexico's Secretariat of the Treasury to convert \$4 million in external debt over a period of four years. Funding for the swap has in turn been provided primarily by the MacArthur Foundation, with additional assistance from the Sequoyah Foundation, Bank of America, and USAID.<sup>57</sup>

The swap is to support CI operations and projects, including the development of a nationwide conservation data center by UNAM's Centro de Ecología, the establishment of a statewide data center for Chiapas for the Institute of Natural History, and the rehabilitation and operation of the Chajul Biological Station in the Montes Azules Biosphere Reserve. Small grants have also been made to Pronatura, the Fundación Miguel Aleman, and FUNDAMAT for conservation communications and education, and Biocenosis was contracted

by CI to conduct feasibility studies for ecotourism development and rural butterfly farming in the Selva Lacandona and ecotourism in in the state's El Ocote reserve. Conservation International also provided initial funding from a MacArthur Foundation grant to Biocenosis for the wildlife project associated with the Plan Piloto Forestal, for an environmental survey of Oaxaca, and for the development of a management plan for the proposed Chimalapas reserve. Support for conservation of the Sea of Cortez region, initiated by the Nature Conservancy but transferred along with key project personnel to CI, includes funding for the development of a conservation data center by the Center for Biological Research of La Paz and the Monterrey Institute of Technology of Guaymas.<sup>58</sup>

#### Mexican Participation in Multilateral Agreements

Until recently, Mexican participation in international environmental agreements has been relatively weak. Although Mexico joined the International Whaling Commission in 1949, the legal termination of its small, foreign-controlled whaling industry and the subsequent weakness of national conservation and management efforts meant that the IWC had little real impact on Mexican wildlife policy. Until the mid- to late-1980s, Mexico refused to accede to a growing number of treaties aimed at the conservation of wildlife and habitat, including the 1971 Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat

(Ramsar Convention), the 1972 Convention Concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention), the 1979 Bonn Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), and the 1973 Convention on International Trade in Endangered Species of Fauna and Flora (CITES).

Encouragement from the United States for Mexican efforts to conserve wetlands and migratory waterfowl contributed to Mexico's accession to the Ramsar Convention in 1986. Accession was accompanied by the required listing of one national wetlands area, Ria Lagartos, a Yucatan state wildlife refuge.<sup>59</sup> However, despite the presence of several important wetland zones on the Pacific, Gulf, and Caribbean coasts, no further listings have been made, reflecting an informal policy of not proposing any area lacking effective legal and management structures or areas already included in the federal protected areas system, which is considered to render Ramsar listing redundant.<sup>60</sup> Lack of further action under the convention may also reflect reliance on existing U.S. and Canadian assistance for wetlands and waterfowl conservation. However, while weak administrative capacity and bureaucratic lags slow the declaration of new areas, refusal to list established protected areas misses an opportunity to foster continuity of management and conservation and to encourage the provision of multilateral assistance for these areas.

Similar considerations blocked Mexican accession to CITES until 1990. Assessments by SEDUE of the possibility of accession during the mid-1980s concluded that Mexico lacked the legal instruments, infrastructure, and administrative capacity and coordination to implement the Convention. For example, national legislation provided no legal or regulatory basis for protection of non-game species or plants, authority over wildlife, fisheries, and forestry resources remained administratively fragmented, and available personnel were insufficient to monitor and enforce border controls. Furthermore, domestic regulations prohibiting most commercial trade in native wildlife species were considered to offer the most feasible option for protecting native species, and the majority of legal (as well as illegal) trade was with the United States, with which Mexico had established regular communication and cooperation through the Joint Committee on Wildlife Conservation.<sup>61</sup> A further, albeit unmentioned, obstacle to CITES accession was the continuing trade in sea turtles in contravention of CITES requirements and in the face of harsh international criticism. Mexican sea turtle exports were absorbed primarily by Japan, which had acceded to CITES but listed a national reservation permitting continued trade in sea turtle products.

A number of developments led to the 1990 presidential decision to accede to the Convention. By the late 1980s,

Mexico remained the only mainland country in Latin America to remain outside CITES, and this fact combined with weak enforcement structures meant that Mexico increasingly served as a channel for illegal wildlife products from Central and South America into the United States and Europe. The national ban on commercial wildlife trade in native species also failed to halt illegal exports, particularly of ornamental birds and plants. Mexico was thus subjected to increasing pressures from the USFWS and the U.S. State Department, the CITES Secretariat, WWF and WWF-US, and other U.S. and international NGOs to accede to and implement CITES. Pressure from the U.S. increased in the atmosphere surrounding the free trade negotiations.

SEDUE's administrative capacity had also improved somewhat by the late 1980s, as it had gradually wrested greater control of fishery and plant species from other secretariats and increased its authority to protect endangered and non-game species with the passage of the General Law of Ecological Equilibrium in 1988. Mexico's first official list of endangered and threatened animal and plant species was also under preparation, and would be released in early 1991.

The final push came again from the United States, in the form of the highly publicized controversy over the sea turtle fishery. In 1989, a major publicity campaign was directed by U.S. and international NGOs against Mexico's

turtle fishery, including a Greenpeace demonstration in London during a visit by Salinas and a mail-in campaign by Earth Island Institute which flooded government offices in Mexico with letters from concerned citizens. These efforts were matched within Mexico by a series of newspaper articles written by the Grupo de lo Cien detailing government failure to prevent illegal harvests and trade. In 1989 U.S. legislation was passed mandating an embargo against shrimp exports from any nation failing to implement effective sea turtle conservation programs, reinforcing embargo clauses added by the 1988 amendments to the Endangered Species Act. Mexico responded to these events in May 1990 by declaring a total and indefinite moratorium on the harvest, sale, and trade of sea turtles.

In early 1991, implementing regulations for wildlife trade provisions were issued by the U.S. Department of Commerce. In May 1991, the United States certified Japan for its commercial trade in sea turtles, threatening a trade embargo against Japanese wildlife products. Within the month, Japan had declared its intention to phase out and eventually eliminate all sea turtle imports. Mexican accession to CITES was approved by the Mexican Senate in June 1991 and formalized July 1, 1991.<sup>62</sup>

With CITES ratification came increased Mexican efforts to tighten controls on wildlife trade. With the ban on sea turtle trade, virtually all Mexican exports of CITES-listed

species are now prohibited. As discussed further below, Mexico has since 1990 solicited international assistance in increasing enforcement personnel and infrastructure and to meet other CITES requirements such as the listing of additional species and rehabilitation and release of confiscated wildlife. However, no implementing legislation for the Convention has been developed, either separately or within much-needed comprehensive wildlife legislation.

Mexico has not acceded to the Bonn Convention, which lists several species of concern to Mexico, including sea turtles, monarch butterflies, and the gray whale. The Bonn Convention requires that parties negotiate joint management efforts for listed species. However, few of the countries of the Western Hemisphere have acceded to the Convention, including the United States.

Mexico's incentive to participate more actively in the Ramsar and CITES Conventions, and to accede to the Bonn and World Heritage Conventions, is likely to increase with expanded possibilities for international conservation assistance. Not only do many conventions provide technical, financial, and other assistance in implementation, but growing donor emphasis on environmental problems with global implications generally means greater donor interest in programs explicitly linked to existing international efforts. For example, the World Heritage Convention maintains a fund for financial assistance to listed site

management, and a similar fund was created under the Ramsar Convention in 1990.<sup>63</sup> The link between donor funding and participation in international agreements is also made explicit in the case of the Montreal Protocol, which provides concessional financing for implementation in developing countries. Funding criteria for GEF biodiversity conservation also include "areas (or species) that clearly fall under international treaties, laws, agreements and conventions," including CITES and the Ramsar, Bonn, and World Heritage Conventions.<sup>64</sup> Priority is granted to projects combining both conservation goals and treaty jurisdictions.<sup>65</sup>

Mexico did sign the Biodiversity Convention drawn up at the 1992 UNCED Conference in Rio de Janeiro, with ratification following in January, 1993.<sup>66</sup> Several of the measures called for by the Convention were undertaken in anticipation of UNCED, including the creation of an inter-sectorial Biodiversity Commission, headed by the president himself, to develop sectoral and cross-sectoral protection efforts. The identification and protection of areas of high biological diversity has been a priority of Mexico's national system of protected areas since the 1980s. These areas have also increasingly taken the form of biosphere reserves, for which coordinating agreements are sought with NGOs and research institutions for the promotion of conservation and sustainable development activities.

Mexico's list of endangered, threatened, rare, endemic, and protected species, published in 1991, conforms generally to the Convention's criteria for identification of critical components. The Convention also calls for the development and promotion of, and local and indigenous participation in, sustainable uses of the components of biological diversity, areas in which Mexico's performance has been weaker. It remains to be seen whether information, technology, and financial exchanges promoted by the Convention will encourage greater attention to possibilities for local participation in the sustainable use of wildlife resources.

#### The Multilateral Development Banks

Following nearly a decade of net capital outflows, Mexico's economic restructuring has succeeded in regaining the confidence of external lenders, particularly the multilateral development banks (MDBs). World Bank lending authorizations to Mexico totalled over \$2 billion in 1992 alone.<sup>67</sup> Recent World Bank loans include \$16.8 million for agricultural development in Chiapas, \$45.5 million for forestry development in Chihuahua and Durango, \$350 million for the Project for Decentralization and Regional Development in Chiapas, Hidalgo, Guerrero and Oaxaca, \$150 million for agricultural research and modernization,<sup>68</sup> and \$400 million for improvements in irrigation and drainage.<sup>69</sup> Mexico has also received \$180 million in financing through the Multilateral Provisional Fund for the Application of the

Montreal Protocol.<sup>70</sup> Mexico is also involved in ongoing negotiations for an IDB loan for forestry development in Oaxaca, Guerrero, and Jalisco.

The development projects recently negotiated with the multilateral banks generally incorporate decentralization and community development among their primary objectives, and many specifically target low-income groups. As a result of recent reforms to improve MDB environmental performance,<sup>71</sup> much of this funding has also focused on the environment or included environment as one component of project activities. The World Bank loan for regional development in Chiapas, Hidalgo, Guerrero, and Oaxaca includes components for the restoration of archaeological sites and environmental protection, including forestry and protected areas management and a specific component directed at the Montes Azules Biosphere Reserve.<sup>72</sup> Administration and protection of the El Triunfo Reserve serves as the environmental component of the agricultural loan for Chiapas.<sup>73</sup> The IDB in 1991 authorized a loan of \$577,000 for the Program of Social Assistance for Low Income Groups, one component of which is to create a rotating fund for community economic organization, small enterprise development, integrated natural resource management, and environmental conservation. The project is administered in the states of Puebla, Oaxaca, Queretaro, and Morelos by the

NGO Cultura Ecológica.<sup>74</sup> The IDB is also encouraging a Mexican agreement authorizing a series of debt swaps.<sup>75</sup>

Most important for wildlife management is the negotiation of a \$50 million Environment Program loan, matched by a \$30 million GEF grant for protected areas management. Mexico's Environmental Program for 1991-1994, modified during negotiations with the World Bank, states as one of its specific objectives the expansion and consolidation of national capacity for biodiversity conservation.<sup>76</sup> The biodiversity program is in turn comprised of two components, the National Program for the Protection and Conservation of Wild Species, to be funded by the \$50 million World Bank loan, and Consolidation of Selected Protected Areas, to be funded by the GEF grant.

The National Program for Protection and Conservation of Wild Species is targeted at three specific areas: inspection and enforcement of trade in wildlife, wildlife rehabilitation centers, and protection and conservation of marine turtles. Specific actions to be funded include the construction of twelve permanent beach camps to support research and conservation of sea turtles, the creation of mobile units of wildlife inspectors equipped with vehicles and radios, and the completion of construction and operation of five rehabilitation centers for confiscated wildlife.<sup>77</sup>

The total four-year cost of this program is estimated at \$16,702,900, to be funded entirely from the World Bank

loan. By contrast, a program to review and revise environmental legislation, which includes wildlife protection as one of twelve areas to be included, is planned for a single year at a total cost of \$200,000. The Environmental Program also includes slightly over \$1 million for vehicles, equipment, consulting fees, and travel associated with the consolidation of the national system of protected areas (in preparation for implementation of the GETF grant) and \$375,000 for similar costs related to the establishment of biological corridors.

The Protected Areas Program is intended to strengthen the management and conservation of specified protected areas selected by the World Bank from a priority list of 17 parks and reserves on the basis of management and operating plans submitted by SEDUE.<sup>78</sup> These areas include the biosphere reserves El Vizcaíno, Calakmul, Montes Azules, and Sian Ka'an; special biosphere reserves Islands of the Gulf of California, Cascadas de Agua Azul, Mariposa Monarca, Isla Isabel, Isla Contoy, and Ría Lagartos; and national parks Constitución de 1857, Cascada de Bassaseachic, Cañon de Sumidero, Lagunas de Montebello, El Chico, Izta-Popo, and Lagunas de Chacahua. Seven of these areas encompass wetlands, lagoons, or other aquatic habitat, while four include tropical forests.

GEF eligibility criteria include non-availability of alternative funding for proposed activities and the

incorporation of both biodiversity conservation and the pursuit of compatible sustainable development activities. Elements to be funded include basic infrastructure, equipment and vehicles, boundary demarcation, training for administrators and staff, and participation of governmental and non-governmental organizations and specialists in planning and operations through the creation of a Technical Advisory Council in each of the 12 states where the protected areas are located. In addition, funding is to be provided for the development of an ecotourism strategy for Isla Contoy, Quintana Roo, which is uninhabited.

The Results: Policy Priorities, Funding,  
and Local Development Initiatives

This discussion highlights an impressive increase in the amount of external assistance being provided to Mexico's efforts to preserve wildlife and biodiversity. However, the greatest impact on Mexican policy and budgetary priorities, and even its participation in international agreements and funding mechanisms, has been achieved by the U.S. campaigns linked most closely with U.S.-Mexico trade issues and accompanied by negative publicity. Thus, the key wildlife issues on the Mexican conservation agenda are sea turtle protection, the tuna-dolphin problem, wildlife trade control, and to a lesser extent, migratory bird conservation. These are of course important issues, but their politicization has had several negative consequences for Mexican wildlife policy.

International and U.S. campaigns for the protection of sea turtles and dolphins have been particularly damaging to possibilities for involving resource users in wildlife conservation and management. The ban on sea turtle harvests directly threatened the livelihoods of several coastal communities who had depended on both the fishery and the collection and marketing of eggs. Arguably, the unusually high value of sea turtle resources might instead have formed the basis for efforts to establish a sustainable harvest program controlled by and benefitting local residents. Indeed, a step in this direction was taken prior to the ban, when several fishing cooperatives completed the purchase of PROPEMEX slaughter and processing facilities.

In the case of the tuna fishery, the Mexican industry had already taken several independent steps to reduce incidental dolphin mortality, and Mexico had participated in the negotiation of a multilateral dolphin conservation program which offered the possibility of rapidly meeting U.S. standards with industry cooperation and at reasonable industry cost. The effort of fishing nations and their domestic industries to negotiate an acceptable solution was instead undermined by U.S. insistence on an immediate end to incidental dolphin catch.

The diversion of Mexican and external funding to resolve these issues is also problematic. Arguably, the provision of funding for research and infrastructure

potentially contributes in the long term to domestic capacity for sustainable harvest and export programs for sea turtles and other species traded internationally. In practice, however, such an outcome is unlikely. Future resumption and development of the sea turtle fishery following a period of recuperation appears unlikely given the public attention focused on it and the Mexican government's now considerable political stake in sea turtle conservation. Much the same can be said for wider issues of wildlife trade. Neither domestic budgets nor international assistance have been targeted at research on human exploitation or the development of sustainable use. Moreover, infrastructure development has not been accompanied by the hiring and training of long-term personnel capable of effectively utilizing it, a problem which will be discussed further below.

Bilateral cooperation between U.S. and Mexican wildlife agencies has also failed to incorporate attention to human needs, and is in most cases limited to basic scientific research or endangered species recovery programs. Training assistance has also either reflected these priorities or focused on traditional protected areas and wildlife management activities rather than enhancing personnel capacity for including human needs in policy development and implementation.

Although funding is being provided under the NAWMP for waterfowl harvest surveys in Mexico, these surveys are aimed exclusively at sport hunters. Preliminary meetings to develop joint conservation activities have identified illegal hunting as a threat to many wetlands areas, but management proposals include only cooperative and funding possibilities among sport hunters.<sup>79</sup> No information is being gathered either on subsistence hunting or potential conflicts between sport and subsistence needs. While the more recent U.S. Migratory Bird Treaties with Japan and the Soviet Union included exceptions for subsistence hunting, the treaties with Mexico and Canada do not, and neither Mexican agencies nor their U.S. counterparts have attempted to assess the need for amendment.<sup>80</sup>

Much of the conservation assistance provided by the United States has reflected domestic rather than Mexican needs. Research and conservation funded under the Joint Agreement, for example, tends to focus either on the protection of endangered species also native to the United States, or on the management of game species--including migratory birds--hunted primarily by U.S. citizens. Again, nowhere are U.S. interests more evident than in the sea turtle and tuna campaigns, which were waged as much by U.S. industry representatives as environmental NGOs.

The political basis of conservation assistance has also ensured that much of the funding available for field-based

conservation activities is channeled into conceptually simple solutions and highly visible infrastructure investments designed to satisfy preservationist publics. The U.S. Congress, for example, explicitly required that international efforts to conserve tropical forests and biodiversity protection should emphasize protected areas management, anti-poaching measures, and scientific research.<sup>81</sup> Much of the available USAID funding has thus been channeled through the more traditional programs of The Nature Conservancy, or through basic infrastructure programs of other organizations. The GEF, under pressure to rapidly spend and demonstrate visible results from multilateral funding, has also adopted eligibility criteria emphasizing basic infrastructure, equipment, and vehicles. Initial 'emergency' measures funded under the Mexico Protected Areas Program again focused on infrastructure and enforcement.

Mexican agencies on the receiving end of such funding are not immune from the political attractiveness of concrete infrastructure and facilities, and their provision is often an implicit or even explicit condition for NGO, bilateral, or multilateral activity within Mexico.<sup>82</sup> Thus, for example, the debt for nature swap negotiated by Conservation International benefits a number of state institutions and emphasizes measures such as the rehabilitation of the Chajul station, the creation of conservation data centers, and the provision of funding to SEDUE for infrastructure and

enforcement. The swap negotiated by WWF-US includes technical assistance to SEDUE for wildlife trade controls as well as programs in Chiapas and Oaxaca.

The considerable funding now provided by the World Bank and the GEF for biodiversity conservation appears to at last solve the critical problem of funding shortages, but has in fact merely reinforced on a grander scale the problems discussed above. In short, it has not led either to appropriate policy changes at the federal level nor a greater emphasis on sustainable development of natural resources at the local level. Although the environmental loan and the GEF grant have focused governmental attention on biodiversity conservation, little effort has been made to address underlying problems such as uncertain land tenure and conflict between the expansion of protected areas system and the socioeconomic needs of local communities. The recently announced expansion of the Montes Azules Reserve, for example, will incorporate an even larger human population into a reserve already notorious for conflicts among settlements and between settlers and federal agencies.

Both funding programs also fulfill the prophecy that The GEF projects are in danger of suddenly injecting large sums of money to support fairly short-term, visible activities, often involving the development of infrastructure which then needs to be maintained from shrinking government budgets...And the indications to date are that the GEF will not support normal running costs, nor hire additional permanent staff, nor encourage the development of local NGOs that can have real impact on the ground."<sup>83</sup>

The environmental loan and the GEF grant in particular have emphasized infrastructure development and equipment purchase which, as in the past, are unlikely to be maintained or even utilized after short-term funding terminates. First-year emergency funding from the GEF for Montes Azules, for example, was used to restore guard stations which, like the biological station, had been built during and promptly abandoned after the last funding boom, and the World Bank has encouraged the construction of additional stations.<sup>84</sup> Funding for the construction of wildlife rehabilitation centers merely increases the number of such centers already functioning ineffectively and well under capacity due to a shortage of trained personnel and long-term operating budgets. Funds for sea turtle conservation are devoted to the construction of highly visible research stations which may or may not be occupied once international attention to Mexican sea turtle protection declines.

Nor has funding been used to enhance government capacity by hiring, training, and adequately compensating permanent staff. The Program for the Protection and Conservation of Wild Species, for example, plans the training of 144 technicians, but the personnel of the DGCERN itself was to be reduced over the four-year period, with additional personnel needs to be met through the contracting of consultants, for which is budgeted \$4,189,200. Hiring policies following the infusion of World Bank and GEF

funding were similar, leading to public protests by SEDUE employees in April of 1992. The employees protested not only overall personnel cuts of more than 50 percent, but also the hiring of temporary staff and consultants, who by 1992 outnumbered their unionized counterparts by more than five to one and who, despite their temporary status, were trained as well as provided with salaries three to four times higher than those of permanent employees. The latter were designated within SEDUE as "World Bank workers."<sup>85</sup>

The short-term, project-oriented approach of World Bank funding has also made it highly unlikely that the activities funded will achieve any lasting developmental or conservation impact on the ground. Huge budgets have been suddenly made available to poorly staffed and undertrained government agencies which have difficulty expending them in such a short time period. Management plans for many of the protected areas included in the GEF grant could not, in fact, be prepared in time, and those completed were prepared by consulting NGOs that lack permanent presence in the regions concerned and that will not be involved in their implementation. At least one management plan developed independently by an NGO was accepted by SEDUE, despite SEDUE disagreement with its proposals, because it was the only one to be developed in time to receive World Bank funds.<sup>86</sup> Elsewhere, NGO contracts have resulted in the development of

lengthy and unprioritized 'wish lists' by organizations lacking authority to implement them.<sup>87</sup>

The short term project approach of MDB financing has also limited possibilities for local participation and institution-building in sustainable development activities. In Chiapas, for example, SEDUE experienced difficulty in spending the barrage of funding, to which it responded with top-down initiation and implementation of an astounding number of rural development projects far beyond the expertise and experience--and administrative jurisdiction--of the agency. Moreover, despite World Bank and GEF lending criteria which include local participation in conservation planning and implementation, the GEF grant for protected areas explicitly accepts the Mexican policy of not soliciting local input until after reserves are created and management plans finalized.<sup>88</sup>

Support for local sustainable development projects has thus come not from bilateral and multilateral assistance, but from a limited number of NGOs. Nongovernmental organizations possess a great deal of potential for influencing Mexican organizations, as donor NGOs typically either approach a local organization with an idea, or select projects meeting their individual goals and strategies from among a number of proposals submitted by Mexican recipients. NGO funding and influence are expanded by "buy-ins" of

bilateral and multilateral agencies with funds to spend but less information on where to spend it.

Often problematic, however, is the limited amount of foundation and official support for community pilot projects, and the limited availability of Mexican NGOs to implement such programs. Indeed, many funding opportunities are unrealized due to the absence of capable organizations within Mexico.<sup>89</sup> In many cases, however, funding is used to encourage organizations to take on new functions for which they lack experience and expertise.<sup>90</sup>

In immediate terms, the ability of NGOs to directly influence government policy through a small number of isolated pilot projects is also limited relative to that of government agencies and MDBs. This weakness is especially evident when local projects serve as a substitute for, and conflict with, federal policy. The MacArthur Foundation's support of research in the Chimalapas, for example, created intense resentment within SEDUE because socioeconomic studies fostered opposition to SEDUE's plans to create a biosphere reserve in the zone.<sup>91</sup> Instances such as these help to create a negative attitude toward external involvement in domestic conservation problems rather than encouraging policy reconsideration by government agencies. Local projects supported by NGOs are also threatened by the confrontational tactics of more radical organizations operating outside the country, such as Earth Island

Institute, which has played an important role in politicizing the sea turtle and dolphin-tuna issues.

However, when outside organizations can bring their leverage to bear in a cooperative fashion on a specific problem, they may be able to secure government interest in experimenting with ways of involving local communities, as in WWF participation in the ecotourism planning in the Monarca reserve. Successful projects also stimulate government interest in their replication, as with the initiation of community-based ecotourism in El Vizcaíno and INI's replication of the wildlife projects initiated by Biocenosis. The Plan Piloto itself is a striking example of this process, having stimulated similar projects throughout the Yucatan peninsula and the rest of Mexico.

This potential has not been fully realized, however, even within the bounds of political and financial feasibility. The NGOs have also tended to favor short-term projects, a problem reinforced by the small number of local organizations with both proven effectiveness and the willingness and ability to make long-term commitments to individual projects. Nor have donor organizations addressed the implementation problems discussed in the preceding chapter, such as continuing difficulties in achieving real local participation, the weakness of social science training and community development skills within local NGOs, the tendency of implementers to concentrate their effort on the

technical aspects of project management, and the weakness of communication between NGOs and government agencies.

