

# Environmental Scarcity and Violent Conflict: The Case of Chiapas, Mexico



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## *Abstract*

*This paper identifies the different forms of environmental scarcities that affect the people of Chiapas, Mexico. In recent years, these scarcities have become acute. Increased demand for cropland arising from high human fertility and an influx of migrants occurred within the context of a long-standing inequitable distribution of land resources. The contribution of cropland degradation to environmental scarcity was localized to the Central Highlands. Environmental scarcities did not cause civil strife by themselves; in interaction with other factors, however, they multiplied the grievances of the campesino and indigena communities. At the same time, economic liberalization reduced the governing regime's capacity in Chiapas and provided greater opportunities for violent challenges by opposition groups.*

In the hushed morning after San Cristobal's New Year's celebration in 1994, hundreds of masked rebels moved through the empty streets, cutting phone lines, immobilizing the local security apparatus, and establishing an alternative political order. This revolutionary Zapatista government lasted only four days in San Cristobal and other urban centers of the Central Highlands of Chiapas, Mexico. However, in the next two years, the Ejercito Zapatista de Liberacion Nacional (EZLN), or Zapatista National Liberation Army, would bring the plight of Chiapan peasants to the attention of Mexicans, foreign investors, and the international community, challenging anew the legitimacy of the ruling Partido Revolucionario Institucional (PRI).<sup>1</sup> Commentators have attributed a range of revolutionary objectives to the Zapatistas, often obscuring the insurgents' principal goal: relief from escalating environmental scarcities that have impoverished their communities.<sup>2</sup>

There are three common explanations for the conflict in Chiapas. First, orthodox political-economic explanations emphasize broad - and often external - forces driving the conflict.<sup>3</sup> These include the PRI's neglect of peasants as a client group, the difficulties of economic restructuring, the inadequacies of Mexican electoral reform, the fear of the North American Free Trade Agreement (NAFTA), the class basis of land concentration, resurgent Mayan identity, and generalized poverty. Although these explanations sketch

the national and international context in which the crisis evolved, they obscure the role of ecological and demographic forces.

Second, environmental explanations suggest that the rebellion is somehow connected to deforestation, soil erosion, and biodiversity loss.<sup>4</sup> However, these explanations fail to specify the links between degradation and the Zapatista rebellion. The Zapatistas are not fighting for conservation issues as they are commonly understood by Northern environmentalists, even though the Lacandon Rain Forest is one of the last large tropical rainforests in North America and is the focus of many Mexican and international conservation efforts. As a group, these environmental explanations of the conflict are often ideologically biased, describing the main actors, for example, as evil landowners and innocent peasants.

The third group of explanations falls between these two perspectives. A growing and insightful body of literature emphasizes the maldistribution of natural resources - especially land - as the central grievance of the EZLN and its sympathizers.<sup>5</sup> This literature argues that the development model used by the Mexican government has generally failed. The government's focus should be on microeconomic and micropolitical issues, such as market access, peasant agriculture, local corruption, and the control of PRI political bosses. The virtue of these studies is that they analyze both the structural inequities of land distribution and the history of impediments to real reform.

We show below that the insurgency was a product of three simultaneous factors: rising grievances among peasants caused largely by worsening environmental scarcity, a weakening of the Mexican corporatist state by rapid economic liberalization, and efforts by churches and activist peasant groups to change peasants' understanding of their predicament.

An accurate understanding of the roots of the Chiapas conflict is important for U.S. and Canadian policy makers. The conflict helped trigger an economic crisis by reminding the world that Mexico is a developing country that has yet to solve many underlying economic and social problems. Moreover, the EZLN inspired campesinos, indigenous people, labor, and the urban poor of central and northern Mexico to express discontent with the PRI regime by engaging in violent protest and grassroots democratic campaigns. Mexican authorities have been forced to devote substantial resources to keep similar insurgencies from flaring up elsewhere.

### **Overview of the Chiapas Case**

**Geography.** The southernmost state in Mexico, Chiapas shares a 962-kilometer international border with Guatemala and internal borders with the states of Tabasco, Veracruz, and Oaxaca. Chiapas has an area of 7.6 million hectares administered by 112 municipios, which are administrative areas centered on principal towns. Chiapas can be roughly divided into three regional bands running from northwest to southeast across the state: the Soconusco Coast along the Pacific Ocean, the Central Highlands, and the Eastern Lowlands (see Figure 1). The Soconusco Coast is dominated by great plantations of cash crops for export and some light industry served by modernizing port facilities.

The Central Highlands rise 900 meters from the coast to the fertile lands of the Grijalva River and its tributaries. The Highlands encompass two major urban centers, Tuxtla Gutierrez, the state capital, and San Cristobal, a former seat of colonial power and now a popular tourist destination. Also in the Central Highlands is the municipio of Reforma, with abundant oil and natural gas reserves. The Eastern Lowlands include the Lacandon Rain Forest, which is bounded by the Usumacinta River and Guatemala to the east, the vast deforested area of the Marques de Comillas in the south, and the increasingly populous area of the Canadas at the foot of the Highlands. It is in this frontier region between the Highlands and the Eastern Lowlands that people have been most severely affected by environmental scarcities, and it is from here that the EZLN draws its support.

The southern states of Mexico are rich in oil, natural gas, forests, and farmland. In most southern states, and particularly in Chiapas, these resources are extracted by the national government for the use of Mexico's central and northern states. Chiapas produces 5 percent of the nation's oil, 12 percent of its natural gas, 46 percent of its coffee, and 48 percent of its hydroelectric power, yet only a tiny portion of the wealth generated from these resources is returned to the state for development programs - leaving it one of the poorest in Mexico.

**Figure 1:** Geography and Political Economy of Chiapas, Mexico



**Demography.** Since 1970, the population of Chiapas has grown 3.6 percent annually, though the rate for the indigena population - speakers of the Mayan family of languages - has been 4.6 percent.<sup>6</sup> According to official Mexican statistics, the total indigena population in Chiapas is currently over 700,000. A full demographic assessment, however, must also include 60,000 indigena refugees who fled Guatemala between 1980 and 1985 and the annual fluctuation of another 60,000 to 120,000 Guatemalan migrant laborers.<sup>7</sup> Most of the Chiapan and Guatemalan indigenas live in the Eastern Lowlands, a socially and economically marginalized region with inadequate educational and health infrastructure (see Appendixes 1 and 2 in print version of paper). Adding migration from Mexican states to the north, the population growth in the Canadas and other frontier communities has been between 8 and 12 percent annually for the last two decades (see Figure 2, available in print version).<sup>8</sup>

**Class Relations.** In the story of the Zapatista uprising, six groups are important. As mentioned above, the *indigenas* are the native peoples of this region. One-third of indigenas are unilingual speakers of an indigenous language, and 70 percent live in towns of 1,000 people or less. Spanish is at best their second language, and indigena cultures and languages cut across state and municipio boundaries. The state and municipio governments try, but often fail, to contain and manage these groups. The largest groups are the Tzeltal, Tzotzil, and Chol