Competition for limited external funding and the domestic influence which accompanies it has also exacerbated conflict and lack of communication and coordination among local NGOs, universities, and research institutions. External donors tend to establish close links with a selected number of local organizations which then tend to monopolize both funding and conservation activity within a given geographic area. These organizations are in turn favored by government permits, communication, and collaboration, particularly when NGO activities offer concrete benefits to the agencies themselves. Resulting problems can be severe, as in the case of Amigos de Sian Ka'an, publicly accused by the Director of the reserve of being an obstacle to research by government and university institutions in the reserve.<sup>92</sup> Although Amigos enjoys a favorable relationship with government agencies in Mexico City, its effectiveness has been hindered by conflicts with the reserve director, representing the state government, and state research institutions with a long history of involvement in the area.<sup>93</sup> Similarly, Ecósfera, with an extensive background in the Selva Lacandona, has been pushed out of the area by CI and Biocenosis, and the conflict has spilled over into a lack of communication between their respective wildlife projects in the Yucatan Peninsula.

Several of these problems may be alleviated through the strategy adopted by the MacArthur Foundation, that of providing funding directly to successful communities and organizations to support locally-developed resource initiatives. The expansion of such a strategy depends on initial successes by local institutions and organizations, but could provide needed funding continuity to projects initiated locally as well as those developed by NGOs, universities, or government agencies.

#### Conclusion

External assistance for environmental protection and natural resource conservation has undoubtedly contributed to the technical capacity of Mexican researchers and administrators, and increased the body of scientific information needed for domestic policymaking. However, noticeably absent from most of the initiatives described above is an attempt to translate the tenets of sustainable development into projects and assistance packages.

In some instances, the exclusive emphasis on scientific research and infrastructure is established by official Mexican priorities. Often, however, it is reinforced by funding criteria established by the GEF, USAID, NGOs, or other donors. In either case, external assistance for natural resource conservation has maintained the short-term, top-down, results-oriented orientation typical of development assistance. Only a handful of NGO-supported

projects have incorporated the goals of local participation, community development, and sustainable use.

If international cooperation has generally failed to encourage national efforts to address the needs of wildlife users, pressures from the United States have actively discouraged them. Not only are U.S. funding, technical cooperation, and training oriented toward either preservation or wildlife management in the interests of sport hunters, but pressures from the north have conditioned Mexico's participation in international institutions and agreements such as CITES and the GEF. Campaigns to protect tropical forests, sea turtles, and dolphins have directed Mexican budgets away from other needs as well as thwarting possibilities for compromise between state agencies and resource users. The social and ecological consequences of these campaigns will be discussed at length in the case studies that follow.

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CHAPTER 11  
CASE STUDY: RAINFOREST POLITICS IN THE SELVA LACANDONA

Introduction

If biodiversity has been the environmental watchword of the 1980s and 1990s, tropical forests, covering only about 7% of the earth's surface but estimated to contain at least half of the world's species of flora and fauna,<sup>1</sup> have been its standard-bearer and chief fundraiser. Signalling the rapid deforestation of the tropics and the related loss of species, the World Bank, FAO, UNDP, and World Resources Institute in 1985 created the Rainforest Action Network to distribute some \$8 million to over 70 countries for the improvement of forestry policies. The International Tropical Timber Organization was created in 1983, with one of its goals the encouragement of sustainable forestry practices. Organizations such as Cultural Survival and Conservation International have fostered small-scale development projects involving the commercialization of rainforest products by indigenous inhabitants, and "save the rainforest" products have become high-demand consumer items in the developed world.

The Amazon Basin has been the prime target of the "save the rainforest" movement, attracting the bulk of

conservation assistance offered by the European Community, as well as international research and publicity. However, tropical southern Mexico has also received a share in publicity and financial assistance, particularly in the region of the Selva Lacandona of Chiapas, which incorporates the 331,000 hectare Montes Azules Biosphere Reserve created in 1978. The Selva Lacandona is estimated to contain approximately 25% of Mexico's biodiversity, including 112 species of mammals and some 300 species of birds, 800 diurnal butterflies, and 4000 vascular plants.<sup>2</sup>

The Selva Lacandona is also a region buffeted by many of the same pressures which have become famous in the Amazon: the expansion of the agricultural frontier by colonists and conflict between indigenous inhabitants and settlers; the conversion of rapidly-degraded tropical soils from agricultural to livestock production; the socioeconomic and ecological disruptions caused by oil exploration; the exploitation and illegal trade of rare and threatened tropical species such as jaguars, macaws, and toucans; conflict over federal development of large-scale hydroelectric projects; and political and military conflict along the Mexico-Guatemala border, with accompanying flows of Guatemalan refugees escaping from domestic conflict. Superimposed on this scene are periodic governmental and nongovernmental efforts to halt the destruction of the

forest, which by 1986 was estimated at only 30% of its former coverage.

#### Historical background

From the late 1800s to the early 1940s, the most important external influence on the Selva Lacandona was the activity of U.S., Spanish, Belgian, and occasionally Mexican companies extracting mahogany and cedar on vast government concessions. As the region's only permanent inhabitants were the small, scattered settlements of the Lacandon Maya, the logging companies obtained their labor force from the more densely populated highlands of Chiapas and from the states of Campeche and Tabasco, who were immediately locked into a system of debt peonage.<sup>3</sup>

While labor conditions under the control of the logging companies were horrific, the impact of logging on the forest itself was at first relatively minor. Timber exploitation was limited to the export of raw logs to Europe, and only those of the highest quality were removed. Although the felling of these enormous trees invariably damaged surrounding vegetation, the destruction in no way compared to the logging and agricultural land clearing which would come later. The primitiveness of extractive technology extended to transportation as well; the logs were strapped together and floated down larger rivers to the Gulf ports of Tabasco and Campeche. The zone of influence of timber extraction was therefore limited to a relatively

small distance from those currents sufficiently strong and clear for the logs to reach their destination. Some settlements sprang up near the logging camps, but these remained small and transient, in large part due to discouragement by the logging companies, who feared loss of control over their lands.<sup>4</sup>

The region also attracted chicleros, harvesters of natural latex from the chicozapote tree, which was primarily exported to the United States for the manufacture of chewing gum. Again, however, the impact on the forest appears to have been relatively slight. Chicle extraction involves making a series of diagonal cuts in the bark of the tree, which can be revisited year after year. Individual trees can be killed by overexploitation, but during this period the expanse of forest available suggested little reason for this to occur. Furthermore, the chicleros only entered the forest for four to five months during the rainy season, when the latex achieves the consistency necessary for its extraction. In the dry season, the chicleros returned to civilization in Tabasco and Campeche to spend their earnings and to contract the new debts which would require their return the following season.<sup>5</sup>

With the advent of the Mexican revolution and World War I, which closed off European lumber markets, logging entered into a slow decline, with large landholdings gradually replaced by smaller companies which in turn failed

after a few years. The decline was accelerated with the end of government land grants to foreign companies and a 1949 decree prohibiting the export of raw logs. The extraction of chicle peaked during World War II and declined rapidly thereafter due to the invention of synthetic latex. In the late 1940s and early 1950s, prominent visitors to the abandoned camps were archaeologists exploring Mayan ruins and European anthropologists studying the still unacculturated Lacandon Maya, whose numbers had been reduced to roughly 180 individuals by diseases introduced by the loggers and chicleros, with whom they traded game, salt, axes, machetes, and guns.<sup>6</sup>

With the abandonment of the logging companies, colonists began to trickle into the area from the north and west. Portions of the forest were declared national lands in 1961, and colonization by settlers from the Chiapan highlands and from other states began to receive official encouragement.<sup>7</sup> Spontaneous settlement accelerated in 1964 when the company Maderera Maya, formed with U.S. capital, contracted the Canadian Asseraderos Bonampak to construct a sawmill in Chankalá and to open new logging roads.<sup>8</sup>

In 1972, a presidential decree granted an area of 614,321 hectares to the Comunidad Lacandona, represented by 66 families, despite the fact that several communities of colonists had already been established on the same lands. Several communities on the western edge of the forest were

subjected to unsuccessful state efforts at forcible eviction to make way for the extraction of mahogany and cedar by state companies.<sup>9</sup> In 1976, some 30 small communities of colonists, mostly Tzeltales and Choles, were recognized as forming part of the Comunidad Lacandona, but were relocated to the eastern edge of the forest. Frontera Echeverría was settled by 475 Chol families, Nueva Palestina by 822 Tzeltal families.<sup>10</sup> Also in 1976, PEMEX initiated petroleum exploration in Marqués de Comillas, on the southern edge of the forest. Exploration necessitated the construction of a new highway running south from Palenque, encouraged by the federal government in order to secure what was now a strategic zone along the Guatemalan border.

In 1978, the Montes Azules Biosphere Reserve was created, covering 331,200 hectares. Although the reserve proposal drawn up by the Instituto de Ecología and adopted with little revision by the federal government described this area as virtually uninhabited, 80% of the reserve was located on lands previously granted to the Comunidad Lacandona, and its declaration affected the lands of 36 ejidos in Las Cañadas to the west of the reserve.<sup>11</sup> The legal status of the Comunidad was not formalized until 1986, when its area was reduced to 425,509 hectares to exclude 23 ejidos already granted legal status. A number of illegal settlements continued to exist on the lands of the

Comunidad, however, provoking sometimes violent conflict with its members.<sup>12</sup>

Survival in the Selva: Agriculture and Forestry Development

The buffer zone north of the reserve is the only area well-communicated with the rest of the state. Coffee, chile, and livestock production for regional markets is therefore common, and most of the population has access to electricity, running water, and medical and educational services. In the rest of the region, electrification is slowly extending south, but communities still lack running water and drainage systems, and few have access to schools or health clinics. In the Comunidad Lacandona to the east of the reserve, Marqués de Comillas to the south, and Las Cañadas to the west, slash and burn agriculture for the production of maize and beans predominates, although commercial production of rice, coffee, cacao, chili, pepper, and marijuana are now gaining importance. Maize and beans are destined primarily to household consumption, as marketing is hindered by a lack of production credits and storage facilities and by the difficulty of transport.

Other consumer goods are transported from outside the zone; this, as well as the influx of PEMEX employees, have raised local prices for food and consumer goods well above those in other areas of the state. The consequent need for cash incomes has also led to the rapid growth of extensive cattle production, now extending to two-thirds of the ejidos

in Marqués de Comillas, and accounting for 2.6% of land use in the Comunidad Lacandona and 21% in Las Cañadas.<sup>13</sup>

Forestry production has also been an important economic activity in the Selva. In 1972, Aserraderos Bonampak was sold to the Mexican parastatal NAFINSA, to be managed by the Compañía Industrial Forestal de la Lacandona (COFALASA). While Aserraderos Bonampak had obtained its raw materials through contracts with private landholders, COFALASA exploited the forest resources of the Comunidad Lacandona, paying stumpage fees to the Comunidad.<sup>14</sup> In 1976, a sawmill was installed in Palestina, to be fueled by the stumps and branches left by COFOLASA, but the mill soon failed due to technical, organizational, and administrative problems. Continuing problems with corruption and illegal cutting and trade in timber led to the institution of a statewide forestry ban in 1989.

Official efforts to regulate resource use in the reserve were few until the mid-1980s, despite the creation of a technical committee in 1978 charged with research and sustainable resource development.<sup>15</sup> In 1986, federal and state agencies formed the Commission for the Protection of the Selva Lacandona, which called together a workshop with the participation of research institutes and NGOs to plan rational land use strategies. The result was the publication by SEDUE of a development program in 1986 and a management plan in 1987, but funding to carry them out was

not forthcoming.<sup>16</sup> In 1987 and 1988, SEDUE constructed inspection stations along transportation routes into the Selva, but the stations were quickly abandoned and fell into ruin. The Chajul research station, established through the efforts of UNAM's Centro de Ecología, the University of Florida, and Conservation International, suffered a similar fate. In 1988, the state government created a Technical Planning Team of federal agencies and NGOs to prepare a Management Plan for the Reserve, issued in 1991.<sup>17</sup>

Federal efforts to protect the Selva were renewed in 1989 under the Salinas administration. Rural development activities were initiated under an intersectorial commission headed by the state governor, with 25% of the funding for these activities provided by the state government and 75% through PRONASOL from the World Bank loan for rural development and decentralization in Chiapas, Oaxaca, Guerrero, and Hidalgo.<sup>18</sup> Responsibility for many of these programs, including integrated farming, rural aquaculture, aviculture development and sanitary improvement, nurseries to provide seedlings for reforestation, and development of palm extraction, was taken over by SEDUE itself, through the Programa de Asistencia Económica y Social para Comunidades Populares.<sup>19</sup>

Conservation activity in the Selva accelerated in 1990-91 with a sudden influx of foreign funding. Additional support was provided by the GEF grant for protected areas

management, used to rehabilitate existing inspection stations in 1991-1992. The grant was also to have permitted the construction of new stations and the hiring of inspection and enforcement personnel, although by mid-1992 this program had not begun.

The GEF grant is also contributing to the restoration of the Chajul research station, with additional support from the CI debt-for-nature swap. The swap will also support the creation of a Conservation Data Center within the state government's Instituto de Historia Natural and diverse projects by Conservation International, which by 1992 had begun cartographic surveys and feasibility studies for ecotourism and butterfly cultivation.<sup>20</sup>

Efforts to foster sustainable resource production have achieved little success to date. Until 1986, COFOLASA paid stumpage fees to the Comunidad Lacandona and was authorized to exploit logs removed in the construction of the border highway and PEMEX access roads, but the company also penetrated into unauthorized zones to remove timber.<sup>21</sup> In 1987, ejidatarios in Marqués de Comillas were authorized to clear 50,000 hectares for agricultural production, and to saw and sell dead timber on these lands. The result was a massive influx of illegal loggers and traders, to which the government responded by prohibiting lumber sales. Another attempt was made in 1989 by the state government, which authorized the sale of cut timber exclusively to state-owned

sawmills. Ejidatarios soon complained, however, that large portions of the lumber brought to these sawmills was accepted without payment due to claims that the wood was damaged or of poor quality.

A 1989 state initiative banned forestry activities, shut down the parastatal COFOLASA, prohibited further changes in land use, and levied fines and prison terms against those charged with illegal cutting or possession of unregistered chainsaws.<sup>22</sup> Despite the logging ban, illegal timber trade continues with such practices as driving nails into tree trunks to bring about their 'natural' death and thus to obtain a permit from SARH for cutting. Government inspection agents are also known to illegally trade in confiscated lumber, creating outrage among the forest's residents. Their response was a protest march to Mexico City, which won them agreements for the provision of social services but no change in the state forestry policy.<sup>23</sup>

Accompanying the state forestry ban are reforestation projects promoted by SEDUE, SARH, and PEMEX. Eight nurseries have now been established, three of them community-owned, with financing from PRONASOL.<sup>24</sup> Both SARH and PEMEX have established programs for plantings of cedar and mahogany, but these species are slow-growing and have therefore elicited little response from ejidatarios. Faster-growing rubber plantings, to which state and federal agencies turned following their failure to encourage the

expansion of cacao plantings, have gained wider producer support, but suffer from a lack of technical and extension assistance. For example, Nueva Palestina by 1991 had planted 3 hectares of cedar and mahogany and 60 hectares of rubber, but the first two years of rubber plantings failed.<sup>25</sup> Another ejido, not wanting to reforest agricultural land, placed their seedlings in a power-line throughway, which had to be recleared by the Federal Electricity Commission.

Official and ejidal efforts have also been made to foster the rational development of non-wood forestry products. In 1978, the Sociedad Cooperativa de la Selva Lacandona was created in the Comunidad Lacandona for the extraction of chicle, previously harvested by seasonal workers contracted from Tabasco and Campeche by foreign chewing gum companies. However, the ejidatarios had no experience with chicle production, and were unable to abandon their agricultural activities during the rainy season. Chicle production ended in 1981 when Adams and Wrigleys ceased to purchase natural latex.

In 1980, the cooperative began the harvest of chamaedorea palm, also previously in the hands of contracted labor. Although no special skills were required for palm cutting, which could be undertaken year-round, the palm was soon overexploited by the community and other settlements,

aided by population concentration during resettlement. The cooperative collapsed in 1983.<sup>26</sup>

In 1991, SEDUE initiated another attempt to foster community production of chamaedorea palm, extracted throughout Central America.<sup>27</sup> Mexico is the world's largest producer of chamaedorea palm, which is exported to the United States for use in floral arrangements. Seven different species are harvested in the states of Chiapas, Oaxaca, Veracruz, Campeche, Tabasco, Quintana Roo, Tamaulipas, San Luis Potosí, Hidalgo, and Puebla.

Mexico's export industry began in the late 1940s and early 1950s, with U.S. buyers contracting professional cutters operating primarily on federal lands. Later, ejidatarios would increasingly be hired in their place as ejidos replaced federal lands. Three or four leaves may be cut per plant, the leaves being sold in bundles, or gruesas, of roughly 120; a good cutter may harvest up to 40 gruesas daily. The gruesas are sold to intermediaries who transport the leaves to warehouses, where they are packed in kraft paper, refrigerated, and then shipped by refrigerator truck to Texas.<sup>28</sup> From the 1960s to the late 1980s, two U.S. companies dominated the market, although a German company which has accounted for the bulk of the market in Guatemala has recently begun to purchase palm from Mexico.<sup>29</sup> U.S. imports from Mexico reached over 275 million stems in 1990 and nearly 333 million stems in 1991.<sup>30</sup>

Palm exploitation began in Chiapas in the 1950s, and in 1980 the Comunidad Lacandona was authorized a harvest of 200 tons. After the dissolution of the cooperative in 1983, palm exploitation continued by some 600 families in the Comunidad as well as by contracted cutters, with the palm sold to intermediaries supplying warehouses in Tabasco and to buyers in neighboring Guatemala.<sup>31</sup> By 1991, the Comunidad reported palm production of 800 tons annually,<sup>32</sup> but there is no way to estimate unreported harvests by Comunidad members, outside communities, and Guatemalan cutters, who reportedly transport the palm across the border with the assistance of Mexican military personnel.<sup>33</sup> Intermediaries pay roughly US\$0.80 per gruesa, generating an annual revenue of some \$41,650.00, of which a portion goes to the ejido.<sup>34</sup>

The large and uncontrolled number of harvesters and the overexploitation of the resource has created concern among community members and government agencies, and led to the instigation of the SEDUE program. This project incorporated three components: a five-year survey of natural palm populations, the creation of experimental nurseries on community lands to investigate the feasibility of intensive palm production, and the development of direct marketing by the Comunidad to U.S. buyers, eliminating middlemen and increasing Comunidad earnings.

The resource survey was estimated to cost some US\$27,000.00, for which funding was to be provided through PRONASOL. Proposed surveys included no socioeconomic or market research, and the SEDUE team charged with implementing the project had no information on buyers, prices, or market routes. No organizational or technical assistance was planned to the Comunidad, despite experience with the past failure of the cooperative. Instead, SEDUE planned to develop an agreement with the intermediary buyers, permitting them to continue commercialization of the palm during the first phase of the project, in return for their assistance in capacitation of Comunidad members.

Problems with the project were many and obvious. First, World Bank funding will terminate after 1994, and with it possibilities for continued project funding. Second, critical technical assistance was omitted from the project, and intermediaries have little incentive to assist the Comunidad in establishing their independence. Third, while under natural conditions palm grows at higher altitudes in the forest understory, the nurseries planned by SEDUE were to be located on cleared lowland sites near population centers. Fourth, there was no component to address uncontrolled cutting by the community or by outside harvesters. Fifth, the project was designed and implemented entirely by SEDUE, with at best passive acceptance by ejidatarios. Finally, the project almost immediately

encountered resistance from SARH, which normally has jurisdiction over such technical studies, and which laid claim to research funds.

#### Conservation in the Selva

Against the generalized failure of agricultural, forestry, and social development, the urgent calls of ecologists and environmentalists have been seen by campesinos as yet another obstacle to their survival. Their resentment has been increased by the attention focused on the campesinos themselves as responsible for ecological destruction.<sup>35</sup> In a 1990 meeting, ejidatarios from Marqués de Comillas declared that "In various communications of the media and of environmental groups, information on the problem of the forest has been partial, twisted, and manipulated, the campesinos appearing as plunderers, leading to violations of our human rights, committed against us physically and morally..."<sup>36</sup> Criticism of official conservation programs leaves aside what the campesinos feel is the most critical issue: the lack of social and economic assistance.<sup>37</sup> There is widespread awareness of external funding assistance for conservation in the Selva, leading to questions concerning its destination. The result is popular distrust both official and non-governmental conservation programs.

In this setting, rational management of faunal resources has been an elusive goal, with past and present

efforts to achieve it best described as incongruous. What remains of the Selva Lacandona provides habitat to a number of species highly demanded for export, domestic markets, and subsistence. Although hunting is prohibited in both the nucleus and buffer zones of the reserve, there is an extensive illegal trade in crocodilian skins, scarlet macaws, parrots, toucans, parakeets, raptors, and a variety of song and cage birds from the area. Jaguars, ocelots, and margays are shot on sight for their pelts, and brocket deer, white-lipped and collared peccaries, armadillos, tapirs, pacas, agoutis, coatis, curassows, crested guans, chachalacas, and river turtles and their eggs are heavily exploited for subsistence.<sup>38</sup>

The widest range of species is consumed by the Lacandones. Some nineteen species of larger mammals are hunted for meat, including spider and howler monkeys, pumas, river otters, squirrels, raccoons, ring-tailed cats, cottontail rabbits, porcupines, squirrels, and kinkajous, as well as the more commonly hunted species listed above.<sup>39</sup> Also exploited by the Lacandones are twelve species of reptiles, three species of amphibians, and fifteen species of fish, crustaceans, and molluscs.<sup>40</sup> While hunting pressure by the Lacandones is sufficient to bring about local depletion, its effects were probably historically insignificant due to low population numbers and concentration, related to dispersion into family groupings,

frequent relocations involved in shifting agriculture, and the traditional practice of abandoning family settlements following a death. Their concentration and resettlement in three larger communities as a result of the governmental land grant to the Comunidad Lacandona is, however, likely to have resulted in more significant local game depletion.

Subsistence hunting by colonists is also significant.<sup>41</sup> Most own rifles and hunt regularly in and around their fields for agoutis, pacas, and armadillos. In addition to milpa hunting, directed day hunting is carried out by individuals or pairs of hunters in a radius of roughly 8 kilometers around the community, with important game species including collared and white-lipped peccaries, white-tailed and brocket deer, coatis, spider and howler monkeys, currasows, toucans, and parrots.

To the north of the reserve, Tzotzil settlers from the Chiapan highlands rely much less heavily on game, due in part to the reduced availability of game in the longer-settled highlands, as well as to the close proximity of new Tzotzil settlements in the Selva. The only species hunted systematically are the paca and white-tailed and brocket deer. Few residents possess rifles, and hunting takes place mostly on Sundays.

In the more recently settled Marqués de Comillas, hunting is carried out in the natural areas of the Comunidad Lacandona by settlements along the edge of the Comunidad,

while settlers farther in the interior hunt less due to the lesser availability of game habitat. The settlers, coming from the states of Oaxaca, Tabasco, and Veracruz as well as Chiapas, reveal different hunting patterns according to place of origin, size of family, and length of residence in the zone. The most important game species for domestic consumption are agoutis, pacas, brocket deer, curassows, white-tailed deer, wild turkeys, and collared and white-lipped peccaries, the latter now locally depleted in some areas. Settlers from Tabasco and Veracruz hunt more frequently than those from Oaxaca and Chiapas.

Subsistence hunting is also more intensive among new settlers to the region, prior to the acquisition of domestic livestock. Exceptions to these general rules are larger families with scarcer monetary resources with which to acquire other protein sources. Indigenous settlers also tended to rely more heavily on game than mestizos. Hunting is generally pursued on Sundays by individuals or by fathers accompanied by their sons, in the case of pacas using trained dogs. Also occasionally forming part of subsistence diets were aquatic turtles, caught with harpoons.

Game is also heavily exploited by palm cutters camping in the Selva, as it was by chicleros; by military forces stationed in increasing numbers along the Guatemalan border; and by PEMEX surveying teams.<sup>42</sup> PEMEX teams, generally consisting of 15 to 25 members, designate a team member as a

full-time provider of game.<sup>43</sup> Dynamite fishing by settlers in the Comunidad Lacandona has also been reported.<sup>44</sup>

Commercial hunting is important in Marqués de Comillas, primarily involving the high-demand species with prices justifying the cost of transport. These include river turtles traditionally destined for markets in Chiapas, Veracruz, and Tabasco, where high prices have led to overexploitation.<sup>45</sup> Prices have risen further as a result of their near extermination elsewhere in the country, despite being granted complete nationwide protection in 1985. Their primary market is now Tenosique, Tabasco, where they are flown by plane after being captured by full-time professional collectors.<sup>46</sup>

Another heavily traded species is the scarlet macaw, whose nests are visited in the month of May by settlers in Marqués de Comillas to collect fledglings for sale as pets. Although macaws may sell for several hundred dollars in Mexico City markets, and for thousands of dollars in the U.S., trappers receive less than \$20 per bird.<sup>47</sup> Real and lesser toucans and parrots are also taken for export or sale in Mexico City pet markets. Crocodiles and caimans are hunted their skins and sold openly throughout Chiapas in the form of belts, wallets, pocket-knife holders, and the like.<sup>48</sup> Finally, the skins of jaguars, ocelots, and margays are traded in considerable numbers; hunters receive approximately US\$665.00 for a single jaguar pelt,<sup>49</sup> and

spotted cat skins are frequently sold in urban centers.<sup>50</sup> Jaguar hunting in particular may further increase hunting pressure on other species; while little information is available on harvest and trade in the Selva Lacandona, hunters elsewhere in the southeast attract jaguars by hanging deer, peccary, paca, agouti, or monkey carcasses.<sup>51</sup>

Several organizations have attempted to encourage wildlife conservation by the Selva's inhabitants, but few have attempted to work directly with local communities. The Chiapas branch of PRONATURA, for example, has distributed fliers urging the protection of endangered species such as tapir, an effort that one community leader described as ludicrous given the area's high rates of illiteracy.<sup>52</sup>

In most cases, the importance of wildlife products for subsistence and commerce has been addressed through experiments in wildlife farming and ranching. As early as 1968, the Institute of Natural History and INIREB received a grant from WWF-US to begin an experimental captive breeding program for crocodiles.<sup>53</sup> The Technical Committee formed in 1978 also contemplated studies by the Instituto de Ecología to explore large-scale production and industrial use of crocodiles.<sup>54</sup> SEDUE's Commission for the Protection of the Selva Lacandona, in consultation with NGOs and research institutes, suggested horticulture of wild orchids and bromeliads and captive propagation of military macaws, iguanas, boas, agoutis, pacas, and butterflies, and

technical assistance to communities for farming crocodiles and collared peccary.<sup>55</sup> In 1983, INIREB initiated a pilot project for crocodile farming and peccary ranching, with the peccary project continued by Ecósfera until 1990.<sup>56</sup> The Institute of Natural History and the Miguel Alvarez de Toro Zoo in Tuxtla Gutierrez also began in 1984 a project to study captive reproduction of agutis and pacas, to determine the feasibility of small-scale production.<sup>57</sup> In 1991, a similar program was begun with support from WWF-US to study captive propagation of the ocellated turkey.<sup>58</sup>

Conservation International is also interested in commercial wildlife production programs, and is now exploring possibilities for commercial production of the white river turtle and extensive butterfly farming.<sup>59</sup> Captive propagation of white river turtles was begun in Tabasco by SEPESCA in 1978, but after eleven years its stock totalled 900 specimens of five species, against a registered national production of more than 62,000 tons in 1984 alone, representing several million specimens.<sup>60</sup> In the early 1980s, ten professional collectors operating on the Río Salinas in Marqués de Comillas harvested some 800 specimens per week of two species.<sup>61</sup> Considering problems of scale, as well as investment and technical skill needed for intensive production, captive production of aquatic turtles appears to offer little hope of success in the Selva.

A more promising option, though still untested in Mexico, is butterfly farming. Conservation International and Biocenosis are fostering butterfly projects in Calakmul and Los Chimalapas as well; a preliminary survey of Los Chimalapas found the presence of 838 commercially valuable species, with market prices ranging from US\$0.15 to \$80.00 per specimen.<sup>62</sup> A feasibility is now underway in the Marqués de Comillas region of the Selva Lacandona, based from the Chajul research station. Technical difficulties are not insignificant for this project either, including the training of campesinos in species identification, specimen handling to prevent damage, and the construction of facilities for packing and storage, but these are more easily overcome than in the case of production projects for other faunal species. More significant barriers are posed by problems of transportation, marketing, and distribution, which may have to be assumed by the NGO itself.

The possibility of wildlife farming and ranching has also attracted the interest of colonists, especially in Marqués de Comillas. Ejidos there have called for the encouragement of ecological tourism and the production of wild flora and fauna, and for the assistance of developed countries in controlling illegal trade and providing economic and technical assistance to campesino organizations.<sup>63</sup> A statement issued by the ejidos urged that

The conservation of the Selva should take into account the human beings who inhabit it. Considering that we are today in the eye of national and international environmentalists and worldwide criticism as destroyers of the Selva, we propose: the realization of a Study of Natural Resources; to promote the creation of Wildlife Farms and Ethnobotanical Nurseries of Fruit and Wild Flora to conserve and commercialize the excess production; ...that national and international environmentalists protect wildlife, in addition to providing economic and material resources to our campesino organizations."<sup>64</sup>

Although few such projects have moved beyond initial research and feasibility studies, the experience of those that have is illustrative. One of these was initiated in Marqués de Comillas by a community worker employed by INI. The interest of ejidatarios of Reforma Agraria in increasing production of military macaws was at first stimulated by high international demand and prices; eventually, however, continued resistance by SEDUE to wildlife commercialization and Mexico's accession to CITES led to a change in project goals from commercialization to ecotourism. The project began in 1990 with a grant from INI of US\$7300.00 for the community to construct 30 artificial nests in a section of its remaining 1000 hectares of forest. The project was begun at the end of the macaw breeding season, so the nests were used instead by owls, woodpeckers, and raptors. Funding terminated after the first three months of the project, and the ejido is now seeking other assistance to continue nest construction, build a tourist station, and acquire skiffs to transport tourists. Also under consideration is the establishment of an ejidal forest

reserve. However, few tourists presently penetrate the region, and it is doubtful that the tourism investment would be recuperated in the near future.<sup>65</sup>

Another wildlife production project involved the captive breeding of collared peccaries in Lacanjá-Chansayab, a Lacandon settlement within the Comunidad Lacandona. The project was begun by INIREB in 1983 and later continued by Ecósfera with funding from WWF-US. Interest in the project was stimulated by the importance of traditional use of peccary by the Lacandones, the high hunting pressure to which it is subjected throughout the Selva, their importance in seed dispersal in tropical ecosystems, and the fact that by-products such as skins and teeth were simply discarded as a result of the prohibition of wildlife commercialization. Eight years later, the principal investigator concluded that farming was not feasible as a result of community organization into rival clans, which made cooperative management difficult; the conflict between agricultural activity and the labor requirements of peccary production; the difficulty of meeting fodder requirements; the difficulty and expense involved in constructing 'rustic' enclosures capable of preventing the animals' escape; and the group behavior of the peccaries themselves, which attacked and sometimes killed new introductions to the herd. The investigator is now exploring ecotourism as an alternative means of income generation.<sup>66</sup>

Conclusion

In the long term, ecotourism and socioeconomic development of this frontier may reduce reliance on both subsistence and market hunting. In the short term, incentives for self-regulation are undone by the precarious economic status of the inhabitants of the Selva and uncertainty and conflict over land tenure, which eliminate incentives to achieve long-term sustainability. Dramatic policy changes stemming from fluctuating degrees of official interest in conservation only help to increase the widespread sense of insecurity and encourage maximum exploitation of natural resources before activity is banned or communities are relocated. As more and more activities become economically impossible or legally prohibited, the only alternative becomes unregulated, unsustainable, illegal exploitation, unlikely to contribute either to development or to conservation.

Against this backdrop, President Salinas announced in February, 1992 an initiative to expand the area of the Montes Azules reserve by 55,000 hectares to the east--thus incorporating more human settlements.<sup>67</sup> In August of the same year, the Lacan-Tun Biosphere Reserve, with an extension of 61,873 hectares, and the Chan-Kin wildlife reserve, with an extension of 12,184 hectares, were declared within the municipality of Ocosingo, while the archaeological sites of Bonampak and Yaxchilan were granted

protected status as Natural Monuments.<sup>68</sup> In a significant change of policy, the decree creating the Lacan-Tun Reserve prohibits hunting only of endangered, threatened, rare, and protected species, although all hunting is still prohibited under the annual hunting calendars.

The expansion of the area protected under federal law will help to ward off two significant threats to the ecosystem: petroleum exploitation, likely to accelerate as a result of external financing and competition over shared oil fields with Guatemala;<sup>69</sup> and the planned reactivation of a major hydroelectric project in the Usumacinta River Basin, originally conceived as a cooperative venture with Guatemala and halted in 1989 at that country's request after international protest over the flooding of tropical forests and Mayan archaeological sites.<sup>70</sup> However, it offers little for human populations in the region unless some equitable compromise can be developed to govern the exploitation of wildlife and other natural resources.

Postscript: Rainforest Conservation in Los Chimalapas

The experience of the Montes Azules Reserve is similar to, and has affected, proposals for the creation of another biosphere reserve in the Mexican tropics, that of Los Chimalapas on the Chiapas-Oaxaca border. Los Chimalapas is now considered to be the most important remaining expanse of tropical forest in Mexico, and has similarly been impacted by territorial disputes and officially-sponsored

colonization programs. The current debate over the future of Los Chimalapas appears to offer an opportunity to learn from the experience of Montes Azules and to set a new direction for protected areas management in the Mexican tropics. Results to date have not been encouraging.

The eastern portion of the region was sold by the Spanish crown in the 17th century to the communities of Santa María and San Miguel Chimalapas, whose property rights were recognized by the Mexican government in 1850 and in 1867.<sup>71</sup> The state of Chiapas, however, claims possession of a 10,000 hectare area along the border with Oaxaca, and in the 1960s began to encourage colonization of the disputed boundary zone by Tzotzil and other indigenous Chiapanecos, who have now established 16 settlements on communal lands in Oaxaca. In this and other zones, conflicts have been created by the expropriation, concession, or sale of community lands to settlers dislocated by the Uxpanapa hydroelectric project, and to private ranchers and lumber companies, and spontaneous colonization by workers brought into the region. The result has been private forestry exploitation on communal lands, illegal marketing of forestry products, expansion of cattle ranching, illegal wildlife harvest and trade, violent conflict among communities and between communities and private livestock and forestry interests, and incursions by Chiapanecan police

to protect the latter.<sup>72</sup> Settlers from Chiapas in turn protest violence encouraged by the Oaxacan government.<sup>73</sup>

Several official efforts have been made to regularize this situation. Attempts were made in 1979-80, 1983-85, 1986, 1987, and 1989 to organize communal forestry production, but its development has been halting and success limited to a few communities. A new effort to encourage its expansion is now underway by SARH, with funding from the IDB forestry loan, but there is little evidence of change in the underlying context of caciquismo, corruption, and centralization. In 1990, a complete ban on forestry activities was imposed, fostering the growth of a black market in forestry products.<sup>74</sup>

In 1988, a special subcommittee of the state Commission for Economic Development Planning (Comisión de Planeación del Desarrollo Económico del Estado, or COPLADE) was formed with governmental and nongovernmental representatives for Los Chimalapas. COPLADE began an investment of some US\$1.5 million in small-scale development projects, with part of the funding from the MacArthur Foundation, but by the end of its first year 80% of the projects funded had already collapsed due to lack of extension and technical assistance.<sup>75</sup>

In 1989, the subcommittee created the Vocalía Ejecutiva de Los Chimalapas, with participation by federal and state government entities, the communities of Santa

María and San Miguel Chimalapas, and a number of local and national NGOs. At the same time, both WWF-US and the MacArthur Foundation provided funding for the development of management plans for the region by the Vocalía, with the study conducted by the NGO Biocenosis, and of a socio-economic survey by the Pacto de Grupos Ecologistas, which in turn provided information for the Vocalía's proposal.

The result of these actions was a division of involved parties into two hostile camps. Biocenosis, the Vocalía, SEDUE, and the state of Chiapas favor the immediate creation of a biosphere reserve in the region. The Pacto and the communities of Santa María and San Miguel, their fears based partly on the experience of the Selva Lacandona, argue that the creation of a biosphere reserve without the prior settlement of land disputes will simply intensify both conflict and natural resource destruction while minimizing opportunities for economic development for the region's economically marginalized inhabitants.<sup>76</sup> They propose instead that territorial and property disputes be resolved, followed by the creation of a community reserve realized through consultation among residents of the region.

To achieve this aim, the two communities in 1991 initiated a process of consultation among the diverse settlements. Despite repeated threats by Chiapanecan police agents against those cooperating in this effort, the communities reached an agreement to end the conflict,

recognize the land rights of all existing settlements, prohibit further settlement, and cooperate in projects of social and economic development and forest protection.<sup>77</sup>

The conflict continues, however. The Vocalía and Biocenosis have attributed local resistance to the creation of a reserve to the pressures of livestock and forestry interests. SEDUE, for its part, attacked the MacArthur Foundation for funding the study which led to this resistance.<sup>78</sup> A new attempt by SEDUE to declare the reserve in early 1992 was blocked at the last minute by a visit by President Salinas' advisor on tropical forest protection. After hearing of threats by Chiapanecan authorities against comuneros and ejidatarios, the advisor gained a presidential agreement to block the decree until land claims could be settled.<sup>79</sup> The communities of Los Chimalapas and the Pacto are now attempting to block the construction of two new highways through the area, supported by the government of Chiapas and Chiapanecan livestock and agricultural associations.<sup>80</sup> In the meantime, the Vocalía has dissolved, along with the inter-sectorial communication it was designed to foster.

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CHAPTER 12  
CASE STUDY: PRESERVING SEA TURTLES

Introduction

The status of sea turtle populations is of special concern to conservationists due to the number of threats these species face and the difficulty of measuring the impact on wild populations. Worldwide subsistence and commercial harvest for meat, eggs, shell, skins, and oil; extensive international trade in turtle products; incidental capture in shrimp and other fisheries; the destruction of coastal nesting habitat; and marine pollution all have contributed to sharp declines in the nine species found worldwide.<sup>1</sup> Because sea turtles are highly migratory and emerge from the sea only to nest, past research has been unable to determine with any degree of certainty total population numbers, age of reproductive maturity, longevity, or hatchling success rates, while the life history of these species makes it exceedingly difficult to produce the animals in captivity or to monitor or predict the effect of harvest of wild populations.<sup>2</sup>

As early as the 1960s and 1970s, Mexico's legal and illegal turtle fisheries had generated concern among Mexican and international conservationists. The most visible target

was the legal Pacific olive ridley fishery, with its slaughterhouses, factories, and mountains of discarded shells presenting a stark image to those favoring complete protection. After 1973, CITES increased international concern by facilitating data collection on legal and illegal Mexican exports. Mexico responded by increasing the number of protection and research camps on nesting beaches, but insisted that the ridley fishery was too important to regional economies to close it down.

All this changed, however, in 1989-90. The olive ridley fishery had been linked in U.S.-Mexico negotiations to pressures from the U.S. to reduce incidental mortality of sea turtles in the nets of its shrimp fleet, a controversy which remains unresolved, and in 1989 U.S. legislation was passed mandating shrimp embargoes against nations lacking adequate sea turtle conservation programs. With this political opening, pressures from environmental organizations on Mexico's olive ridley fishery intensified. Greenpeace, for example, greeted a visit by President Salinas to London with a demonstration denouncing the trade. Earth Island Institute launched a mail-in campaign that flooded government offices with postcards from concerned U.S. citizens, and less public pressures continued from WWF, CITES, and the U.S. State Department. In 1990 Salinas decreed a total and permanent ban on harvest, sale, and trade of sea turtles and their products, accompanied for the

first time by stiff penalties and significant enforcement effort, and research on incidental mortality and turtle excluder devices (TEDs) was intensified. Both of these issues will be discussed in the following sections.

#### Shrimpers and Turtles

During the 1980s, as the conservation movement pushed for increasingly stringent measures to reduce incidental capture of marine turtles by shrimp trawlers, U.S. shrimpers in turn pushed for similar requirements in other nations to prevent a situation of competitive disadvantage. The Mexican shrimp industry, which sends roughly one-third of its production and three quarters of its exports to the United States<sup>3</sup> and which competes with U.S. shrimpers in the Gulf of Mexico,<sup>4</sup> was among its targets.

In 1987, after several years of research on TEDS, which are attached to shrimp nets to allow the turtles' escape, the U. S. National Marine Fisheries Service (NMFS) issued regulations requiring their use by shrimp trawlers in the Gulf of Mexico and parts of the Atlantic. Resistance by U.S. shrimpers, including court action by the state of Louisiana and Concerned Shrimpers of Louisiana and harbor blockades by Texas fishermen, delayed implementation of these regulations. During the 1988 Endangered Species Act reauthorization hearings, shrimpers argued that the devices sharply reduced their shrimp catch as well, and won amendments delaying the effective dates of the regulations

to May 1989 for offshore areas and May 1990 for inshore. Further delays occurred due to continued litigation, but in September 1989 environmentalists obtained a court order demanding enforcement by the Department of Commerce.<sup>5</sup>

In November, 1989, President Bush added an amendment to the budget instructing the Department of Commerce to take required actions to ensure the protection of sea turtles caught incidentally by the shrimp fleet; included was a mandate to impose embargoes against shrimp imports from nations lacking sea turtle protection programs comparable to those of the United States.<sup>6</sup> An embargo could be avoided by the U.S. President's certification that the country in question had such a conservation program and that its rates of incidental capture were at least equal to those of the United States. Implementing regulations issued in 1991 gave countries with Gulf and Atlantic fleets a period of three years, beginning May 1, 1991, to develop required programs. Initial certification required demonstration of legal requirements for the use of TEDS, reduction of trawling time to reduce the number of turtles drowned in the nets, resuscitation of captured specimens, and appropriate sanctions for violators. Subsequent certification required effective implementation of these programs, reports by affected countries detailing implementation and the imposition of penalties, and agreement to cooperate with U.S. requests for scientific data or technical cooperation.

On May 1, 1991, Mexico received initial certification by President Bush.

Mexico had begun its first research program on incidental take of marine turtles in 1983, with the NMFS providing two TEDS for trial runs from Tampico, Tamaulipas. From 1984 to 1987, experimental use of TEDS was conducted on 14 voyages on the Gulf and Pacific coasts; the four-year reported result was a reduction in the shrimp catch of 17% in the Gulf and 14.2% in the Pacific, with no capture of turtles.<sup>7</sup> Not surprisingly, Mexico's research effort was redoubled in 1990. The May 1990 decree extending complete protection to sea turtles included the requirement that turtles caught incidentally by fishermen be returned to the sea, whether dead or alive, and instructed SEPESCA to establish a research program to determine the degree and impact of incidental capture and to establish gear modifications for its reduction.<sup>8</sup> Seminars were held in Tampico and Guaymas in 1990 and 1991 for the "Training of Technical Cadres Specialized in the Construction, Installation, and Use of Turtle Excluder Devices," with financial assistance from USAID and instructors provided by the NMFS. In late 1990 and early 1991, 15 experimental runs were made by commercial trawlers in the Gulf, using four different models of TED, which were again provided by the NMFS. Reported results indicated an 11% reduction in shrimp catch, with no sea turtles captured.<sup>9</sup>

On May 17, 1991, SEPESCA published new regulations requiring shrimpers to register incidental captures of marine turtles, to resuscitate and release when possible captured turtles, and to cooperate with SEPESCA observer and TED research programs.<sup>10</sup> In the 1991-92 season, an observer program was created to evaluate existing incidental capture and the economic impact of TED use. Results indicated a loss in shrimp catches of 27% in the Gulf and 29% in the Pacific as the result of TED use. A sample size of 286 trips resulted in a total take of 51 turtles, 7 using TEDS and 44 without. Extrapolating to the entire shrimp fleet from the non-TED trawls, SEPESCA estimated a total mortality of 1913 for the entire shrimp fleet during the 1991-92 season.<sup>11</sup> The reliability of these data is highly questionable, however. First, only 177 of the trips were selected for statistical analysis: 160 from the Gulf of Mexico and 17 from the Pacific. The reason for eliminating 109 trips from the analysis was not given. Furthermore, most of the eliminated data were from the Pacific, where 70% of Mexico's shrimp catch is obtained and where it is likely that vessels operating offshore from southern nesting beaches capture significant numbers of turtles. Recapture of Pacific green (or black) turtles tagged on the coast of Michoacan suggests that incidental mortality by shrimp trawlers may be quite heavy.<sup>12</sup> Finally, although no further data are available, it appears highly unlikely that

the previous six years of research detected zero capture of marine turtles, or that the 1991-92 report reflects Mexican fleet performance, given recorded U.S. and other fleet captures in the same waters. Annual captures by U.S. vessels off the Atlantic and Gulf coasts, for example, were estimated in 1987 at approximately 11,000 turtles.<sup>13</sup>

The threat of a U.S. embargo thus appears to have achieved the result some observers predicted for the tuna embargo--namely, eliminating the possibility that accurate evaluation can be made of the impact of commercial fishing on sea turtle populations. The suggestion of data manipulation is more evident for the shrimp than for the tuna fishery, for two reasons. First, the stakes are much higher for the former, as exports generate more than \$200 million annually, as compared to \$20 million for the tuna industry.<sup>14</sup> Second, the tuna fleet is observed by Inter-American Tropical Tuna Commission as well as SEPESCA, so that any significant manipulation of data would be readily apparent by comparing the two sets of data. No such constant is available for the shrimp fleet.

The economic impact of a U.S. shrimp embargo, however, would be very much similar to that experienced by the Mexican tuna fleet. Like the tuna fishermen, the cooperatives to which the fishery was reserved until 1991 has been undergoing a deep crisis in recent years. Overexploitation of the fishery coupled with the evaporation

of credits from dissolved parastatal processing plants has led to widespread bank seizures of cooperatives' vessels and a decline in production of 20% between 1989 and 1990.<sup>15</sup> The entry of private capital into the shrimp fishery comes at the expense of the cooperatives, as their current weakened position contributes to their inability to compete with the private fleet. Between September 1991 and March 1992, private companies purchased more than 400 boats from bankrupt cooperatives.<sup>16</sup> Some 350 of these vessels entered the fleet during the 1991 season,<sup>17</sup> and in 1991 shrimp production rose to 83,000 tons, with approximately 40,000 tons exported to the United States.<sup>18</sup> The imposition of TED requirements is widely perceived within the industry as an effort to weaken this recovery and open Mexico's shrimp fishery to foreign fleets,<sup>19</sup> a perception likely to hinder cooperation by shrimpers with turtle conservation measures.

While a further "shaking out" of the Mexican cooperatives is not inconsistent with Salinas' economic goals, the loss of export earnings is. However, despite their experience with the tuna embargo, SEPESCA officials appear to remain confident that current efforts to reduce incidental mortality will be sufficient to avoid an embargo.<sup>20</sup> They cite their extensive nesting beach protection programs, a strategy countered by Earth Island Institute claims that considerable illegal trade continues, and renewed public uproar over the neglect of nesting

beaches during the transition period following SEDUE's dissolution.<sup>21</sup> A U.S. embargo may well be imposed before 1994, as Earth Island Institute initiated court action against the Department of Commerce in February 1992.<sup>22</sup>

### The Sea Turtle Ban

If the impact of outside conservation pressures on the shrimp fishery have been significant, the the consequences for Mexican cooperatives--to which the sea turtle fishery was reserved from 1972 to 1992--has been devastating. The following sections provide an overview of the development of the fishery and the reasons for its closure. Particular attention is paid to the human and ecological consequences of the sea turtle ban, and to the issue of whether the fishing cooperatives were necessary casualties of efforts to protect these species.

### Mexico's Sea Turtle Fishery

Since time immemorial, sea turtles have provided meat, eggs, shell, oil, and skins to coastal populations throughout Latin America, figuring prominently in international trade well before European exploration in the region. In Mexico, sea turtle products were among those traded between Mayan settlements on the Caribbean coast and their Central American neighbors. Later, English vessels plying the Caribbean coast in search of logwood harvested or purchased from coastal residents live turtles, which when stored on their backs in the holds of ships provided an

excellent source of fresh meat.<sup>23</sup> In the Gulf of California, the Jesuit missionary Miguel del Barco reported in the late 18th century that green turtles were caught from canoes by indigenous populations for subsistence, while the hawksbill was pursued for its shell, which was transported inland for the manufacture of small crafts.<sup>24</sup> By the 1800s a market for sea turtles had developed in the Pacific United States, and meat and shell began to flow northward.<sup>25</sup>

In the 19th and early 20th centuries, the United States and Britain were the region's largest markets for hawksbill shell, and green turtle meat and soup. After a temporary lull in the 1940s and 1950s, brought about by World War II and the development of plastic substitutes for hawksbill shell, worldwide demand for shell, meat, and oil for cosmetics intensified. Furthermore, as a result of the decline in world crocodilian stocks due to demand for exotic leather, new markets developed for skins and leather of the Pacific olive ridley.<sup>26</sup>

In Mexico, nationwide turtle landings peaked in 1968 at 14,522 tons, representing roughly 358,000 turtles.<sup>27</sup> This peak was the result of rapid growth in Mexico's green turtle fishery in the Yucatan peninsula and the Gulf of California,<sup>28</sup> and the olive ridley fishery in the Pacific states of Oaxaca, Guerrero, and Jalisco.<sup>29</sup> In that year, the harvesting of eggs and exploitation of the leatherback turtle were prohibited, and an attempt made to promote full

industrial use of other species by conditioning exploitation rights on the development of industrial uses for meat, skin, bones, shell, viscera, blood, and fat.<sup>30</sup>

After 1968, sea turtle production declined, due partly to overexploitation of the resource and partly to official intervention. In 1971-72 the fishery was closed to allow recuperation, from 1972 onward the fishery was reserved to cooperatives, and from 1973 to 1976 annual quotas were set at approximately 100,000 animals per season.<sup>31</sup> While the Yucatan and Gulf fisheries continued to decline, nationwide captures remained high due to the development of the Pacific ridley fishery, first in Guerrero and Jalisco and later in Oaxaca. In 1976, captures of Pacific green turtles were prohibited except by the indigenous Seri, Huave and Pomaro communities; in 1977 Rancho Nuevo in Tamaulipas was declared a nesting reserve for small remaining populations of the Gulf ridley; in 1979 harvest of hawksbill turtles was prohibited; and in 1982 permanent closed seasons were established for all species except the olive ridley. As early as the 1960s, SEPESCA also began to establish camps on nesting beaches for research and enforcement.

These measures were poorly enforced, however, and sea turtle harvests remained important along much of Mexico's coasts. In the Yucatan peninsula, eggs of hawksbill, green, loggerhead and leatherback turtles were collected for subsistence and sale to local restaurants, as was green

turtle meat, and hawksbills were intensively harvested for the manufacture of earrings, combs, bracelets, letter openers, picture frames, and other tortoiseshell objects. This market gained importance in the 1970s and 1980s with rapid tourism development, particularly in Cancun and surrounding areas. Egg harvests remained equally important on the Pacific coast from Chiapas to Jalisco, while in the Gulf of California, where nesting now rarely occurs, the consumption and sale of meat predominated.<sup>32</sup> The legal olive ridley fishery was accompanied by an extensive illegal harvest and trade of skins and eggs.

One of the first international attempts to control the harvest of sea turtles occurred with the creation of CITES, as sea turtles were among the first species listed by that convention. All six species native to Mexico are now listed as endangered. The most important importers of sea turtle products, the United States, Japan, and the countries of Western Europe, were among the first signatories of CITES, but Japan, France, and Italy listed reservations with regard to sea turtles, and key exporting states such as Mexico and Ecuador refused to accede to the convention at all. CITES trade reporting capacity also remained relatively undeveloped in the 1970s, so that significant illegal imports also occurred in the United States. Mexico also refused to establish a cooperative regulatory framework called for by the Bonn Convention on Migratory Species with

other states in the region, notably Ecuador and Costa Rica, with which it shares the highly migratory olive ridley population. Ecuador, which acceded to CITES and closed its ridley fishery in 1982, became sufficiently frustrated with the Mexican stance to reopen its fishery, closing it again in 1990 following the Mexican ban.<sup>33</sup>

### Oaxaca

Oaxaca is one of the poorest of Mexico's states. Its population of 2.37 million, 68% of which is rural, represents 3.5% of the country's population but contributes only 1.4% of national GDP.<sup>34</sup> Until recently, its coast has been left in relative isolation, lacking accessible highways to the interior, adequate port infrastructure, and often electricity and potable water. Only the industrial port of Salina Cruz, the site of a PEMEX refinery and point of departure for a small fleet of high-seas shrimp trawlers, possesses sufficient infrastructure to contribute significantly to national fisheries production. The towns and villages to the west of Salina Cruz are engaged in the production of shrimp, lobster, skipjack tuna, shark, red snapper, grouper, octopus, clams, oysters, and until recently, sea turtles. In the last few years, significant tourism development has occurred in Santa Cruz Huatulco, Puerto Escondido, and, to a lesser extent, Puerto Angel.

The importance of the Oaxacan coast as a site for the nesting of the olive ridley sea turtle is due precisely to

Oaxaca's lack of development, as other important Pacific coast fisheries were exploited, and exhausted, much earlier.<sup>35</sup> The industrialization of olive ridley products began in Jalisco and Guerrero at the initiative of a private company, PIOSA, which was purchased in 1982 by the parastatal PROPEMEX. As sea turtle harvests declined in these states, the nesting beach at Escobilla, Oaxaca became the focus of the olive ridley industry.

In Oaxaca, nine cooperatives were granted fishing rights to the olive ridley; of these, five were located in Puerto Angel, one in Puerto Escondido, one in Cacalotepec, one at Morro Ayuta, and one at Chacahua. Although scattered olive ridley nesting occurs along the entire coast of the state, eight of these cooperatives concentrated on the nesting beach at Escobilla.

The olive ridley fisheries began showing signs of decline in the early 1980s, with legal (registered) capture decreasing from an average of 39,187 per year in 1973-1978 to 32,343 in 1980-85.<sup>36</sup> This apparent decline, coupled with increasingly negative attention from the conservation community, led to the institution of several conservation measures. The beach at Escobilla was declared a reserve, with Navy and SEPESCA personnel stationed in a permanent camp to prevent egg harvest, while the taking of turtles was permitted only at sea. Overall harvest quotas were reduced

from 48,944 in 1980 to 23,000 by 1986, remaining at that level until 1989-90.<sup>37</sup>

The harvest of sea turtle eggs had been prohibited since 1968, and in the late 1970s PIOSA initiated an egg protection program. Eggs were removed from the carcasses of harvested females and incubated, with the head-started hatchlings released at Escobilla. SEPESCA's Regional Center for Fisheries Research (Centro Regional de Investigaciones Pesqueros, or CRIP) also incubated a substantial number of eggs in conjunction with their research activities. In addition, the cooperatives were required, in return for fishing rights, to contribute to conservation measures by donating a percentage of their sales to the "Turtle Fund."

Despite these official conservation measures, the sea turtle harvest greatly exceeded the official quota for the capture of adults. In the 1970s, as international demand for exotic leather goods surged, the illegal trade in olive ridley skins from Mexico also surged. With the complicity or direct involvement of local landowners, state and federal political figures, and SEPESCA officials, high-powered speedboats engaged in night fishing just offshore of Escobilla; the skins were removed and the carcasses discarded for the sake of efficiency. While the authorized fishing cooperatives undoubtedly also exceeded their quotas, this illegal harvest was conducted for the most part by independent fishermen who obtained their equipment from the

eventual purchasers of the skins. Illegal as well as legal skins passed through the parastatal slaughterhouse and distribution facilities.<sup>38</sup>

At the same time that the official quota for adult turtles was being exceeded--according to some observers, by as much as 100%--the harvest of eggs at Escobilla and other nesting beaches continued. The consumption of sea turtle eggs by indigenous and other coastal residents is a centuries-old tradition which continued unhindered on Oaxaca's largely unprotected beaches. At Escobilla, where the Mexican navy and SEPESCA cooperated in patrolling against egg poaching, harvest also continued, albeit under different circumstances. Men and boys from nearby villages of Escobilla and Cazoaltepec now organized themselves into teams of four, two to watch for patrols and two to venture onto the beach to collect eggs. When the patrols approached, the poachers hid in the vegetation behind the beach, or immersed themselves in the sea or in one of the two lagoons bordering the reserve. The experienced hueveros, as environmentalists call them--or playeros, as they call themselves--needed only a few moments to locate the egg cavity and remove the eggs, and so were able to harvest several thousand eggs per night, despite the patrols.<sup>39</sup> (In Morro Ayuta, church bells rang to announce the arrival of nesting turtles, and residents left on horses and burros to collect eggs).<sup>40</sup> Navy and SEPESCA personnel

stationed at Escobilla also harvested the eggs, accepted bribes from local harvesters, and sold confiscated eggs. Much of the harvest was distributed to inland markets, first to Pochutla and Puerto Escondido and from there to Oaxaca City, Salina Cruz, Tehuantepec, Juchitan, and Mexico City.

The olive ridley fishery also attracted a great deal of official U.S. attention. The U.S. Fish and Wildlife Service began funding research at Escobilla in the 1970s, often including surveys of harvest, commercialization, and trade. Both NGOs and journalists publicized the illegal trade; one of the most influential of these called attention to the problems in the PIOSA egg incubation scheme--namely, that the eggs taken from slaughtered carcasses were receiving minimal care from untrained slaughterhouse employees. Subsequent reports confirmed an abysmally low hatching success rate. A later article publicized the conviction of Antonio Suarez, PIOSA's owner, on charges of illegally exporting sea turtle meat to the United States.<sup>41</sup> Following Suarez' arrest, PIOSA was purchased by PROPEMEX, but the illegal harvest and trade accelerated. Groups such as Greenpeace, the Marine Conservation Center, Earth Island Institute, and World Wildlife Fund waged public campaigns against the harvest, while the Mexican NGO Pronatura received funding from the U.S. for the collection of information on key organizers of the illegal skin trade.

In 1989 and 1990, several events converged to pressure the Mexican government to call a halt to all harvest and trade in sea turtles. Among them were activity by Greenpeace and Earth Island Institute, but also influential were a series of articles by Homero Aridjis, President of the Grupo de los Cien, detailing the history of the trade, the involvement of several well-known business and political figures, and the exploitation of the Oaxacan fishermen by smuggling rings.<sup>42</sup> Another key factor was the U.S. threat of implementing the 1988 Endangered Species Act Amendments and the 1989 law mandating U.S. embargoes against shrimp exports from countries failing to implement effective sea turtle protection measures. Coming at a time when Mexico was making its strongest pitch ever for trade, aid, and investment, this sequence of events led to the issuance of a presidential decree imposing a total and permanent ban on all harvest and trade in May 1990.<sup>43</sup> In May, 1991, Japan agreed, after a threatened U.S. embargo against imports of Japanese wildlife products, to phase out sea turtle imports. In June, 1991, Mexico acceded to CITES.

#### Oaxaca After the Ban

With the presidential decree, the taking of sea turtles or their eggs became punishable by fines ranging from two to two thousand times the daily minimum wage, prison terms, and the confiscation of all boats, motors, and fishing gear. Enforcement effort by the Navy, SEPESCA, and

SEDUE increased, for the first time becoming a significant impediment to the trade. The speedboats of independent fishermen which had dotted the horizon in front of Escobilla disappeared, and while scattered seizures of illegal skins continued, the small quantities involved suggested a sharp drop in the volume of illegal trade.

At the time the ban was imposed, an official agreement was signed between the fishing cooperatives, SEPESCA, and a number of social assistance agencies providing that the cooperatives would receive an official indemnification, fisheries development assistance, and broader social assistance such as infrastructure development and programs for electrification and the provision of potable water.<sup>44</sup> In the fall of 1990, the first of this assistance arrived. To each of the cooperatives were distributed a pickup truck for transporting their catch to market, several skiffs and motors, and longlines and nets for the capture of sharks. The fishermen of Cacalotepec, one of the poorest and most isolated communities, were provided with a cold storage room, but as of late 1991 this facility had yet to be used, as the cooperatives had received neither gasoline for its operation, nor the allotted indemnification, which might have permitted the purchase of fuel.

Conservationists supporting the ban argued that the nine cooperatives, with an average of 30 members each, lost relatively little with the closure of the fishery, due to

already reduced harvest quotas and the relatively small percentage of final value captured by the fishermen. This argument, however, ignores the central place of the sea turtle fishery in the regional economy and the significant indirect benefits stimulated by the fishery.<sup>45</sup> By 1989-90, the legal harvest quota for Oaxaca had been reduced to 20,000 turtles, divided among the roughly 270 fishers. In the late 1980s, five of the cooperatives negotiated the purchase of the PROPEMEX slaughterhouse at San Augustinillo, near Puerto Angel, and the processing and refrigeration plant in Puerto Angel. As a condition of the purchase, the cooperatives were required to sell their catch to PROPEMEX, with the purchase price of US\$50,000 subtracted from the product. Thus, until the repayment of the debt in 1988, the cooperatives received US\$5.28 per turtle, while members of the four cooperatives refusing to take part in the takeover received \$7.83. In 1989 the plant and slaughterhouse passed into the hands of the five cooperatives; in the 1989-90 season, they received \$16.35. After subtracting \$3.55 for the expenses of the cooperative for boats, motors, and fuel, and \$0.35 for the "Turtle Fund," each cooperative member received \$12.44 per turtle. In other words, the net earnings of each member for the ten-month season would total \$922.00, gross earnings \$1211.33.

The community of Masunte suffered additional losses due to its location near the slaughterhouse at San

Agustinillo, where many of the fishermen had earned additional income as employees, especially as skinners. Unusable meat and immature eggs were also distributed among community members. The cooperatives Mazunte, San Martín, Santa María, Puerto Escondido and Pastoria have also lost their investment in the slaughterhouse, now closed, and processing plant, which now only produces ice. The ex-manager of the plant under PROPEMEX, widely known to be a key figure in the illegal skin trade, is now the owner of a new processing plant, across the street from the old.

Although they present less sympathetic figures, the illegal fishermen, who of course receive no official compensation, also suffered considerable losses. While each cooperative was restricted to fishing five days per month, and prohibited from fishing during peak nesting periods, the illegal fishermen (with 75 hp motors rather than the 40-45 hp motors of the cooperatives, which allowed them to evade enforcement personnel) suffered no such restrictions. Many of them used boats, motors, fuel, and gear provided by the purchasers of the skins, and received a salary of \$124.44 per fishing day or sold the skins at \$14.22 each. Several of their boats were confiscated during the first year of the ban and are now used by SEPESCA enforcement personnel.

In some of these coastal communities, former legal and illegal fishermen have alternative sources of income to fall back on. Large-scale tourism development in Santa Cruz

Huatulco, apparently destined to become the next Acapulco or Cancun, will bring significant employment opportunities to the coastal population, although probably too few jobs to fill demand for them. Puerto Escondido and Puerto Angel attract a growing number of tourists, with associated demand for high-value fish and shellfish. Puerto Angel boasts a dock; Puerto Escondido has no dock, but still attracts a number of sport fishermen seeking billfish, tuna, and shark. A fishing cooperative in Puerto Escondido runs sport fishing and sightseeing excursions, one of which includes a sea turtle viewing component. Both ports are also accessible from the coastal highway, so that fisheries products can be transported to regional and national markets.

Other communities are less fortunate. Fishermen in Chacahua, Cacalotepec, and Rio Seco harvest shrimp from coastal lagoons, but productivity is low, and due to poor quality and poor transportation infrastructure, destined only for local markets. Again, fishermen from Mazunte are hardest hit, as they have relied almost entirely on the sea turtle and are inexperienced in other fisheries. Not surprisingly, continued illegal fishing is concentrated in Cacalotepec, Puerto Escondido, Chacahua, and Mazunte. In the administrative shuffle that followed the dissolution of SEDUE, however, the lapse in research and enforcement activity generated a temporary but widespread surge in illegal fishing and egg collection.<sup>46</sup>

While the trade in sea turtle skins appeared to have declined, or at least to have gone deep under ground, the egg trade continues openly in several coastal areas; only in those areas closest to Escobilla and thus under closest surveillance has it become more problematic. The greatest impact of the ban on egg trade, in fact, has been to make it impossible for the hueveros living close to Escobilla to market their own product. The lower prices they now receive per nest ensure continued collection in order to reach a minimum income level.

Although egg collectors occasionally come from as far away as Oaxaca City, the majority of the collection at Escobilla is done by residents of two nearby communities, Escobilla and Cazoaltepec, whose houses are scattered along the coastal highway in front of Escobilla. The majority live on communal lands, where they grow corn, peanuts, melons, and sesame. The land consists of poor, sandy soils, so that at the best of times agricultural output is low. As in much of Mexico, population growth continually reduces the plots of land available to each household. In dry years, such as 1991, the corn crop fails, and there are no commercial establishments to provide employment. A fishing cooperative was formed some years ago in Escobilla, but the rough seas render fishing impossible except for a three-month season. The community's investment was lost when the president of the cooperative dissolved it and sold the title

to fishermen in Puerto Angel. In 1990 another attempt was made to form a cooperative for shrimp fishing in nearby lagoons, but SEPESCA refused to grant the permit. Several residents come to the lagoon at night with their nets, but have to dodge the soldiers patrolling from the beach camp.

Sea turtle eggs have always provided a critical source of income to these coastal residents. The vegetation behind the beach is laced with trails between houses and to the beach and lagoons, and children learn at an early age how to enter and leave the beach without being detected. With increased enforcement under the ban, the hueveros now work alone, but gather along the highway at the end of the night's work to exchange stories of being shot at by soldiers, of running barefoot through cactus and mesquite to avoid the patrols, or even of submerging themselves in the lagoons or the sea, in the latter case often being carried great distances by the strong currents before it is safe to emerge onto the beach again.

The inhabitants of Cazoaltepec grow fruits and fish in the Río Cazoaltepec, which empties into the sea at Escobilla. Thus, hueveros from this community rely less on the sale of turtle eggs, and consume a greater proportion than residents of Escobilla. Egg poaching there has taken on the flavor of a game, and the men of the community compete at telling stories of daring escapes from the patrols. They can also enter the beach on the opposite side

of the river, out of reach of the patrols, and have been known to taunt the soldiers by throwing eggs at them across the river. In Escobilla the situation is more grim, with most of the eggs sold out of necessity, and local women sometimes prostitute themselves to the soldiers in return for permission to harvest eggs. The soldiers are easily bribed to disappear during turtle nesting. Often, they poach themselves to supplement the meager food rations that are frequently reduced by corruption.

Before the ban, eggs would either be sold on the beach, to buyers waiting with vehicles to transport them, or be transported to Pochutla on public buses or private vehicles. In 1989, the year before the ban, hueveros were paid US\$3.50 to \$8.50 per 100 eggs, depending on availability. In markets and bars, the eggs were sold for roughly \$2.50 per dozen. By the time they reached Mexico City, they sold for nearly \$1.00 each.

This market changed after 1991. Eggs were no longer sold on the beach or transported to Pochutla for sale, but were purchased in the homes of local buyers or sold directly to the outside buyers who make regular visits to Escobilla. Vendors do not openly sell eggs in Puerto Angel, Puerto Escondido, or Pochutla, and are extremely wary about selling under the table, preferring to deal only with trusted clients. Most of the commerce is conducted by the women merchants of Juchitan and Tehuantepec, where the consumption

of eggs, particularly at fiestas, is still very much a part of the change-resistant local culture. In these communities eggs are still sold openly at markets and fiestas. The merchants buy the eggs at Escobilla for \$1.75 to \$3.50 per 100 during the nesting season, although prices may rise to \$12.00 to \$17.00 from January to May, when the eggs are scarce. The eggs are then sold regionally for roughly \$3.00 per dozen fresh, \$2.00 per dozen dried, or \$2.75 per dozen boiled. Eggs also continue to be sold in cantinas, where a plate of 18 boiled eggs may cost \$13.50 to \$17.00. Fresh eggs in Mexico City are sold for roughly \$1.00.<sup>47</sup> Thus, while the price obtained by the hueveros has fallen despite their increased risk, the earnings of those who continue to market the eggs appear to have risen considerably.

#### Alternatives to the Sea Turtle Fishery

The harvest of eggs was prohibited as early as 1966, in order to preserve the resource for the more lucrative skin trade. In ecological terms, however, the more sustainable use of the resource would be precisely the harvest of eggs rather than adults. During the nesting season, the olive ridley nests in immense monthly nesting concentrations, or arribadas, in which thousands of turtles appear in a single area in the space of a few days. The nesting concentrations at Escobilla remain so dense that many nests are unearthed each season by the turtles themselves. Traditional egg exploitation reportedly focused

on these already unearthed eggs, which otherwise become the prey of dogs, crabs, and vultures.<sup>48</sup>

One solution to the economic and ecological trap of Escobilla would be to organize the hueveros into cooperatives for the exploitation of eggs during the first one or two nights of the arribada or during inter-arribada periods when nesting is less concentrated. Legalization of the harvest and sale of the eggs would enable the cooperatives to market the eggs themselves, and thus capture a greater portion of the final sale price and reduce the number of nests harvested out of necessity. Furthermore, allowed to harvest the nests openly, the population of Escobilla would be faced with a significant incentive to protect the nesting beach against nonresidents or those not participating in the cooperative, and if necessary could cooperate in beach patrols. This is indeed the type of management program currently in operation in Ostional, Costa Rica, where olive ridley arribadas result in similar nest destruction.<sup>49</sup> The fear that legalization of the trade would stimulate greater harvest on less productive beaches is insignificant in this case, as only Escobilla is subject to any real enforcement effort, and only here does nesting occur on a viable scale for controlled commercialization.

The nature of the campaigns waged in defense of the sea turtles considerably limit the likelihood that such a program could be implemented. Public education programs in

Mexico and abroad have helped to create--at least among urban residents--an image of the sea turtle as inviolate, rather than a resource to be exploited, so that public outcry overwhelms a more pragmatic approach. The campaigns are also viewed as acts of interference in domestic affairs, generating widespread hostility among public officials towards environmental NGOs. As a result, Mexican NGOs working in the field have steered away from issues of harvest and trade. Thus, the social and economic investigations which formed a central part of PRONATURA's sea turtle program have been abandoned, and staff and volunteers now devote themselves entirely to scientific research, with the exception of a single staff member charged with environmental education in nearby communities.

The shark fishery was considered by SEPESCA to be the logical substitute for the sea turtle fishery and the only alternative to receive official support. Although sharks are highly susceptible to overfishing due to their low reproductive rate and slow maturation, the shark fishery is not subject to any regulation in Mexico, and despite indications of nationwide overexploitation, no significant research effort has been devoted to these species.<sup>50</sup> Therefore, even in 1990, independent fishermen as well as cooperatives who received gear for that purpose had access to the resource. There are no closed seasons or size limits, as there are for the more valuable and more over-

exploited lobster and shrimp fisheries. Indeed, shark is either sold in Mexico as "tiburón," for specimens over 1.5 meters, or "cazón," under 1.5 meters, a category which includes both smaller species and juveniles of other species. Shark nets, which are favored over longlines because they eliminate the need for bait, are also responsible for the incidental capture of dolphins, manta rays, and ironically, sea turtles.<sup>51</sup> The sea turtles, which during the nesting season are often carrying egg clutches, are of course eaten; manta ray is eaten or marketed; and dolphins are a traditional bait for the Yucatan shark fishery, although no evidence is available to determine a similar use on the Pacific coast.

Buyers from Mexico City and Acapulco already make regular visits to Puerto Angel to buy fresh or salted fins, or whole fresh carcasses for industrial use, especially during the peak season of November-May. Shark skin production has risen as a result of the sea turtle ban, as most of the tanneries and manufacturers of exotic leather goods which remained open after the ban converted wholly or partially to sharkskin production.<sup>52</sup> However, as Oaxaca's fishermen sell the product fresh, they receive approximately US\$1.00 per kg, whereas a pair of sharkskin boots may sell for \$180.00. SEPESCA's fisheries assistance package did not include training in the processing techniques or marketing

skills which would have allowed fishermen to capture a larger share of these products' final value.

Another alternative income generator for the egg harvesters of Escobilla is ecotourism. Following the ban, Earth Island Institute proposed to construct a sea turtle museum at the site of the defunct slaughterhouse as a form of assistance for Mazunte fishermen. However, the beach is unknown and inaccessible to tourists in the area, and preliminary feasibility studies indicated a lack of interest among potential visitors. More promising would have been the relocation of the slaughterhouse facilities to Escobilla in order to provide a double attraction in the form of both a museum and a chance to view nesting and/or hatchling turtles. Escobilla lies along the frequently-traveled tourist route between Huatulco and Puerto Escondido, where turtle viewing tours are gaining popularity. With a minimal federal, state, or NGO effort to provide credit and technical assistance, the community might have been able to develop transportation services to Puerto Escondido and Puerto Angel, and to find employment in the museum, refreshment stands, grounds maintenance, and the like.

Ironically, each of these possibilities was foreclosed due in large part to Earth Island's own strategies. Federal efforts were quickly made not only to preempt the project by removing the slaughterhouse facilities,<sup>53</sup> but also plans were announced--as part of Mexico's Ten-Point Program to

prevent a U.S. embargo against tuna imports as a result of dolphin mortality by the Mexican fleet--to establish a Living Museum of the Sea Turtle at Escobilla, with funds from the World Bank environmental management loan.<sup>54</sup> The project has not yet been implemented, and was further delayed by the dissolution of SEDUE.

### Conclusion

The closure of Mexico's olive ridley fishery represents the culmination of a long history of missed opportunities. The scientific community, aware of the threat of overexploitation, paid little heed to the social dynamics underlying it. Environmental NGOs publicized the fate of turtles, not of fishermen, and failed to use their influence to urge a more equitable regulatory framework for the fishery. When they did act, it was too late for equitable alternatives, and it was the cooperativistas who suffered. Antonio Suarez invested his earnings in the tuna industry, and the PROPEMEX manager built a new fisheries processing plant, but few options exist for the fishermen.

Scientists and environmentalists also remain unconcerned about the international economic conflicts which underlie their influence in Mexico. The U.S. shrimpers played a critical role in the 1990 sea turtle ban, a role acknowledged only by Mexican turtle fishermen. This presents an interesting contrast with the efforts of the new private shrimp fleet to publicize the threat of a U.S.

shrimp embargo, and with the ability of Mexico's private tuna fleet to enlist the support of Mexican environmentalists against U.S. pressure to eliminate incidental dolphin captures. The otherwise similar dynamics of the tuna-dolphin controversy are described in the following chapter.

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CHAPTER 13  
CASE STUDY: THE TUNA-DOLPHIN CONTROVERSY

Introduction

The U.S. embargo of imports of Mexican yellowfin tuna and tuna products initiated in 1990 under the U.S. Marine Mammal Protection Act (MMPA) is but one example of an increasing trend toward unilateral use of trade measures to press for environmental protection abroad. Given scientific and technical uncertainties, highly politicized terms of debate, and the economic costs of trade sanctions, however, the ecological and diplomatic consequences of embargo politics are not always as straightforward as they might appear. This is especially true of U.S.-Mexican relations, marked by a long history of clashes over high seas fisheries management<sup>1</sup> and now troubled by Mexican charges of U.S. "ecoimperialism." Although U.S. passage of the International Dolphin Conservation Act of 1992 is widely hailed as a means of resolving the conflict, the implications of the tuna-dolphin controversy for environment and environmental policy merit careful consideration.

The United States and Mexico in the ETPO Tuna Fishery  
Development of the Tuna Fishery

The commercial tuna fishery in the Eastern Tropical Pacific Ocean (ETPO) began in San Diego at the turn of the century. Initially, the U.S. fleet consisted of "clippers" fishing with cane poles and live bait and operating the Pacific coast from California to Ecuador. Brief initial experimentation with net fishing was quickly abandoned due to the rapid deterioration of cotton nets and damage by sharks. In the mid-1950s, however, with the development of nylon nets, the U.S. fleet began to convert to purse-seiners employing the technique of encircling tuna schools with a large net maintained at the top by floats, and then hauling in the net by means of a hydraulic winch. The net is hauled aboard the vessel until the fish are concentrated in a small portion of the net remaining in the water, a scoop used to remove the fish to on-board storage compartments, and the remainder of the net hauled aboard.<sup>2</sup>

The most important commercial tuna catch in the ETPO is the yellowfin tuna, which is favored for its lighter meat and less "fishy" taste. The yellowfin is also unique in the extent to which it is discovered traveling in association with schools of dolphins, primarily spotted and spinner dolphins, although associations with common, striped, and other dolphin species also occur. Because dolphins are more active and travel closer to the surface, they can be used to

indicate the presence of yellowfin tuna schools, and the new U.S. purse seine fleet quickly developed the technique of "setting on dolphin," or rounding up and encircling the dolphin schools in order to capture the tuna schools beneath. By the 1960s, this technique had resulted in increased tuna catch, but also in rising dolphin mortality.

#### The Issue of Dolphin Protection

Because the dolphins caught in association with tuna have no commercial value, because the process of untangling dead dolphins from the nets implies the loss of valuable fishing time, and because dolphins which escape from the nets will continue to be useful in locating tuna, the tuna fleet as early as 1960 developed the 'backdown' maneuver to facilitate the dolphins' release from the nets. The backdown procedure begins after the net has been partially hauled aboard, and involves shifting the vessel engine into reverse, causing the corkline at the far end of the net to submerge and effectively causing the net to be pulled out from under the dolphins. Speedboats are stationed at this end of the net in order to assist the dolphins' escape and to ensure that tuna do not escape as well. As many dolphins continued to become entangled in the far end of the net, the fleet by 1971 had developed the fine-mesh Medina safety panel at the uppermost strip of the net's release area.

The effectiveness of these measures is reflected in early estimates of dolphin mortality in the ETPO. Estimated

mortality of offshore spotted, Eastern spinner, and whitebelly spinner dolphins increased from 109,000 in 1959, when sets on dolphins first came into use on a significant scale, to 853,000 in 1960. Following adoption of the backdown procedure in 1960, mortality dropped to 713,000 in 1961, 169,000 in 1962, and 213,000 in 1963. Between 1964 and 1968, the number of seiners increased and the fishery moved farther offshore, where fishing on dolphin rather than schools of fish was the dominant technique employed, and mortality estimates again rose to an annual average of roughly 380,000. In 1969, the fishery expanded farther west, into an area in which nearly all tuna sets occur in association with dolphin, resulting in mortality of 529,000 in 1969 and 492,000 in 1970. Use of the Medina safety panel and other measures resulted in a drop in mortality from 315,000 in 1971 to 134,000 in 1976.<sup>3</sup>

In 1972, partly in response to continued high mortality in 1969-1970, the U.S. Congress passed the MMPA, intended to prevent populations of marine mammals from declining below their 'optimum sustainable population' and to restore any stock which had fallen below that level. Although the MMPA entered into effect in late 1972, its provisions were not applied to commercial fishing fleets until late 1974, after which marine mammals could not be 'taken' except under the terms of permits issued by the U.S. National Marine Fisheries Service (NMFS). Such permits were

issued to the American Tunaboat Association, as representing the U.S. fleet, under the condition that vessels use required gear, maintain logs of their fishing activities, and carry government observers when required. The MMPA also contained provisions for U.S. embargoes against fisheries imports from any country failing to institute programs for the protection of marine mammals. Between 1975 and 1990, MMPA embargoes of yellowfin tuna were imposed against Peru, Senegal, Congo, Mexico, the USSR, El Salvador, Venezuela, Vanuatu, Panama, Ecuador, and Spain.

In 1974, U.S. environmental organizations brought suit against the Department of Commerce protesting the issuance of general permits for the taking of dolphins. The 1976 decision in the U.S. District Court was to prohibit any taking of porpoise. A series of legal battles delayed the order, which was finally forestalled altogether by the establishment of annual porpoise kill quotas. The first quota was set a total of 78,000 porpoise in 1976 and was reached by October of the same year, after which porpoise fishing was prohibited until 1977. Beginning in 1977, species quotas were also set within the overall kill quota of 62,429, but in that year U.S. fleet mortality estimates dropped to a record low of 23,000. The overall kill quotas were reduced to 51,945 in 1978, 41,610 in 1979, 31,150 in 1980, and 20,500 from 1981 to 1986, with extensions in 1986 and 1988.<sup>4</sup> U.S. mortality estimates have been lower than

these quotas in every year except 1976, 1982, and 1986, aided by the development of techniques such as the use of speed boats to prevent net collapse and rafts to aid dolphins in escaping; larger safety panels constructed of finer-mesh net; the prohibition of night sets and the use of small explosives to herd dolphins; and the provision of training workshops to vessel captains and crews. The development of these measures was aided by the creation of the industry-financed U.S. Tuna Foundation and its research arm, the Porpoise Rescue Foundation, and were subsequently required by the MMPA. In 1981, the MMPA was amended to state that the goal of zero mortality would be met for the purse-seine fishery "by a continuation of the application of the best marine mammal safety techniques and equipment that are economically and technologically practicable."<sup>5</sup>

The Latin American fleet operating in the ETPO began to form in the 1930s and 1940s, and in 1950 the Inter-American Tropical Tuna Commission (IATTC) was created by agreement between the United States and Costa Rica, with Panama, Ecuador, Mexico, Canada, Japan, France, Nicaragua, and Vanuatu later adhering.<sup>6</sup> In the 1970s, with the declaration of national Exclusive Economic Zones (EEZs) consistent with the international Law of the Sea negotiations, the non-U.S. fleet grew rapidly, and began to account for a growing proportion of dolphin mortality in the ETPO. In 1976, in response to a proposal by the Mexican

government, the duties of the IATTC were expanded to include data collection on dolphin populations and incidental mortality, research on dolphin behavior and potential gear modifications, and education in order to maintain dolphin stocks and minimize incidental take.<sup>7</sup> The IATTC tuna-vessel observer program began in 1979, covering roughly 30% of each of the fleets fishing in the ETPO except the Mexican, which joined the observer program in 1986.

In 1976, the U.S. fleet fishing in association with dolphins numbered 155, and was responsible for an estimated dolphin mortality of approximately 110,000, while the non-U.S. fleet was composed of 94 vessels, with an estimated mortality of roughly 20,000. After 1976 the number of U.S. vessels declined steadily, to 101 in 1978, 60 in 1983, 34 in 1986, and 29 in 1989. U.S. fleet mortality averaged 16,194 annually during this period, dropping to 1002 by 1991. Non-U.S. vessels, numbering 94 in 1976, increased to 132 by 1980, dropped to below 100 from 1982-1984, again increased to 126 in 1987, and maintained at between 93 and 95 vessels in the period 1988-1990. Dolphin mortality attributed to the non-U.S. fleet, virtually equal to the U.S. kill in 1977, remained below 25,000 until 1984, increasing to 39,642 in 1985.<sup>8</sup>

The foreign fleet estimates, however, did not include the Mexican fleet, which accounted for the bulk of the non-U.S. tuna capture in the ETPO. In 1986, when Mexico began

to participate in the international observer program, NMFS estimates of incidental dolphin mortality by the Mexican fleet totaled roughly 80,000 dolphins, and the non-U.S. fleet kill estimate jumped to 112,482. After 1986 the foreign fleet kill declined to 85,195 in 1987, 59,215 in 1988, 84,336 in 1989, 47,448 in 1990, and 26,290 in 1991.<sup>9</sup> Mexican dolphin kills dropped to roughly 55,000 in 1987, 40,000 in 1988, 50,000 in 1989, 26,000 in 1990, and 16,000 in 1991. This drop occurred despite a rise in production from 113,000 metric tons in 1986 to 130,000 in 1991.<sup>10</sup>

#### The MMPA and Embargo Politics: 1988-1992

In 1984, the MMPA was amended such that dolphin-protection programs similar to those of the United States would be required in order to avoid trade sanctions.<sup>11</sup> Not until 1988, however, did the NMFS issue interim final regulations. Intense pressure from the environmental lobby against both the U.S. and foreign fleet dolphin take in the 1988 reauthorization hearings resulted in more detailed requirements for the domestic fleet and the imposition of more specific standards for judging foreign fleet performance.<sup>12</sup> For the U.S. fleet, 100% observer coverage was required, kill-rate performance standards were established for individual captains, night sets and the use of small explosive charges to herd dolphins were prohibited, and percentages were set for individual species within the

global mortality quota: the eastern spinner dolphin 15%, and the coastal stock of the spotted dolphin 2%.

The amendments required U.S. tuna embargoes against those countries lacking similar marine mammal provisions, or whose tuna fleets exceed twice the U.S. kill for 1989 and 1.25 the U.S. kill for 1990. The ETPO fishing nations were informed of the details of the 1988 MMPA Amendments at an IATTC dolphin workshop in Costa Rica in March 1989, at which the U.S. State Department representative described 1989 as a 'test year' in which affected countries would have to demonstrate enforcement of required regulations.<sup>13</sup>

Then, in April 1990, the three largest U.S. canneries, Star Kist, Bumble Bee, and Van Camp, announced their 'dolphin-safe' policies. Under intense pressure from environmental and animal rights organizations, and facing a consumer boycott of non-albacore tuna and the introduction of House and Senate bills requiring 'dolphin-safe' labelling by law, the canneries announced that they would no longer purchase tuna from the ETPO without a written statement from a certified observer that no fishing on dolphins had occurred during the fishing trip.<sup>14</sup>

In June, 1990, Earth Island Institute brought suit against the U.S. Department of Commerce in the district court of San Francisco, alleging that NMFS had failed to implement the 1988 MMPA Amendments by continuing to permit tuna imports from Mexico and other countries exhibiting high

dolphin mortality. On August 28, 1990, a district court ruled in favor of Earth Island Institute, and on October 10, 1990 the U.S. issued an embargo on all yellowfin tuna imported from Mexico, Colombia, Panama, Ecuador, Venezuela and Vanuatu. Panama, Ecuador, and Vanuatu subsequently demonstrated comparable dolphin protection programs and were allowed to resume tuna exports to the United States.

Following the court-imposed embargo of 1990, the IATTC member nations went into action. At an intergovernmental meeting in September 1990, the ETPO fishing nations issued a resolution adopting an international program including 100-percent observer coverage of participating nations; establishment of mortality limits; research programs on the tuna-dolphin association and on alternative gear and fishing techniques; and training programs to improve fleet performance and develop national research capacity. The program was to be coordinated by the IATTC, with funding from government, industry, NGO, and international sources.<sup>15</sup> The details of the program were discussed and agreed upon at an intergovernmental meeting in January, 1991, which resolved to establish 100% observer coverage by July 1, 1991, to be financed by a contribution of US\$10.00 per ton of capacity by each of the vessels operating within the ETPO; contributions by each of the participating nations in national research programs on alternative fishing techniques; national dolphin protection programs to achieve

by 1991 a 50% reduction in 1989 mortality rates; and continued negotiations toward a 1992 program that would reduce incidental mortality to a level approaching zero.<sup>16</sup> At the annual IATTC meeting in April 1992, overall kill limits were set for the ETPO fleet, to be reduced from 19,500 in 1993 to less than 5000 in 1999.<sup>17</sup> By the end of 1991 the U.S., Ecuador, Panama, Venezuela, and Vanuatu had adopted 100% observer coverage, while Mexico rapidly approached that goal for 1992.<sup>18</sup>

The embargo was rescinded on November 14, 1990, but reinstated on February 11, 1991, with the addition of a secondary embargo to go into effect in May 1991. Mexico challenged the embargo before an arbitration panel of the General Agreement on Tariffs and Trade (GATT), which in August 1991 found the embargo to be inconsistent with GATT rules. Following high-level negotiations to resolve the dispute, Mexico offered to drop its protest before GATT and to expand its dolphin protection program in return for a U.S. commitment to lift the embargo.<sup>19</sup>

Despite Mexican efforts to uphold its end of the bargain, the U.S. State Department had underestimated the difficulty of revising U.S. regulations. Facing intense public concern over the effects not only of the GATT panel decision, but also of the North American Free Trade Agreement negotiations, on U.S. and international environmental laws, Congressional amendments perceived as

weakening the MMPA were a political impossibility.<sup>20</sup> The Departments of State and Commerce were unable to prevent either the continuation of the original embargo or the court-ordered imposition of a secondary embargo in February 1992, affecting some 27 nations which had refused to follow the U.S. in banning imports of tuna from Mexico, Colombia, Venezuela and Vanuatu. The countries potentially affected included Panama and Ecuador, which had already prohibited dolphin sets, and Costa Rica, which has no tuna fleet at all, as well as major importers of Mexican tuna such as Spain, Italy, France, and Japan.<sup>21</sup> In March, 1992, Panama became the first nation to prohibit imports of Mexican tuna as a result of the U.S. secondary embargo.<sup>22</sup>

Almost simultaneously, the GATT Council, considering Mexico's complaint against the U.S. embargo, failed to adopt the earlier panel ruling. Venezuela and the European Community protested the new decision, with the EC threatening to file its own complaint if the panel ruling was not adopted.<sup>23</sup> In the meantime, Mexico declared that it would impose a moratorium on dolphin sets ETPO by 1994 if expanded research programs were unable to reduce incidental dolphin mortality to zero by that date,<sup>24</sup> a goal which the IATTC declared unrealistic.<sup>25</sup>

In June, 1992, the stalemate was resolved. A compromise agreement was reached between the United States, Mexico, and Venezuela to impose a moratorium on dolphin sets

in the ETPO by 1994 if expanded national and international research programs were unable to reduce incidental dolphin mortality to zero by that date.<sup>26</sup> This agreement was formalized in June 1992 with the introduction of H.R. 5419, The International Dolphin Conservation Act of 1992, which was signed into law on October 27, 1992.<sup>27</sup> The Act calls for a five-year moratorium on dolphin sets, beginning in 1994, during which it would be illegal to import any tuna or tuna products not certified as dolphin-safe. Although existing embargoes will be lifted, nations not complying with the moratorium after 1994 would again be subject to U.S. import bans. In July 1992, the European Commission also proposed new regulations banning purse-seine sets on dolphins.<sup>28</sup>

### Industries and Environmentalists

#### Regulatory Measures and U.S. Fleet Performance

While the U.S. fleet is responsible for the development of the most effective dolphin-protection measures currently in place, its support of legislatively-imposed protection has not been entirely wholehearted. The industry fought the initial imposition of kill quotas, opposed and successfully overturned a 1980 NMFS order prohibiting sundown sets, and achieved the 1984 freeze on mortality quotas. In 1981 the American Tunaboat Association sued to end the enforcement component of the NMFS observer program, beginning a legal battle which prevented NMFS observers from boarding U.S.

vessels until 1984.<sup>29</sup> Observers are also frequently subject to verbal and physical harassment by ship captains and crew.<sup>30</sup> The U.S. fleet has also been accused of evading the MMPA through transfer of vessels to foreign registry or transfer of U.S. vessels to new fishing grounds. Between 1974 and 1988 a total of 90 purse seiners (including 2 or 3 vessels involved in repeat transactions) were transferred from U.S. to foreign fleets. Many of these transfers were destined to other ETPO fleets: 21 to Venezuela, 16 to Mexico, 7 to Chile, 6 to Vanuatu, 4 to Panama, and 3 to Costa Rica. The net result was a reduction in the U.S. purse seine fleet from 101 in 1979 to 66 in 1988.<sup>31</sup>

The transfer of tuna vessels to foreign flag registry was, however, due in large part to industry restructuring during the 1980s. In the late 1970s and early 1980s, consumer resistance to high-priced domestic tuna and a change in preference from oil-packed to water-packed tuna led to an effort to reduce production costs by closing marginal plants in the continental U.S. and transferring production capacity to Puerto Rico and American Samoa, where canneries benefitted from lower labor costs and generous tax incentives. The U.S. canneries increasingly relied on lower-priced imports of raw and even canned tuna, with raw tuna principally from Taiwan, Japan, Venezuela, France, Ghana, Vanuatu, Mexico, and Spain, and canned tuna from

Thailand, Taiwan, the Philippines, and Indonesia.<sup>32</sup> As much of the U.S. fleet had been owned, wholly or in partnership with captains, by the processing sector, many of these vessels were sold during restructuring, while others were forced to suspend fishing because of competition with cheap imports.<sup>33</sup> By 1989, of the three largest U.S. tuna processors, two, Bumble Bee and Van Camp Seafood, had been sold to Asian food conglomerates, and the third, Star Kist, had transferred all of its processing facilities to Puerto Rico and American Samoa. By 1990 only two canneries remained in California, one owned by Bumble Bee and another by Pan Pacific Fisheries, which had reduced its personnel by 57% since 1984. As of 1989, 94% of U.S. tuna processing was based in Puerto Rico and American Samoa.<sup>34</sup>

While the transfer of the U.S. fleet to foreign registry during 1979-1989 appears to have been primarily a response to market conditions, the transfer of the remainder of the fleet from the eastern to the western Pacific in the late 1980s and early 1990s appears to be a response to increasingly stringent dolphin protection measures and especially to the dolphin-safe policy of tuna processors. Much of the U.S. fleet's fishing effort was transferred to the western Pacific during the El Niño, or warming current, of 1982-1984, but many returned to the ETPO during 1985-86.<sup>35</sup> In 1981, there were 11 U.S. vessels operating in the western Pacific, increasing to 17, 29, and 49 vessels in

1982, 1983, and 1984, respectively, dropping back to 33 vessels in 1989.<sup>36</sup> By 1988, virtually all of the purse seiners left in the U.S. fleet were again fishing in the ETPO. After 1988 the U.S. purse-seine fleet in the ETPO again declined, from 54 in 1987 and 1988 to 53 in 1989, 46 in 1990, and 23 in 1991. According to the IATTC and the American Tunaboat Association (ATA), by 1991-1992 only five or six of these vessels operated full time in the ETPO. The decline of U.S. fleet fishing effort in the ETPO is also reflected in catch statistics, which dropped from 110,000 short tons in 1987 to 97,225 in 1988, 86,730 in 1989, 59,201 in 1990, and 24,173 in 1991.<sup>37</sup> This large-scale relocation has been possible due to a 1987 U.S. agreement with the Foreign Fishery Agency of the South Pacific Forum, which provided for a U.S. transfer of \$60 million in license fees, technical assistance, and aid.<sup>38</sup> A recent extension of the agreement opened access for the remainder of the U.S. ETPO fleet.<sup>39</sup>

#### The Mexican Tuna Industry

The small boats of the U.S. fleet began appearing in Mexican waters in the early 20th century, prompting the beginnings of a small Mexican industry by the 1930s.<sup>40</sup> In 1976, Mexico's tuna fleet consisted of 27 vessels based in Ensenada, Baja California, a free trade zone where vessels, parts, and other inputs could be imported from the U.S., and in close proximity to the California canneries. The

linkages between the U.S. and Mexican tuna industries included not only exchange of inputs and production and continued U.S. fishing in Mexican waters, but also of labor, with the employment of U.S. crewmembers on Mexican vessels and a much greater involvement of Mexican workers on U.S. vessels.<sup>41</sup>

In 1976, with Mexico's establishment of a 200-mile EEZ, the Mexican government established exclusive management authority over tuna and other resources within its EEZ and initiated an ambitious fisheries development program. In that year, fisheries administration was moved from the Ministry of Commerce to achieve cabinet status under a new Secretaria de Pesca (SEPECSA), and in 1979 the Banco Nacional Pesquero y Portuario (National Fishery and Ports Development Bank, or BANPECSA) was created to provide credit to the developing industry. By 1982, private investors, many of which moved into the tuna industry as a result of the 1979 nationalization of the shrimp fleet and its transfer to cooperatives, had purchased 54 new purse seiners, with BANPECSA financing 31 vessels and guaranteeing the debt on the remainder. The parastatal PROPEMEX was also involved in vessel construction and purchase and by 1986 itself operated nine canneries, twenty purse seiners, and five bait boats.<sup>42</sup>

Mexico's tuna industry, producing a mere 2,426 short tons annually in 1966, grew steadily to a production of

15,016 tons by 1976, 26,261 in 1979, and 46,746 in 1981.<sup>43</sup> In 1969, the IATTC began to establish seasonal catch quotas for yellowfin tuna, but the growth of the Mexican fleet led to increasing resistance to the quotas, which Mexico argued favored the United States at the expense of developing-country fleets. In 1976, the U.S. passed the Magnuson Fisheries Conservation and Management Act, which created a 200-mile fisheries conservation zone but which excluded tuna species from national management jurisdiction. The U.S. position, prompted by the dependence of the U.S. tuna fleet on fisheries within the EEZs of other coastal nations, clashed with that of other states of the region, especially Mexico, which had assumed a strong position in favor of national sovereignty over coastal-zone marine resources.<sup>44</sup> U.S.-Mexico negotiations over U.S. access to Mexico's EEZ were initiated in 1976, continuing without success for three years. In 1978 Mexico withdrew from the IATTC in disagreement over the annual quotas, and in 1980 required a license fee for foreign vessels operating within the Mexican EEZ, a measure which aroused strong opposition from the U.S. fleet. In 1980, after seizures by the Mexican navy of U.S. vessels fishing in Mexican waters without a license, the U.S. imposed an embargo on imports of Mexican tuna, and Mexico terminated all fishing treaties and negotiations with the United States. An additional U.S. embargo was imposed

in 1981 under the MMPA, although with little effect, given the previous embargo.

The breakdown of formal fisheries relations caused significant damage to both sides. U.S. canneries, deprived of a major source of fish, experienced a large fall in production, accompanied by the loss of an estimated 12,500 tuna-related jobs in California.<sup>45</sup> Mexico's loss of export earnings was also significant, since the United States prior to 1980 accounted for nearly 100% of Mexican tuna exports.

In response to the embargo, Mexico attempted to transfer output to the domestic market by subsidizing production, and to diversify export markets. Its efforts were hindered, however, by a combination of the 1982-1983 El Niño, which caused a drop in available tuna stocks, and by the economic crisis of 1982-1983. The crisis, with its related exchange rate instability and devaluation, led to falling export earnings and rising costs of imported inputs, as well as rising interest payments on boat mortgages, lack of credits with which to outfit the fleet, and reduced domestic demand.<sup>46</sup>

Mexican production of yellowfin and skipjack tuna dropped from a record high of 66,000 metric tons in 1981 to 35,000 in 1982 and 26,000 in 1983.<sup>47</sup> The end of the El Niño after 1983 and measures such as a 1985 tuna trade agreement with Canada and a Mexican-French joint venture for the construction of new packing plants led to renewed

production increases in 1984 and 1985, to 64,000 and 87,000 metric tons, respectively.<sup>48</sup> In 1986, Mexico's offer of voluntary export limits of 20,000 tons led to the withdrawal of both U.S. embargoes and Mexico's incorporation into the IATTC observer program.<sup>49</sup> Mexican exports of fresh, chilled and frozen tuna to the United States jumped from 536,000 kilograms in 1986 to 17,198,000 kilograms in 1987.<sup>50</sup>

Production by the Mexican fleet continued to rise from 113,000 metric tons in 1986 to 105,000 in 1987, 124,000 in 1988, and 137,000 in 1989, then dropped to 128,800 in 1990 and 120,000 in 1991, with the active fleet decreasing from 60 in 1990 to 52 in 1991 as a result of the U.S. embargo.<sup>51</sup> The number of Mexican bait boats in the ETPO also rose to 16 by 1989, dropping to 11 in 1990 and 9 in 1991, with a further decline likely in 1992.<sup>52</sup>

Ironically, the U.S. embargo of 1980-1986 contributed to the Mexican industry's ability to weather later trade restrictions by forcing it to expand domestic markets and diversify export markets. By 1989, Mexican consumers absorbed some 60% of domestic production, with exports destined for Italy, Japan, Spain, France, and the United States, the latter importing only about 2% of overall Mexican production, or 5% of Mexican exports. With the embargo of 1990-91 and the U.S. canneries' 'dolphin-safe' program (which in effect rendered the official embargo

redundant, as virtually all Mexican tuna is caught with purse seiners in the ETPO), Mexico responded with intensified efforts to open new export markets and promote domestic sales. According to several companies,<sup>53</sup> the most damaging initial consequence of the embargo was a drop in international prices for Mexican tuna, aggravating an existing downward trend in prices resulting from oversupply during the late 1980s and early 1990s. The threat of a secondary embargo closed many of Mexico's new markets and proved more damaging to the industry.

The most likely response of the Mexican tuna industry to continued embargo politics, and to the 1994 moratorium on dolphin sets in the ETPO, will be to follow their U.S. counterparts to the western Pacific. By early 1992, six Mexican vessels had already relocated, and SEPESCA was already involved in negotiations with the island nations of the western Pacific to allow additional entries.<sup>54</sup> However, only the most modern and efficient vessels of the Mexican fleet will be able to support the costs of relocation, and the industry will likely suffer from its latecomer status, as the western Pacific fishery is reportedly already showing signs of saturation.<sup>55</sup> It is also unlikely that the Mexican processing sector will be capable of relocating, especially given competition with already-established U.S. offshore canneries. The end result of the compromise may be the virtual destruction of the

Mexican industry. Industry representatives claim that this is the purpose of the tuna embargo and the adoption of the zero mortality standard, as under the Law of the Sea Convention countries unable to exploit fisheries within their EEZs must open the fishery to foreign fleets.<sup>56</sup>

Hardest hit have been Mexico's fishing cooperatives, 16 of which have been formed in the peninsula of Baja California alone.<sup>57</sup> The cooperatives, operating a small fleet of aging purse seiners and bait boats, have been affected in recent years not only by shrinking markets and falling prices, but also by economic liberalization, which has included the dissolution or sale of state-owned processing plants, which formerly outfitted cooperative vessels and purchased their catch, and the dissolution of BANPESCA and the National Fishing Cooperative Fund. At least some of the cooperatives based in Ensenada also sold their tuna catch to purchasers in San Diego, favored over Mexican purchasers because they paid dollars, in cash and immediately, and also provided capital rapidly for the outfitting of boats prior to the opening of the season.

For the tuna cooperatives, 'dolphin safe' and the U.S. embargo have intensified the more generalized economic crisis affecting Mexico's social fisheries sector. By early 1992, only five of the sixteen cooperatives in the peninsula of Baja California were operating, the rest having lost their boats to creditors or to sinkings. While some of the

bait boats may survive long enough to benefit from the 1994 moratorium on purse seining, the cooperatives' small purse seiners, lacking capital to restructure or relocate, may disappear as well.

#### Mexico's Dolphin Protection Programs

Mexico's dolphin protection program began in 1977 with the publication of regulations requiring use of the backdown maneuver and prohibiting the deliberate taking of marine mammals.<sup>58</sup> This, however, was merely an internal regulation lacking both enforcement and penalties. Not until June 1987 was the backdown maneuver required by federal law, updated by the inclusion of specifications for the use of the Medina safety panel, speed boats, rafts for operation within the net, and lighting to illuminate the backdown channel during sundown sets.<sup>59</sup> Declining dolphin mortality estimates after 1987 reflected this greater official commitment. In June 1990, additional regulations were added, including required use of towing bridles by speedboats to prevent net collapse; prohibition of sundown sets and the use of explosives; vessel maintenance of logs registering the circumstances and results of all fishing operations, which would be provided to SEPESCA; and the requirement that vessels carry and facilitate observers when requested and present annual reports assessing vessel performance.<sup>60</sup>

As in the United States, the Mexican fleet itself has been responsible for many of the most important initiatives to date. In August 1989, the National Congress of Fishing Industries (Cámara Nacional de Industrias Pesqueras, or CANAINPES) established a Tuna-Dolphin Office to coordinate industry efforts to reduce dolphin mortality and to confront the U.S. embargo. From 1989 to the end of 1991, the office had coordinated eight IATTC training courses for captains and crew to improve vessel performance. In 1990, the Tuna-Dolphin Office initiated a weekly reporting program whereby observers aboard Mexican vessels radio in vessel performance to vessel owners, resulting in some cases in the recalling of vessels in the middle of a voyage due to high kill rates. CANAINPES also independently required periodic gear inspection and test sets with IATTC personnel. Finally, the Tuna-Dolphin Office has been involved in publishing public awareness materials for distribution to tuna-fishing cooperatives, which are not members of CANAINPES. One of Ensenada's largest private companies also initiated, at its own expense, experiments with a new design of jet-propelled rescue boat, equipped with sonar and a jet propulsion engine which appears to offer improved maneuverability net.<sup>61</sup>

On May 20, 1991, the Mexican government established the National Program for the Exploitation of Tuna and the Protection of Dolphins, to be funded jointly by SEPESCA and the private fleet. The program is charged with coordinating

the national observer program and conducting research on dolphin stocks and population trends, the tuna-dolphin association, gear improvements, and alternate fishing techniques. As part of the program, a goal was set of at least 50% reduction in mortality from 1989 to 1991, and an overall reduction of 80% from 1989 to 1995. A committee of experts was also created, including SEPESCA, industry representatives, and scientists, to evaluate vessel performance. Based on their findings, SEPESCA was authorized to suspend captains with above-average mortality. SEPESCA was also required to establish performance requirements, six-month vessel inspections with annual trial sets, and mandatory training programs for suspended captains to allow them to rejoin the fleet.

In September 1991, new regulations established vessel performance requirements of an average of four dolphins per set, to be calculated continuously using observer data collected at the end of each fishing trip; this quota was reduced in June 1992 to three dolphins per set.<sup>62</sup> Vessel owners exceeding this limit would be subject to revocation of fishing permits, fines, and the confiscation of fishing gear. As of early 1992, the program had coordinated a training course for 60 new national observers, with financial assistance from USAID to cover salaries and expenses of the NMFS personnel who served as course instructors.<sup>63</sup>

Both official and industry efforts are reflected in the 80% decline in dolphin mortality achieved between 1986 and 1991, despite increasing tuna catches and despite increasing observer coverage. Mortality per set dropped from 16.4 in 1986 to 3.3 in 1991. In December 1991, penalties for intentional capture, harm, or killing of marine mammals were established at six months to two years imprisonment.<sup>64</sup>

Much of the Mexican government's effort in the area of dolphin protection has been directed toward the promotion of national or multilateral programs emphasizing national sovereignty and the importance of international agreement in the establishment of environmental norms and regulations. Although Mexico introduced the proposal leading to the expansion of the IATTC's functions to include research on dolphin biology, behavior, and mortality, it was not until 1986 that Mexico entered the IATTC's observer program. The expansion of observer coverage is primarily a national rather than an international effort, with the eventual goal of 50% coverage by the IATTC and 50% by SEPESCA.

In 1988, Mexico attempted to bypass U.S. influence within the IATTC by joining Ecuador, El Salvador, Nicaragua and Peru in the creation of the Eastern Pacific Tuna Organization, an alternate body to the IATTC which is charged with both tuna resource conservation and dolphin protection. In 1990, Mexico was responsible for introducing

proposals for the creation of tuna-dolphin and shrimp-marine turtle research programs within the Latin American Fisheries Organization (OLDEPESCA). One of Mexico's most effective moves was to challenge the embargo before an arbitration panel of the GATT, which in August 1991 ruled that the embargo was inconsistent with GATT Rules.

Following high-level U.S.-Mexico negotiations to resolve the dispute, however, the two governments arrived at a compromise: the Mexican government would initiate an expanded dolphin protection program and drop its protest before the GATT in return for a U.S. State Department promise to secure the amendment of the MMPA in order to be able to lift the embargo.<sup>65</sup> The Mexican government duly postponed a decision by the full GATT council, as part of a ten-point program announced by President Salinas de Gortari in San Diego in September, 1991. Other points in the program included 100% observer coverage aboard the Mexican fleet, publication of new regulations governing captain and fleet performance, reform of the Federal Fisheries Law to include legal penalties in the case of intentional destruction of marine species and ecosystems, the convocation of an International Conference on Responsible Fishing in 1992, the sponsoring of a \$11 million national research program, government financial support to the Cousteau Society to construct natural dolphin habitat as part of a new marine biology center in Nayarit, cooperation

of private industry in efforts to reduce dolphin mortality, and the creation of a 'Living Turtle Museum" in Oaxaca.

The International Conference for Responsible Fishing was convened in May 1992, with the participation of the UN Food and Agriculture Organization and 60 other fishing nations. At this conference, Mexico was able to win a small, symbolic victory: multilateral support for a declaration affirming national sovereignty in the management of marine fisheries resources, and condemning the use of trade restrictions to influence the fisheries policy of other nations.<sup>66</sup> Following passage of the U.S. International Dolphin Conservation Act, Mexico's Ministry of Foreign Relations again objected to the imposition of unilateral measures, and asserted that the measure would mean "the destruction of the fishing industry."<sup>67</sup>

#### The Divided Environmental Lobby

In the 1984 and 1988 MMPA reauthorization hearings, U.S. environmental NGOs directed their lobbying primarily toward reducing dolphin mortality caused by the U.S. fleet. In 1988, however, greater attention was focused on the foreign fleet as a result of both the industry's defensive maneuvers and the nature of the evidence presented by environmentalists. One of the most influential testimonies in the 1988 hearings was that of Samuel LaBudde, representing Earth Island Institute and the Center for Marine Conservation, who presented a narrated video of a

fishing trip by the María Luisa I, a Panamanian boat operating from Mexico. The video, a dramatic depiction of extremely high dolphin mortality during tuna sets, was filmed by LaBudde, who claimed that the video was representative of U.S. and other fleets in the ETPO. Testimony by James Joseph, IATTC Director, that the disastrous performance of the María Luisa was the result of highly atypical and unprofessional conduct by its captain and crew was ignored,<sup>68</sup> and the video was shown not only in the hearings, but also aired on each of the three major U.S. television networks, sparking widespread public indignation and consumer boycotts against non-albacore tuna.

Earth Island Institute and public opinion in general refused to be swayed by Mexico's ten-point program of 1990. Conservation groups denounced the program as a buy-off and the Cousteau Society declared that it knew nothing of a marine ecology center. Furthermore, the GATT panel decision had sparked U.S. concern that the MMPA and other U.S. and international environmental laws--e.g., for wildlife and tropical timber trade--would be undermined by the decision.<sup>69</sup> Earth Island demonstrated against President Salinas during his 1991 visit to San Diego, and took out full-page ads in the New York Times and the Los Angeles Times accusing him of attempting to undermine U.S. and international environmental protection laws.<sup>70</sup> IATTC proposals for a gradual reduction of dolphin mortality and

expanded research efforts on alternative fishing techniques and gear were similarly rejected as insufficient. Finally, a coalition of some twenty-five U.S. and international conservation organizations, including Earth Island Institute, WWF-US, and animal welfare groups, chose to back the International Dolphin Conservation Act.<sup>71</sup>

Greenpeace, which had initially urged both the U.S. and the European Community to embargo imports of Mexican tuna, changed its position as political tensions heightened over the threatened secondary embargo. The Rainbow Warrior was brought to Ensenada in February, 1992 for the unusual announcement that it opposed the U.S. embargo, immediately after demonstrating with the Sierra Club Legal Defense Counsel, Defenders of Wildlife, and Solutions International in San Diego to revoke the U.S. fleet's 'license to kill' 20,500 dolphins annually.<sup>72</sup> Although the organization continued to urge an eventual ban on dolphin sets, it attacked the embargo and argued in favor of continued research to offset the gradual phase-out of dolphin sets.<sup>73</sup> The Cousteau Society, following initial confusion generated by the premature Salinas declaration, met with Mexican officials to suggest improvements in the dolphin program and conservation efforts for other marine species.<sup>74</sup>

Mexican environmentalists have responded to the tuna-dolphin controversy in a rather unique fashion. New to the issue and hampered by a lack of published information, they

have merely adopted the official positions of SEPESCA and the Ministry of Foreign Relations. Indeed, given the extent to which Mexican NGOs depend on governmental goodwill to obtain registration, research permits and the like, most prefer not to adopt an anti-government position on such a politically charged issue. The Mexican movement's politically liberal members also react as strongly against foreign intervention as they do against environmental destruction, and protests against U.S. pressures have all but drowned out discussion of Mexican marine mammal policy. The only exception was the internationally-oriented Grupo de los Cien, which complained that it had become unpatriotic in Mexico to support dolphin protection.<sup>75</sup>

#### Environmental Protection or Economic Protectionism?

It seems appropriate at this juncture to consider the validity of Mexican charges that the tuna embargoes were motivated more by economic interest than by environmental concern. An unequivocal answer is impossible given the history of the 1980 embargo; longstanding industry complaints that foreign fleets were not subject to the same requirements as the U.S. fleet, thereby putting the U.S. fleet at a competitive disadvantage; and the role of industry pressure in adding trade clauses to the MMPA.

By 1990, on the other hand, the U.S. tuna industry as a whole had less than usual to gain from embargo politics. The controversy aroused during the 1988 reauthorization

hearings and by more recent embargo politics touched the U.S. fleet as much, if not more, than foreign fleets, by publicizing the issue of dolphin mortality and the annual quotas assigned to them by the NMFS. At this stage, defending itself against the onslaught of public opinion became a much more immediate goal than seeking import restrictions. Furthermore, the processing sector has sustained significant losses as the result of both past and recent embargoes and of its self-imposed dolphin-safe policy.

The Bush administration, engaged in free trade negotiations with Mexico, also resisted the use of trade sanctions. The Departments of State and Commerce, internal disagreement notwithstanding, attempted to head them off. When litigation forced immediate action, the administration worked to overturn judicial rulings and even to seek amendment of the problematic clauses of the MMPA. But the U.S. Congress, facing intense pressure from the environmental lobby to prevent the 'weakening' of U.S. legislation as a result of NAFTA and GATT trade rules, instead passed more stringent legislation.

Trade sanctions are no longer the domain of industry; they have also won widespread support among environmentalists as a means of enlisting compliance with domestic and multilateral policy, as with the CITES and the International Whaling Convention. However, the

environmental lobby, despite consensus to end dolphin mortality in the tuna fishery, was not united in support of the U.S. tuna embargoes. Most U.S. environmental organizations and scientists concentrated on the performance of the U.S. fleet; exceptions such as the Environmental Defense Fund, which presented extensive testimony in 1984, issued only general statements of support for the industry's claims of competitive disadvantage.<sup>76</sup> International groups such as The Cousteau Society and Greenpeace (which was preparing to open an office in Mexico City) ultimately found it more productive to work with target countries for a more gradual phase-out of dolphin sets. But with the presentation of its critical documentary evidence in 1988, Earth Island Institute became the uncompromising leader in legal, lobbying, and press attacks on foreign, and particularly Mexican, fleets, and eventually the key NGO supporter of the International Dolphin Conservation Act. In sum, both industry and environmentalists were willing partners in exerting trade pressures against the foreign ETPO fleet, until legal action raised the stakes too high for either of them.

#### Issues of Controversy: Standards and Alternatives

##### The Status of Dolphin Populations

The IATTC monitors dolphin population status using data collected from on-board observers and from periodic censuses from vessels contracted specifically for the

purpose of research. Given the difficulty of counting aquatic organisms in such a large area, the population figures obtained are sketchy at best, but can be used to monitor trends toward increase or decrease. According to IATTC data, populations of spotted, spinner, and common dolphins experienced declines in the late 1970s and early 1980s, stabilizing in the last four to six years at estimated populations of approximately 3.2 million offshore spotted, 1.03 million spinner dolphins, and 403,000 common dolphins. In the case of Eastern and whitebelly spinner dolphins, the data suggest a possible tendency toward decline in 1988 and 1989, the last year for which data are published, although none of the populations shows significant trends.<sup>77</sup>

The NMFS since 1986 also conducts population estimates from U.S. research vessels. Abundance estimates based on pooled data from surveys conducted from 1986 to 1990 suggested total stocks of 2.07 million spotted dolphins, 1.65 million spinner dolphins, and 3.09 million common dolphins, including 631,800 eastern spinner, 1,019,300 whitebelly spinner, and 29,800 coastal spotted dolphins.<sup>78</sup> National Research Council analysis of data obtained from NMFS research vessels yielded population estimates of 1.8 million offshore spotted dolphins, 1.6 million spinner dolphins, and 3.2 common dolphins.

None of these statistical analyses suggests a significant trend toward decline of spinner, spotted, or common dolphins, the species most involved in the purse seine fishery.<sup>79</sup> They suggest instead that current mortality rates should allow dolphin stocks to remain stable or even increase.<sup>80</sup> At the NMFS tuna-dolphin workshop in January 1991, NMFS, NGO, and industry representatives concluded that no significant decline was likely to occur in the next few years and agreed to transfer research vessel funding from population estimation to gear research.<sup>81</sup> However, in June 1992 the Department of Commerce proposed to list the eastern spinner and northern offshore spotted dolphin stocks as depleted, revealing the uncertainty of status determinations.

The zero mortality goal also conflicts with NMFS marine mammal policies for other fisheries. Implementing regulations for the 1988 amendments to the MMPA, developed to allow continued incidental take while pursuing the goal of zero mortality, proposed in 1991 the concept of "allowable biological removal," or the total level of incidental take which could be permitted without significantly affecting marine mammal stocks. For the tuna fishery, the allowable biological removal of dolphin stocks would be 38,000 annually, nearly double current rates of incidental take. After public comment, the proposed regulations were modified to allow a "potential biological

removal," to reflect the inclusion of a correction factor allowing for population increase in marine mammal stocks considered to be currently below their optimum sustainable population, a proposal which would still allow a considerable incidental take. These regulations are applied to every fishery except for the yellowfin tuna fishery of the eastern tropical Pacific.<sup>82</sup>

In light of declining mortality and apparently stable populations, many U.S. and international observers consider that the critical issue is not species status per se, but instead a moral and ethical question of whether any dolphin mortality should be permitted. The answer of U.S. and international environmental organizations is clearly negative. The U.S. and Mexican tuna industries as well as the Mexican government, while publicly in favor of eliminating unnecessary mortality, argue that no country may impose on another standards based not on scientific analysis but instead on cultural and ethical values. They argue that research and performance goals should be established by international consultation and consensus.

#### MMPA Standards of Dolphin Protection

Assuming an affirmative response to the question of whether U.S. standards should be imposed on the international fleet, several problems exist with the standards themselves. First, the MMPA's definition of depletion is based on calculations of the original

population existing prior to the onset of fishing pressure, but data for this determination are not available. A determination of depletion therefore fails to take into account present mortality and trends of abundance. Second, the 1988 MMPA Amendments required that foreign fleets achieve by 1990 a dolphin mortality rate not exceeding 1.25 times that of the U.S. fleet. The statistical standard employed by the NMFS in this determination was mortality per set until 1990, in which year it dropped to 2.8 from 3.7 in 1989. After 1990 U.S. fleet performance is measured in mortality per ton of tuna caught. Mortality per ton by the U.S. fleet averaged .321 in 1981-1985 and .202 in 1986-1990, dropping to .137 in 1990.<sup>83</sup>

There are two principal problems with the use of a fixed percentage of U.S. fleet performance as a foreign fleet standard. First, because U.S. mortality per ton cannot be computed until the end of the fishing year, foreign fleets are faced with a standard which not only fluctuates from year to year but which also, for all practical purposes, is unknown until it is too late to adapt fleet performance to meet it. The second problem is that the relocation of nearly all of the U.S. fleet leaves an ETPO sample size which is too small to be statistically reliable. This is especially true given vast differences in the performance of individual skippers. For the U.S. fleet in 1990, for example, average mortality rates per set per

skipper ranged from less than one to more than five.<sup>84</sup> With the number of U.S. vessels fishing full-time in the ETPO totalling only five or six, the possibility increases of a dramatic drop in mortality standards to levels unreachable in the short term by the foreign fleet.<sup>85</sup>

Another problem with MMPA standards involves the percentages allowed for individual species, set at 15% of the total for the Eastern spinner and 2% for the spotted dolphin by NMFS regulations.<sup>86</sup> According to the IATTC, the spotted dolphin is rarely involved in the tuna fishery and does not merit special attention in NMFS regulations. Furthermore, percentages are set regardless of overall mortality, raising the possibility that a country which reduced total mortality from several thousand to only 100 could still face a U.S. embargo if more than 15 of the dolphins killed are Eastern spinners or if more than 2 are spotted dolphins. A second hypothetical result is that a country realizing a low overall mortality but a high percentage of either dolphin stock near the end of the fishing season could intentionally bring about high mortality of other species in order to reduce the percentage of spinner and spotted dolphins within the total, thus avoiding an embargo. The first situation is precisely that faced by the Mexican fleet, which reduced mortality per set from 16.4 in 1986 to 6 in 1990 and 3.3 in 1991, the latter figure falling within former MMPA standards.<sup>87</sup> Although

data on mortality per ton of tuna captured are not available, using Mexican 1991 landings of 126,800 metric tons and overall mortality estimates of 16,000 dolphins, and assuming that roughly 74 to 100% of captures were made in association with dolphins (in 1990, 72% of total tonnage captured by the non-U.S. fleet was caught in association with dolphins<sup>88</sup>), Mexico's mortality per ton would fall within 125% of U.S. standards. Mexico remains subject to an embargo, however, because Eastern spinner mortality accounts for more than 15% of the total.

The above leads to a related Mexican argument against MMPA standards; namely, that its fleet is subject to a U.S. embargo despite having achieved in five years performance levels which the U.S. fleet took fifteen years to achieve. The argument is indeed worthy of consideration, especially given the discrepancy between the resources available in the two countries for research on fishing techniques and gear modifications.

#### Possibilities for Improved Fleet Performance

The ETPO fleet is caught between the decline in fisheries stocks and captures likely to result from alternative fishing methods (see below), and the small likelihood of achieving significant declines in dolphin mortality through gear modifications in the near future. The most effective dolphin protection measures--the backdown procedure and the Medina safety panel--were already in use

by 1971, having been adopted by the U.S. and often by international fleets before their use was required legislatively.

Subsequent adoptions, such as speedboats equipped with tugging bridles to prevent net collapse, the use of a rubber raft manned by a crewmember with a facemask to assist dolphin release within the net, the use of larger safety panels with finer-mesh net, and the prohibition of explosives to herd dolphins and of sundown sets, have all contributed to further reduce mortality. Research is currently being conducted on minor modifications such as the use of more easily maneuverable jet boats within the net, modified corkline construction to facilitate dolphins' escape from the net, and the use of the Doppler current profiler to monitor the subsurface currents which cause net collapses and canopies, but these modifications can be expected to achieve only marginal results.

Major modifications, such as the use of alternative netting material or structural adaptations to control net movement during backdown or to separate dolphins from tuna before backdown begins, would require several years of research before they could even be employed on an experimental basis aboard tuna vessels. While each of the nations fishing in the ETPO has already agreed to channel new funding to such research, these programs are long-term and highly resource-intensive and offer uncertain results.

Furthermore, regardless of captain skill or minor gear modifications, the possibility of human error or mechanical breakdown resulting in periodic 'disaster sets' remains. The goal of zero mortality by 1994 thus appears unreachable barring the adoption of alternate fishing techniques or the shutdown or relocation of the entire fleet.

Each of these alternatives carries in turn its own drawbacks for fisheries management and for the conservation of non-commercial marine species. The most widespread alternative to purse seining, longline fishing, is economically inefficient, incapable of supplying the quantity of raw material currently demanded by the processing industry, and indiscriminate with regard to species and age groups. The IATTC has therefore increasingly focused its research effort on sets on fish aggregating devices, or FADs. Tuna are presently caught in association not only with dolphins, but also with floating objects such as logs, debris, or artificial devices set for that purpose. However, the tuna-dolphin association involves primarily large, sexually mature yellowfin, with an average weight of 50 lbs, while the tuna caught in association with FADS are smaller juveniles, with an average weight of about 10 lbs. As research programs have yet to discover a way to capture large fish with alternative methods, the IATTC and the tuna industry contend that the widespread adoption of this technique would result in a

sharp drop in tuna production and a decline in tuna stocks as a result of harvesting pre-reproductive juveniles.<sup>89</sup> Furthermore, other marine organisms, such as sharks, sea turtles, and juveniles of other fish species, are also caught with FADs.<sup>90</sup>

The relocation of the fleet to other fisheries is also problematic. First, few national industries, including processing facilities as well as fleets, are capable of relocating. Second, it is questionable whether other fisheries can support new entrants. The Atlantic tuna fishery, for example, is already overfished, and in the western Pacific there is evidence of saturation, with increased competition between artesanal fisheries and the foreign purse seiner fleet arriving in increasing numbers.<sup>91</sup> Third, it is not evident that relocation of the purse seine fleet would resolve the problem of dolphin mortality. Although no observer program accompanies tuna vessels outside the ETPO, a growing body of evidence suggests that fishing on dolphins and other marine mammals also occurs in the western Pacific, the Atlantic, the Indian Ocean, and the Gulf of Mexico.<sup>92</sup> In the absence of regulatory bodies or observers in these waters, the environmental consequences of relocation are thus unclear.

Two related points deserve mention. First, neither relocation nor adoption of alternative techniques provides assurance to the tuna fleets that environmental conflicts

will be avoided in the future. Indeed, longlining is now prohibited in Mexico because of its indiscriminate catch and because of conflicts between commercial and sport fishermen of tuna and billfish. Second, Mexican and other ETPO fleets consider that because of their cooperation with research and observer programs that are nonexistent in other regions, they have been unfairly singled out among a number of fisheries associated with marine mammals, both incidental and directed.<sup>93</sup>

#### The Unexplored Alternative: Skipper and Crew Training

A 1992 National Research Council report concluded that

improvement in captain performance is the single most important step that can be taken to reduce dolphin mortality in the ETP purse-seine fishery. For example, if in 1989 the average kill per set for all captains of the international fleet had been the same as the average for those of the U.S. fleet, the total dolphin mortality would have been reduced by 60% . . . If in 1989 all captains had operated with the rates of the best five captains of the international fleet, the total mortality would have been reduced by 87%. This reduction could occur without making any improvement in the basic technology or auxiliary equipment of purse seining.<sup>94</sup>

A relatively small number of captains are responsible for a large percentage of the total kill in both U.S. and non-U.S. fleets. In the U.S. fleet in 1990, 60% of all dolphin sets resulted in zero mortality, and 54% of the total dolphin mortality occurred in just 4% of the sets.<sup>95</sup> A large reduction in kill per set by the U.S. fleet between 1989 and 1990 was achieved in large part by a U.S. skipper performance program mandating the revocation of certificates

for skippers exceeding a kill rate of 3.9 per set for 3 consecutive trips; in 1989 the worst skippers had kill rates of five or greater, and in 1990 all U.S. captains stayed within the new limits. This suggests enormous potential improvements in overall and weighted mortality figures to be gained from intensified training of captains and crew, and the establishment of captain performance standards. Moreover, these achievements are possible over very short time periods and at a relatively low cost, incurred primarily for the expanded observer coverage needed to monitor captain performance.

Improved captain and crew performance is indeed largely responsible for the halving of dolphin mortality rates between 1989 and 1990, and again between 1990 and 1991. For example, while the number of sets on dolphins decreased by roughly 10 percent between 1990 and 1991, the decline in fishing effort is not large enough to account for the halving of dolphin mortality. Also important are a decline in the number of net collapses and net canopies and the number of dolphins left in the net following backdown, which are among the factors most affected by training and performance requirements.<sup>96</sup>

Enhanced training and expanded adoption of performance standards would allow the reduction of dolphin mortality to the lowest technologically feasible level without resort to standards established on the basis of a single fleet, and

would target those captains with unusually high kill rates in place of entire national industries. While enhanced training is included in the IATTC proposal, this option is eliminated under the International Dolphin Conservation Act.

Conclusion: The Costs and Benefits of Embargo Politics

Assuming that the U.S. objective is to achieve reduced dolphin mortality by the international fleet, it must be asked whether trade measures are the only or even the most effective means of achieving that goal. (For purposes of the present discussion, no effort will be made to distinguish the effects of the MMPA embargo and the industry's dolphin-safe program, as they were imposed almost simultaneously and with almost identical results in the case of Mexico.) The timing of the events described above certainly suggests that embargo politics were a critical impulse to the dolphin protection programs of the IATTC, the Mexican government, and other ETPO fishing nations. More importantly, the Mexican industry responded as soon as the threat of an embargo became apparent, and had achieved substantial reductions in dolphin mortality before these programs were adopted.

Whether the threat of an embargo needed to be fulfilled is a different question. The Mexican government's involvement in regulation and research might have been stimulated by less confrontational means, especially with an administration so sensitive to the linkage between

environmental performance and trade politics. Further, although enforcement and compliance of existing Mexican environmental regulations are notoriously weaker than in the United States, industry self-interest had quickly brought dolphin mortality almost to U.S. levels. Had this and other foreign fleets been given a reasonable period of time in which to reduce mortality, the embargo might have been unnecessary.

The embargo itself, once declared, also risked the cessation of cooperation by other nations. The IATTC argued that the imposition of an embargo against nations which had already achieved significant performance and regulatory improvements might result in their withdrawal from the IATTC observer program and the consequent loss of reliable data, especially if information used from the observer program were used to inflict such penalties.<sup>97</sup> Moves in such a direction were suggested by Mexican actions such as the strengthening of OLDEPESCA and the creation of the Eastern Pacific Tuna Organization as an alternative to the IATTC, or the decision to achieve 100% observer coverage with national rather than IATTC observers. Unreasonably rapid improvements and stiff penalties required by countries anxious to prevent or end a U.S. embargo also provide an incentive to captains to manipulate data and/or to harass observers when present. Although these responses apparently

did not occur, they remain potential costs which must be considered in evaluations of trade sanctions.

Industry costs have been substantial in both the United States and in the target nations, but particularly hard-hitting in the developing nations. Industry losses in these countries will be more severe with the enactment of a moratorium. The U.S. public is regularly faced with such trade-offs as a result of endangered species protection, but the dolphin stocks involved in the tuna fishery are not endangered or threatened, and no conclusive evidence exists that they are declining. Arguably, this context made other measures, such as enhanced training and performance standards for captains and crew, worthy of further exploration.

A significant cost has also been incurred for the environmental movement. The Mexican backlash against U.S. 'ecoimperialism' is accompanied by uncritical acceptance not only of the Mexican government's claims in the area of dolphin protection, but also of the various unrelated programs--sea turtles, vaquita, gray whale--cited as examples of official commitment to marine conservation. This backlash inhibits the public scrutiny needed to ensure serious official efforts to seek reasonable compromises between development and environment, encourages an official political environment characterized by misunderstanding and

mistrust of external influence, and may limit future exchange between Mexican and international NGOs.

The ecological benefits of embargo politics are significant, but even they may be mixed blessings. On the one hand, the incidental mortality of dolphins has been sharply reduced by nations attempting to avoid a U.S. embargo, and may be eliminated altogether in the ETPO with the International Dolphin Conservation Act. Some of the ecological costs of the fishery will, however, merely be displaced. In the immediate future, some dolphin mortality is likely to continue even in the western Pacific, but very little research is available to suggest likely quantities, and no organization exists to monitor and control that fishery. The ban on dolphin sets which will apparently be in place by 1994 will encourage sets on logs and FADs, with unknown effects on tuna stocks and on other species of marine organisms which associate with surface objects. Unfortunately, the single-issue "save the dolphins" campaign has not encouraged efforts to evaluate the impact of these alternatives. It may therefore have achieved only the temporal and geographic displacement of environmental problems and of international conflicts over their resolution.

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## CHAPTER 14 CONCLUSION

The destruction of Mexico's wildlife resources by growing rural populations represents a very real tragedy of the commons. Slowing or reversing the tragedy requires, however, that its various causes be correctly identified. Merely attributing the tragedy to an inevitable dynamic of human relations obscures the highly structured outcomes of political and economic conflict between the privileged and commoners.

The fate of Mexico's wildlife resources is intricately linked to the fate of its commoners, the campesinos and fishermen whose livelihoods are most closely tied to biological resources. Their dependence on wild animals and plants is often the result of their exclusion from arable agricultural land and from forestry and livestock production, lack of access to inputs and credit, and exploitation by landed and commercial interests. The use of wildlife as a resource of last resort places clear limits on the potential for sustainable use. But even hunting and gathering are controlled and structured by conflicts between commoners and non-commoners, limiting the contributions of

wildlife to rural welfare and the ability of the rural poor to organize collective responses to resource depletion.

It will come as little surprise to social scientists that the allocation and use of natural resources in Mexico is often determined by the distribution of wealth and political influence. However, social as well as natural scientists have ignored the potential of conservation measures to strengthen existing inequalities. Conservation as well as allocation of wildlife resources has consistently targeted those interests least likely, and least able, to organize and defend themselves against outside incursions on their livelihoods.

Usually, the most important buffers between the state and disadvantaged resource users have been the low productive potential of the resources in question and the state's limited interest in and capacity for the enforcement of its own policies. Only when small-scale resource use competes directly with more powerful economic interests--including the state itself--does the state act forcefully to structure resource use. The emergence of a vocal conservation lobby targeting low-output resource systems has removed existing buffers and thus served to tip the scales even more sharply against disadvantaged resource users. To the rural poor, the conservation movement often appears as the final insult, an attempt to place off limits what resources are left to them.

In some cases, even the privileged have been affected as Mexico's outward search for economic solutions strengthens the hand of the international environmental movement. But the rapid expansion of the protected areas network has come at the expense of ejidal and communal, not private, lands. Outside conservation pressures impact cooperative, not private, shrimp, tuna, and sea turtle fishermen. And those hunters who rely on wildlife as a resource of last resort are most negatively affected by external assistance for enforcement. Furthermore, the commoners will be the last to benefit from new opportunities to profit from wildlife, as the state, domestic and foreign investors, and even environmental organizations rush to exploit Mexico's potential for ecological and hunting tourism.

The role of environmental NGOs in this process is more problematic than is typically acknowledged. The environmental movement is an overwhelmingly urban, upper-class phenomenon of little relevance to rural resource management in Mexico, and both Mexican and international organizations have emphasized preservation at the expense of development. The domestic environmental movement's critique of the state has extended only as far as its direct involvement in resource destruction. Alliances between environmentalists and campesinos or fishermen, for example, have formed only when the state could clearly be charged

with environmental degradation, as in contamination by the nuclear and petroleum industries. When the problem at hand is illegal logging, hunting, or overfishing, the state is called upon to provide more effective enforcement against small-scale resource users.

Ironically, the ability of the rural poor to defend themselves against further incursions on their commons is weakened by the rise of international organizations and institutions espousing the cause of sustainable development. Public attention to policy outputs has generated intense pressures on the GEF, bilateral aid agencies, and NGOs to demonstrate immediate results. This is typically achieved by channeling funding through the small number of developing-country recipients with sufficient organizational and management capacity to absorb outside assistance. External funding has thus increased the capacity of the Mexican state to intervene in rural resource economies, and has helped to maintain peak Mexican environmental organizations as persistent voices in domestic policymaking. It has left untouched the weak organization and collective representation of the rural poor in policy decisions at local, national, or international levels.

To be sure, there are some very notable exceptions to this rule. In Los Chimalapas and in the Plan Piloto Forestal, for example, non-governmental organizations have drawn attention to and begun to address the economic and

political barriers to sustainable resource use. A number of NGOs have also begun to provide meaningful information on the human dimensions of wildlife management and conservation. In most cases, however, their arguments have been drowned out by the more vocal demands of the preservationists. The specific projects developed thus far also raise doubts about whether, in the long term, such organizations are capable of providing a foundation for effective local organization and participation in resource management. In the meantime, the short-term experiments of inexperienced environmental NGOs represent rather dangerous tinkering in high-risk local economies.

The growing links between domestic and international environmental interests raise additional barriers to the sustainable use of wildlife resources. One neglected issue is the nature of the "authoritative" interests represented by international and domestic scientific communities, which play a critical role in calling public attention to resource exploitation and degradation but often ignore the political and economic dynamics underlying the destruction of wild species. Relatively powerless in the Mexican political system, domestic scientists have forged links with outside interest groups which are even less sensitive to Mexican economic and political constraints. They have participated in pressuring the Mexican state for policy reforms without predicting or recognizing the human consequences of public

campaigns, the displacement of ecological impacts to new species or areas, or the nature of Mexico's defensive maneuvers in response to the politicization of wildlife conservation issues.

Understandably, many of these international networks are supported by developed-country interests and industries seeking to redistribute the costs of conservation and management at home. Their influence within the government agencies providing funding and technical assistance to Mexico is particularly evident in efforts to protect sea turtles, dolphins, and migratory waterfowl. The Mexican executive and resource management agencies, facing diplomatic pressure, economic sanctions, and adverse publicity from the United States, have scrambled to ward off these successive threats through rapid shifts in policy and budgetary priorities. In practice, therefore, increased environmental cooperation between Mexico and the United States means a greater likelihood that the conservation of Mexican wildlife will serve the purposes of sport rather than subsistence hunters, U.S. rather than Mexican fishermen, and foreign tourists rather than campesinos.

In practical terms, the Mexican experience suggests that scientists and environmentalists should be more careful what they wish for. In theoretical terms, it suggests the need to put politics back into analyses of the commons. Whether targeted toward small-scale common property regimes

or global environmental cooperation, the pursuit of sustainable development will remain an empty gesture unless, and until, the full implications of the tragedy of the commons are recognized and addressed.

APPENDIX A  
ANIMAL SPECIES COMMONLY USED FOR SUBSISTENCE CONSUMPTION

Mammals

Manatee	<u>Trichechus manatus</u>
White-tailed deer	<u>Odocoileus virginianus</u>
Mule deer	<u>Odocoileus hemonius*</u>
Brocket deer	<u>Mazama americana</u>
Pronghorn antelope	<u>Antilocapra americana*</u>
Bighorn sheep	<u>Ovis canadensis</u>
Collared peccary	<u>Pecari tajacu</u>
White-lipped peccary	<u>Tayassu pecari*</u>
Tapir	<u>Tapirella bairdii*</u>
Armadillo	<u>Dasyopus novemcinctus</u>
Opossum	<u>Didelphis spp.</u>
Hares	<u>Lepus spp.</u>
Rabbits	<u>Sylvilagus spp.</u>
Agoutis	<u>Dasyprocta punctata</u>
	<u>D. mexicana</u>
Paca	<u>Agouti paca</u>
Coatis	<u>Nasua narica*</u>
	<u>Nasua nelsonii</u>
Kinkajou	<u>Potos flavus</u>
Raccoon	<u>Procyon lotor</u>
Ring-tailed cat	<u>Bassariscus astutus</u>
	<u>B. sumichrasti</u>
Squirrels	<u>Sciurius spp.</u>
Pocket gopher	<u>Orthogeomys grandis</u>
Spider monkey	<u>Ateles geoffroyi*</u>
Howler monkey	<u>Alouatta palliata*</u>
Black howler monkey	<u>Alouatta pigra*</u>

Birds

Wild turkey	<u>Meleagris gallopavo</u>
Ocellated turkey	<u>Agriocharis ocellata*</u>
Curassow	<u>Crax rubra</u>
Guans	<u>Penelope purpurascens*</u>
	<u>Oreophasis derbianus*</u>
Chachalacas	<u>Ortalis vetula</u>
	<u>O. poliocephala</u>
	<u>Penelopina nigra*</u>

Tinamous	<u>Tinamus major</u>
	<u>Crypturellus spp.</u>
Quail	<u>Phasianidae</u>
Pheasants	<u>Phasianidae</u>
Bobwhites	<u>Phasianidae</u>
Doves	<u>Columbidae</u>
White-winged dove	<u>Zenaida asiatica</u>
Ducks	<u>Anatidae</u>
Geese	<u>Anatidae</u>
Coot	<u>Fulica americana</u>

### Reptiles

Common iguana	<u>Iguana iguana*</u>
Black iguana	<u>Ctenosaura pectinata*</u>
Striped iguana	<u>C. similis*</u>
Bolson tortoise	<u>Gopherus flavomarginatus*</u>
Desert tortoise	<u>Gopherus agassizi*</u>
Mud turtles	<u>Kinosternon spp.*</u>
	<u>Staurotypus spp.*</u>
Central American river turtle	<u>Dermatemys mawei*</u>
Snapping turtle	<u>Chelydra serpentina*</u>
	<u>Claudius angustatus*</u>
	<u>Trachemys scripta*</u>
Soft-shelled turtles	<u>Trionyx spp.*</u>
Green sea turtle	<u>Chelonia mydas*</u>
Loggerhead sea turtle	<u>Caretta caretta*</u>
Olive ridley sea turtle	<u>Lepidochelys olivacea*</u>
Leatherback sea turtle	<u>Dermochelys coriacea*</u>
Hawksbill sea turtle	<u>Eretmochelys imbricata*</u>
Boa constrictor	<u>Boa constrictor*</u>
Rattlesnakes	<u>Crotalus spp.*</u>
American crocodile	<u>Crocodylus acutus*</u>
Morelet's crocodile	<u>C. moreletii*</u>
Common caiman	<u>Caiman crocodilus*</u>

\*Protected in Mexico

APPENDIX B  
SPECIES LISTED IN THE MEXICAN SPORT HUNTING CALENDAR,  
1992-1993

I. Waterfowl

Black brant	<u>Branta bernicla nigricans</u>
Blue-winged teal	<u>Anas discors</u>
Cinnamon teal	<u>A. cyanoptera</u>
Green-winged teal	<u>A. crecca carolinensis</u>
American coot	<u>Fulica americana</u>
Canada goose	<u>Branta canadensis</u>
Ross' goose	<u>Chen rossi</u>
White-fronted goose	<u>Anser albifrons</u>
Snow goose	<u>Chen caerulescens</u>
Sandhill crane	<u>Grus canadensis</u>
Common merganser	<u>Mergus merganser</u>
Red-breasted merganser	<u>M. serrator</u>
Hooded merganser	<u>Lophodytes cucullatus</u>
White-winged scoter	<u>Melanitti deglandi</u>
Surf scoter	<u>M. perspicillata</u>
Greater scaup	<u>Aythya marila</u>
Lesser scaup	<u>A. affinis</u>
Ring-necked duck	<u>A. collaris</u>
Redhead duck	<u>A. americana</u>
Canvasback	<u>A. valisineria</u>
Northern shoveler	<u>Anas clypeata</u>
American widgeon	<u>A. americana</u>
Common goldeneye duck	<u>Bucephala clangula</u>
Bufflehead	<u>B. albeola</u>
Mallard	<u>Anas platyrhynchos</u>
Wood duck	<u>Aix sponsa</u>
Northern pintail	<u>Anas acuta</u>
Black-bellied tree duck	<u>Dendrocygna autumnalis</u>
Fulvous tree duck	<u>D. bicolor</u>
Gadwall	<u>Anas strepera</u>
Ruddy duck	<u>Oxyura jamaicensis</u>
Mottled duck	<u>Anas fulvigati</u>
Mexican duck	<u>A. diazi</u>

II. Doves

White-winged dove	<u>Zenaida asiatica</u>
White-fronted dove	<u>Leptotila verreauxi</u>

Gray-headed dove	<u>L. plumbeiceps</u>
Band-tailed pigeon	<u>Columba fasciata</u>
Mourning dove	<u>Zenaida macroura</u>
Ruddy quail-dove	<u>Oreopelia montana</u>
Red-billed pigeon	<u>Columba flavirostris</u>

### III. Other Birds

Common snipe	<u>Gallinago gallinago</u>
California quail	<u>Callipepla californica</u>
Douglas' quail	<u>C. douglasii</u>
Gambel's quail	<u>C. gambelii</u>
Mountain quail	<u>Oreortyx pictus</u>
Black-throated bobwhite	<u>Colinus nigroocularis</u>
Common bobwhite	<u>C. virginianus</u>
Scaled quail	<u>Callipepla squamata</u>
Banded quail	<u>Philortyx fasciatus</u>
Montezuma quail	<u>Cyrtonyx montezumae</u>
West Mexican chachalaca	<u>Ortalis poliocephala</u>
Pacific chachalaca	<u>O. leucogastra</u>
Eastern chachalaca	<u>O. vetula</u>
Upland sandpiper	<u>Bartramia longicauda</u>
Red-winged blackbird	<u>Agelaius phoeniceus</u>
Yellow-headed blackbird	<u>Xantocephalus</u> <u>xantocephalus</u>
Brown-headed cowbird	<u>Moluthrus ater</u>
Great-tailed gackle	<u>Cassidix mexicanus</u>
Common starling	<u>Sturnus vulgaris</u>

### IV. Small Mammals

Agouti	<u>Dasyprocta punctata</u>
Agouti	<u>D. mexicana</u>
Banded squirrel	<u>Spermophilus annulatus</u>
White-tail squirrel	<u>Ammospermophilus leucurus</u>
Curved-tail squirrel	<u>Spermophilus tereticaudus</u>
Albert's squirrel	<u>Sciurius alberti</u>
California squirrel	<u>Spermophilus beecheyi</u>
Collie's squirrel	<u>Sciurius colliaei</u>
Harris squirrel	<u>Ammospermophilus</u> <u>harrissii</u>
Rock squirrel	<u>Spermophilus variegatus</u>
Peters' squirrel	<u>Sciurius oculatus</u>
Fox squirrel	<u>S. nayaritensis</u>
Gray squirrel	<u>S. aureogaster</u>
Mexican squirrel	<u>Spermophilus mexicanus</u>
Spotted squirrel	<u>S. pilosoma</u>
Audubon rabbit	<u>Sylvilagus audubonii</u>
Tropical rabbit	<u>S. brasiliensis</u>
Cottontail rabbit	<u>S. floridianus</u>
Mountain rabbit	<u>S. bachmani</u>
Mexican rabbit	<u>S. cunicularius</u>

Black-tailed jack rabbit	<u>Lepus californicus</u>
White-sided jack rabbit	<u>L. callotis</u>
Nine-banded armadillo	<u>Dasypus novemcinctus</u>
Raccoon	<u>Procyon lotor</u>
Coati	<u>Nasua narica</u>
Coati	<u>Nasua nelsoni</u>
Paca	<u>Agouti paca</u>
Common opossum	<u>Didelphis marsupialis</u>
Coyote	<u>Canis latrans</u>

#### V. Limited

Barbary sheep	<u>Ammotragus lervia</u>
Wild boar	<u>Sus scrofa</u>
Collared peccary	<u>Tayassu pecari</u>
White-lipped peccary	<u>Pecari tajacu</u>
Mule deer	<u>Odocoileus hemonius</u>
White-tailed deer	<u>O. virginianus</u>
Brocket deer	<u>Mazama americana</u>
Brocket deer	<u>Mazama gouzoubira</u>
Puma	<u>Felis concolor</u>
Bobcat	<u>Lynx rufus</u>
Gray fox	<u>Urocyon cinereoargenteus</u>
Common turkey	<u>Meleagris gallopavo</u>
Ocellated turkey	<u>Agriocharis ocellata</u>
Rufescent tinamou	<u>Crypturellus ocellata</u>
Boucard's tinamou	<u>C. boucardi</u>
Little tinamou	<u>C. sovi</u>
Great tinamou	<u>Tinamus major</u>
Ring-necked pheasant	<u>Phasianus colchicus</u>

#### VI. Special

Bighorn sheep	<u>Ovis canadensis</u>
Sonora mule deer	<u>Odocoileus hemonius</u> <u>eremicus</u>
White-tailed deer	<u>O. virginianus texanus</u>

Source: Acuerdo que Establece el Calendario Cinegético Correspondiente a la Temporada 1992-1993, Diario Oficial, 21 August 1992.

APPENDIX C  
ORNATE AND SONG BIRDS LEGALLY SUBJECT TO CAPTURE AND SALE,  
1992-1993

COLUMBIDAE

Inca Dove  
Common ground-dove

Columbina inca  
C. passerina

PSITTACIDAE

Green parakeet  
Olive-throated parakeet  
Orange-fronted parakeet  
Barred parakeet  
Orange-chinned parakeet  
White-fronted parrot  
Red-lored parakeet

Aratinga holochlora  
A. nana  
A. canicularis  
Bolborhynchus lineola  
B. (Brotogeris) jugularis  
Amazona albifrons  
A. autumnalis

CORVIDAE

Common raven  
White-throated magpie-jay  
Green jay  
San Blas jay  
Scrub jay  
Gray-breasted jay  
Unicolored jay

Corvus corax  
Calocitta formosa  
Cyanocorax yncas  
C. sanblasiana  
Aphelocoma coerulescens  
A. ultramarina  
A. unicolor

MUSCICAPIDAE

Rufous-backed robin  
Clay-colored robin  
Brown-backed solitaire  
Slate-colored solitaire  
Wood thrush  
Eastern bluebird

Turdus ruffopalliatus  
T. grayi  
Myadestes obscurus  
M. unicolor  
Hylocichla mustelina  
Sialia sialis

MIMIDAE

Curve-billed thrasher  
Long-billed thrasher  
Crissal thrasher  
Tropical mockingbird  
Northern mockingbird

Toxostoma curvirostre  
T. longirostre  
T. dorsale  
Mimus gilvus  
M. polyglottos

PTILOGONATIDAE

Gray silky-flycatcher

Ptilogonys cinereus

## LANIIDAE

Loggerhead shrike

Lanius ludovicianus

## STURNIDAE

Common starling

Sturnus vulgaris

## EMBERIZIDAE

American redstart

Setophaga ruticilla

Rufous-capped warbler

Basileuterus rufifrons

Red-legged honeycreeper

Cyanerpes cyaneus

Green honeycreeper

Chlorophanes spiza

Blue-hooded euphonia

Euphonia elegantissima

Scrub euphonia

Euphonia affinis

Stripe-backed tanager

Piranga bidentata

Blue-gray tanager

Thraupis episcopus

Ant-tanager

Habia gutturalis

Common cardinal

Cardinalis cardinalis

Pyrrhuloxia

C. sinuatus

Rose-breasted grosbeak

Pheucticus ludovicianus

Black-headed grosbeak

P. melanocephalus

Yellow grosbeak

P. chrysopheplus

Blue grosbeak

Guiraca caerulea

Indigo bunting

Passerina cyanea

Orange-breasted bunting

P. leclancherii

Varied bunting

P. versicolor

Painted bunting

P. ciris

Lazuli bunting

P. amoena

Yellow-faced grassquit

Tiaris olivacea

Dickcissel

Spiza americana

White-collared seedeater

Sporophila torqueola

Rufous-crowned sparrow

Aimophila ruficeps

White-crowned sparrow

Zonotrichia lucophrys

Lark bunting

Calamospiza melanocorys

Black-throated sparrow

Amphispiza bilineata

Lark sparrow

Chondestes grammacus

Yellow-winged cacique

Cacicus melanicterus

Bronzed cowbird

Molothrus aeneus

Brown-headed cowbird

M. ater

Brewer's blackbird

Euphagus cyanocephalus

Great-tailed grackle

Quiscalus mexicanus

Yellow-tailed oriole

Icterus mesomelas

Scott's oriole

I. parisorum

Orchard oriole

I. spurius

Altamira oriole

I. gularis

Yellow-headed blackbird

Xanthocephalusxanthocephalus

Red-winged blackbird

Agelaius phoeniceus

## FRINGILLIDAE

House finch

Carpodacus mexicanus

Blue-black grassquit

Volatinia jacarina

Dark-backed goldfinch

Carduelis psaltria

Black-headed siskin

C. notata

PASSERIDAE  
House sparrow

Passer domesticus

Source: Acuerdo por el que se Establece el Calendario de Captura, Transporte y Aprovechamiento Racional de Aves Canoras y de Ornato en la República Mexicana, para la Temporada 1992-1993, Diario Oficial, 21 August 1992.

APPENDIX D  
SPECIES LISTED BY THE U.S.-MEXICO CONVENTION FOR THE  
PROTECTION OF MIGRATORY BIRDS

Ducks, swans, geese	ANATIDAE
Cranes	GRUIDAE
Rails, gallinules, coots	RALLIDAE
Plovers	CHARADRIIDAE
Sandpipers, snipes	SCOLOPACIDAE
Stilts and avocets	RECURVIROSTRIDAE
Phalaropes	PHALAROPODIDAE
Pigeons and doves	COLUMBIDAE
Cuckoos, anis, roadrunners	CUCULIDAE
Nightjars, goatsuckers	CAPRIMULGIDAE
Swifts	APODIDAE
Hummingbirds	TROCHILIDAE
Woodpeckers	PICIDAE
Tyrant flycatchers	TYRANNIDAE
Larks	ALAUDIDAE
Swallows	HIRUNDINIDAE
Titmice, verdins, bushtits	PARIDAE
Creepers	CERTHIDAE
Wrens	TROGLODYTIDAE
Thrushes, solitaires, bluebirds	TURDINAE
Thrashers, mockingbirds	MIMIDAE
Gnatcatchers, gnatwrens, kinglets	SYLVIINAE
Wagtails, pipits	MOTACILLIDAE
Waxwings	BOMBYCILLIDAE
Silky-flycatchers	PTILOGONATIDAE
Shrikes	LANIIDAE
Vireos	VIREONIDAE
Blackbirds, orioles, meadowlarks	ICTERINAE
Tanagers	THRAUPINAE
Grosbeaks, sparrows, finches	FRINGILLIDAE

The following were added in an exchange of diplomatic notes in March, 1972.

Eagles, hawks	ACCIPITRIDAE
Kingfishers	ALCEDINIDAE
Auks, auklets, murre, puffins	ALCIDAE
Darters	ANHINGIDAE
Limpkins	ARAMIDAE

Hérons, egrets, bitterns	ARDEIDAE
Vultures	CATHARTIDAE
Stork, wood ibis	CICONIIDAE
Ravens, crows, jays	CORVIDAE
Albatrosses	DIOMEDEIDAE
Falcons, hawks	FALCONIDAE
Frigatebirds, man-o-war birds	FREGATIDAE
Cormorants	PHALACROCORACIDAE
Flamingos	PHOENICOPTERIDAE
Loons	GAVIIDAE
Oystercatchers	HAEMATOPODIDAE
Storm petrels	HYDROBATIDAE
Jacanas	JACANIDAE
Gulls, terns	LARIDAE
Ospreys	PANDIONINAE
Pelecans	PELECANIDAE
Tropicbirds	PHAETHONTIDAE
Grebes	PODICIPEDIDAE
Shearwaters	PROCELLARIIDAE
Skimmers	RYNCHOPIDAE
Nuthatches	SITTIDAE
Jaegers, skuas	STERCORARIIDAE
Owls	STRIGIDAE
Boobies, gannets	SULIDAE
Spoonbills, ibises	THRESKIORNITHIDAE
Barn owls	TYTONIDAE
Trogons	TROGONIDAE

Source: Convention Between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals, 7 February 1936.

APPENDIX E  
MAMMAL, BIRD, AND REPTILE SPECIES NATIVE TO MEXICO LISTED AS  
ENDANGERED OR THREATENED BY THE U.S. ENDANGERED SPECIES ACT

Mammals

Mexican long-nosed bat	<u>Leptonycteris nivalis</u>
Sanborn's long-nosed bat	<u>Leptonycteris sanborni</u>
Brown bear	<u>Ursos arctos nelsoni</u>
Bobcat	<u>Felis rufus escuinapae</u>
Cochito (Gulf of Calif. harbor porpoise)	<u>Phocoena sinus</u>
Cedros Island mule deer	<u>Odocoileus hemonius</u> <u>cedrosensis</u>
Jaguar	<u>Panthera onca</u>
Jaguarundi	<u>Felis yagouarundi</u>
Margay	<u>Felis wiedii</u>
Black howler monkey	<u>Alouatta pigra</u>
Howler monkey	<u>Alouatta palliata</u>
Ocelot	<u>Felis pardalis</u>
Southern sea otter	<u>Enhydra lutris nereis</u>
Mexican prairie dog	<u>Cynomys mexicanus</u>
Peninsular pronghorn	<u>Antilocapra americana</u> <u>peninsularis</u>
Sonoran pronghorn	<u>Antilocapra americana</u> <u>sonoriensis</u>
Volcano rabbit	<u>Romerolagus diazi</u>
Caribbean monk seal	<u>Monachus tropicalis</u>
Guadalupe fur seal	<u>Arctocephalus townsendi</u>
Central American tapir	<u>Tapirus bairdii</u>
Gray wolf	<u>Canis lupus</u>

Birds

Masked bobwhite	<u>Colinus virginianus</u> <u>ridgwayi</u>
California condor	<u>Gymnogyps californianus</u>
Whooping crane	<u>Grus americana</u>
Eskimo curlew	<u>Numenius borealis</u>
Bald eagle	<u>Haliaeetus leucocephalus</u>
Harpy eagle	<u>Harpia harpyja</u>
Peregrine falcon	<u>Falco peregrinus</u>

Northern aplomado falcon  
 Slender-billed grackle  
 Horned guan  
 Thick-billed parrot  
 Piping plover  
 Merriam's Montezuma Quail  
 Resplendent quetzal  
 California least tern  
 Black-capped vireo  
 Least Bell's vireo  
 Golden-cheeked wood warbler  
 Imperial woodpecker

Falco femoralis  
septentrionalis  
Ouisicalus palustris  
Oreophasis derbianus  
Rhynchopsitta  
pachyrhyncha  
Charadrius melodus  
Cyrtonyx montezumae  
merriami  
Pharomachrus mocinno  
Sterna antillarum browni  
Vireo atricapillus  
Vireo bellii pusillus  
Dendroica chrysoparia  
Campephilus imperialis

#### Reptiles

San Esteban Island chuckwalla  
 American crocodile  
 Morelet's crocodile  
 New Mexican ridge-nosed  
 rattlesnake  
 Bolson tortoise  
 Desert tortoise  
 Aquatic box turtle  
 Central American river turtle  
 Cuatro Cienegas softshell turtle  
 Green sea turtle  
 Hawksbill sea turtle  
 Kemp's ridley sea turtle  
 Leatherback sea turtle  
 Loggerhead sea turtle  
 Olive ridley sea turtle

Sauromalus varius  
Crocodylus acutus  
Crocodylus moreletii  
Crotalus willardi  
obscurus  
Gopherus flavomarginatus  
G. agassizii  
Terrapene coahuila  
Dermatemys mawii  
Trionyx ater  
Chelonia mydas  
Eretmochelys imbricata  
Lepidochelys kempii  
Dermochelys coriacea  
Caretta caretta  
Lepidochelys olivacea

Source: Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12, 29 August 1992.

APPENDIX F  
MAMMAL, BIRD, AND REPTILE SPECIES NATIVE TO MEXICO  
LISTED AS ENDANGERED OR THREATENED BY CITES

Mammals

Mantled howler monkey	<u>Alouatta palliata</u>
Guatemalan howler monkey	<u>Alouatta pigra</u>
Spider monkey	<u>Ateles geoffroyi</u>
Mexican grizzly bear	<u>Ursos arctos nelsoni</u>
Black bear	<u>Ursus americanus</u>
Southern sea otter	<u>Enhydra lutris nereis</u>
South American river otter	<u>Lutra longicaudis</u>
Puma	<u>Felis concolor</u>
Ocelot	<u>F. pardalis</u>
Bobcat	<u>F. rufa escuinapae</u>
	<u>F. rufus</u>
Margay	<u>Felis wiedii</u>
Jaguarundi	<u>Felis yagouaroundi</u>
Jaguar	<u>Panthera onca</u>
Mexican wolf	<u>Canis lupis</u>
Guadalupe fur seal	<u>Arctocephalus townsendi</u>
Caribbean monk seal	<u>Monachus tropicalis</u>
Northern elephant seal	<u>Mirounga angustirostris</u>
Gulf porpoise	<u>Phocoena sinus</u>
Common porpoise	<u>Phocoena phocoena</u>
Dall's porpoise	<u>Phocoenides dalli</u>
Pygmy killer whale	<u>Feresa attenuata</u>
Pacific white-sided dolphin	<u>Lagenorhynchus</u>
	<u>obliquidens</u>
Rough-toothed dolphin	<u>Steno bredanensis</u>
Bottlenose dolphin	<u>Tursiops truncatus</u>
Grey whale	<u>Eschrichtius robustus</u>
West Indian manatee	<u>Trichechus manatus</u>
Central American tapir	<u>Tapirus bairdii</u>
White-lipped peccary	<u>Tayassu pecari</u>
Collared peccary	<u>Tayassu tajacu</u>
Baja pronghorn	<u>Antilocapra americana</u>
	<u>peninsularis</u>
Sonoran pronghorn	<u>A. a. sonoriensis</u>
Pronghorn	<u>A. a. mexicana</u>
Bighorn sheep	<u>Ovis canadensis</u>
Mexican prairie dog	<u>Cynomys mexicanus</u>

Volcano rabbit  
Phillip's kangaroo rat

Romerolagus diazi  
Dipodomys phillipsii  
phillipsii

### Birds

Greater flamingo

Phoenicopterus ruber  
ruber

Atitlan grebe  
Jabiru  
Aleutian goose

Podilymbus gigas  
Jabiru mycteria  
Branta canadensis  
leucopareia

Horned guan  
Masked bobwhite

Oreophasis derbianus  
Colinus virginianus  
ridgwayi

Mearn's montezuma or harlequin  
quail

Cyrtonyx montezumae  
mearnsi

Montezuma or harlequin quail

C. montezumae montezumae

Whooping crane

Grus americana

Imperial woodpecker

Campephilus imperialis

Bald eagle

Haliaeetus leucocephalus

Harpy eagle

Harpia harpyja

Peregrine falcon

Falco peregrinus

Bicolored hawk

Accipiter bicolor

Cooper's hawk

A. cooperii

Goshawk

A. gentilis

Sharp-shinned hawk

A. striatus

Golden eagle

Aquila chrysaetos

Black-collared hawk

Busarellus nigricollis

White-tailed hawk

Buteo albicaudatus

Zone-tailed hawk

B. albonotatus

Short-tailed hawk

B. brachyurus

Red-tailed hawk

B. jamaicensis

Rough-legged buzzard

B. logopus

Red-shouldered hawk

B. lineatus

Roadside hawk

B. magnirostris

Grey hawk

B. nitidus

Broad-winged hawk

B. platypterus

Ferruginous hawk

B. regalis

Swainson's hawk

B. swainsonii

Common black hawk

Buteogallus anthracinus

Great black hawk

B. urubitinga

Hook-billed kite

Chondrohierax uncinatus

Hen harrier

Circus cyaneus

Swallow-tailed kite

Elanoides forficatus

White-tailed kite

Elanus leucurus

Crane hawk

Geranospiza caerulescens

Double-toothed kite

Harpagus bidentatus

Solitary eagle

Harpohaliaetus solitarius

Mississippi kite

Ictinia mississippiensis

Plumbeous kite

Ictinia plumbea

Grey-headed kite

Leptodon cayannensis

White hawk	<u>Leucopternis albicollis</u>
Harris' hawk	<u>Parabuteo unicinctus</u>
Everglades kite	<u>Rostrhamus sociabilis</u>
Ornate hawk eagle	<u>Spizaetus ornatus</u>
Black hawk eagle	<u>S. tyrannus</u>
Black and white hawk eagle	<u>S. melanoleucus</u>
Red-throated caracara	<u>Daptrius americanus</u>
Merlin	<u>Falco columbarius</u>
Orange-breasted falcon	<u>F. deiroleucus</u>
Aplomado falcon	<u>F. femoralis</u>
Prairie falcon	<u>F. mexicanus</u>
Bat falcon	<u>F. ruficularis</u>
American kestrel	<u>F. sparverius</u>
Laughing falcon	<u>Herpetotheres cachinnans</u>
Barred forest falcon	<u>Micrastur ruficollis</u>
Collared forest falcon	<u>M. semitorquatus</u>
Common or crested caracara	<u>Polyborus plancus</u>
Osprey	<u>Pandion haliaetus</u>
Toucan	<u>Ramphastos sulphuratus</u>
Scarlet macaw	<u>Ara macao</u>
Military macaw	<u>A. militaris</u>
Thick-billed parrot	<u>Rhynchopsitta</u>
	<u>pachyrhyncha</u>
Maroon-fronted parrot	<u>R. p. tirrisi</u>
Northern resplendent quetzal	<u>Pharomachrus mocinno</u>
	<u>mocinno</u>
White-fronted amazon	<u>Amazona albifrons</u>
Yellow-naped parrot	<u>A. auropalliata</u>
Red-lored amazon	<u>A. autumnalis</u>
Mealy amazon	<u>A. farinosa</u>
Lilac-crowned amazon	<u>A. finschi</u>
Yellow-crowned amazon	<u>A. ochrocephala</u>
Yellow-headed parrot	<u>A. oratrix</u>
Green-cheeked amazon	<u>A. viridigenalis</u>
Yellow-lored amazon	<u>A. xantholora</u>
Orange-fronted conure	<u>A. canicularis</u>
Green conure	<u>A. holochlora</u>
Olive-throated conure	<u>A. nana</u>
Barred parakeet	<u>Bolborhynchus lineola</u>
Orange-chinned parakeet	<u>Brotogeris jugularis</u>
Mexican parrotlet	<u>Forpus cyanpygius</u>
Brown-hooded parrot	<u>Pionopsitta haematotis</u>
White-capped parrot	<u>Pionus senilis</u>
Barn owl	<u>Tyto alba</u>
Saw-whet owl	<u>Aegolius acadicus</u>
Unspotted saw-whet owl	<u>A. ridgwayi</u>
Striped owl	<u>Asio clamator</u>
Long-eared owl	<u>A. otus</u>
Short-eared owl	<u>A. flammeus</u>
Stygian owl	<u>A. stygius</u>
Great horned owl	<u>Bubo virginianus</u>
Black and white owl	<u>Ciccaba nigrolineata</u>

Mottled owl	<u>C. virgata</u>
Ferruginous pygmy owl	<u>Glaucidium brasilianum</u>
Northern pygmy owl	<u>G. gnoma</u>
Least pygmy owl	<u>G. minutissimum</u>
Crested owl	<u>Lophostrix cristata</u>
Elf owl	<u>Micrathene whitneyi</u>
Screech owl	<u>Otus asio</u>
Bearded screech owl	<u>O. barbarus</u>
Pacific screech owl	<u>O. cooperi</u>
Flammulated owl	<u>O. flammeolus</u>
Vermiculated screech owl	<u>O. guatemalae</u>
Western screech owl	<u>O. kennicottii</u>
Balsas screech owl	<u>O. seductus</u>
Whiskered owl	<u>O. trichopsis</u>
Fulvous owl	<u>Strix fulvescens</u>
Spotted owl	<u>S. occidentalis</u>
Barred owl	<u>S. varia</u>
Burrowing owl	<u>Speotyto cunicularia</u>
Spectacled owl	<u>Pulsatrix perspicillata</u>
Striped owl	<u>Rhinoptyns clamator</u>
Band-tailed barbthroat	<u>Threnetes ruckeri</u>
Long-tailed hermit	<u>Phaethornis superciliosus</u>
Little hermit	<u>P. longuemareus</u>
Scaly-breasted hummingbird	<u>Phaeochroa cuvierii</u>
Wedge-tailed sabrewing	<u>Campylopterus curvipennis</u>
Rufous sabrewing	<u>C. rufus</u>
Violet sabrewing	<u>C. hemileucurus</u>
White-necked jacobin	<u>Florisuga mellivora</u>
Brown violet-ear	<u>Colibri delphinae</u>
Green violet-ear	<u>C. thalassinus</u>
Green-breasted mango	<u>Anthracothorax prevostii</u>
Emerald-chinned hummingbird	<u>Abeillia abeillei</u>
Rufous-crested coquette	<u>Lophornis delattrei</u>
Black-crested coquette	<u>L. helenae</u>
Fork-tailed emerald	<u>Chlorostilbon canivetii</u>
Dusky hummingbird	<u>Cyananthus sordidus</u>
Broad-billed hummingbird	<u>C. latirostris</u>
Common woodnymph	<u>Thalurania colombica</u>
Blue-throated goldentail	<u>Hylocharis eliciae</u>
White-eared hummingbird	<u>H. leucotis</u>
Black-fronted hummingbird	<u>H. xantusii</u>
White-bellied emerald	<u>Amazilia candida</u>
Berylline hummingbird	<u>A. beryllina</u>
Blue-tailed hummingbird	<u>A. cyanura</u>
Rufous-tailed hummingbird	<u>A. tzacatl</u>
Fawn-breasted hummingbird	<u>A. yucatenensis</u>
Cinnamon hummingbird	<u>A. rutila</u>
Violet-crowned hummingbird	<u>A. violiceps</u>
Green-fronted hummingbird	<u>A. viridifrons</u>
Red-billed azurecrown	<u>A. cyanocephala</u>
Stripe-tailed hummingbird	<u>Eupherusa eximia</u>
Green-throated mountain-gem	<u>Lampornis viridipallens</u>

Amethyst-throated hummingbird  
 Blue-throated hummingbird  
 Garnet-throated hummingbird  
 Magnificent hummingbird  
 Purple-crowned fairy  
 Long-billed starthroat  
 Plain-capped starthroat  
 Slender sheartail  
 Mexican sheartail  
 Sparkling-tailed hummingbird  
 Lucifer hummingbird  
 Beautiful hummingbird  
 Ruby-throated hummingbird  
 Black-chinned hummingbird  
 Anna's hummingbird  
 Costa's hummingbird  
 Calliope hummingbird  
 Bumblebee hummingbird  
 Wine-throated hummingbird  
 Broad-tailed hummingbird  
 Rufous hummingbird  
 Allen's hummingbird

L. amethystinus  
L. clemenciae  
Lamprolaima rhami  
Eugenes fulgens  
Heliothrix barroti  
Heliomaster longirostris  
H. constantii  
Doricha enicura  
D. eliza  
Tilmatura dupontii  
Calothorax lucifer  
C. pulcher  
Archilochus colubris  
A. alexandri  
Calypte anna  
C. costae  
Stellula calliope  
Atthis heloisa  
A. ellioti  
Selasphorus platycercus  
S. rufus  
S. sasin

### Reptiles

River turtle  
 Water box turtle  
 Bolson tortoise  
 Desert tortoise  
 Gopher tortoise  
 Loggerhead turtle  
 Green turtle  
 Hawksbill turtle  
 Kemp's ridley turtle  
 Olive ridley turtle  
 Leatherback turtle  
 Cuatro Cienegas soft-shell turtle  
 American crocodile  
 Morelet's crocodile  
 Central American caiman  
 Common or green iguana  
 San Esteban Island chuckwalla  
 San Diego horned lizard  
  
 Orange-throated whiptail  
 Beaded lizard  
 Gila monster  
 Boa constrictor  
 Rubber boa  
 Rosy boa

Dermatemys mawii  
Terrapene coahuila  
Gopherus flavomarginatus  
G. agassizii  
G. berlandieri  
Caretta caretta  
Chelonia mydas  
Eretmochelys imbricata  
Lepidochelys kempii  
Lepidochelys olivacea  
Dermochelys coriacea  
Trionyx ater  
Crocodylus acutus  
Crocodylus moreletii  
Caiman crocodilus fuscus  
Iguana iguana  
Sauromalus varius  
Phrysonoma coronatum  
blainvillei  
Cnemidophorus hyperythrus  
Heloderma horridum  
H. suspectum  
Boa constrictor  
Charina bottae  
Lichanura trivirgata  
Exiliboa placata  
Loxocemus bicolor

Two-striped garter snake

Ungaliophis continentalis  
Thamnophis conchi  
hammondi

Source: World Wildlife Fund, Latin American Wildlife Trade Laws, revised edition (Washington, D.C.: World Wildlife Fund, 1987), 246-251.

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## BIOGRAPHICAL SKETCH

Debra A. Rose was born in 1966 at MacDill Air Force Base in Tampa, Florida, and has lived in Florida, California, Texas, New Mexico, South Carolina, the Phillipines, Mexico, and Poland. In 1983 she began undergraduate studies at Agnes Scott College in Decatur, Georgia, graduating in 1987 Phi Beta Kappa with high honors with a B.A. in international relations. In 1987, Ms. Rose entered the graduate program in political science at the University of Florida, where she became affiliated with the Tropical Conservation and Development Program in the Center for Latin American Studies. She received her M.A. in 1989.

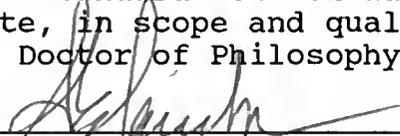
In the summer of 1990, Ms. Rose conducted preliminary dissertation field research on sea turtle management and conservation in Mexico, with funding from the TCD Program and the Tinker Foundation. She simultaneously attended a U.F.-Universidad Autónoma de Yucatán program in tropical ecology and advanced Spanish in Merida, Yucatan. A Pew Charitable Trusts Scholarship for Integrated Approaches to Sustainable Development allowed her to undertake additional interdisciplinary coursework in wildlife ecology and management in 1990 and partially supported a research

internship with the World Wildlife Fund in the spring of 1991.

With funding from a grant by the Social Science Research Council's Latin America and the Caribbean Program, Ms. Rose conducted dissertation field research in Mexico in 1991 and 1992. From a base in Mexico City, she travelled to Chiapas, Oaxaca, Campeche, Yucatan, Quintana Roo, Veracruz, Tamaulipas, Nuevo Leon, Sonora, Baja California Norte, and Baja California Sur to collect data and conduct interviews.

Beginning in January, 1993, Ms. Rose will serve as program officer in the TRAFFIC office of the World Wildlife Fund in Washington, D.C.

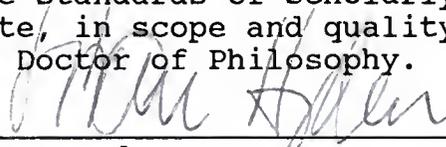
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Steven E. Sanderson, Chair  
Professor of Political Science

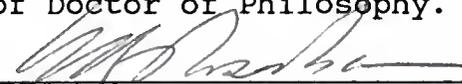
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Assistant Professor of  
Political Science

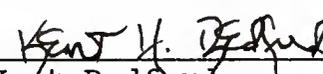
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Goran Hyden,  
Professor of Political Science

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Walter A. Rosenbaum,  
Professor of Political Science

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This dissertation was submitted to the Graduate Faculty of the Department of Political Science in the College of Liberal Arts and Sciences and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December 1993

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Dean, Graduate School

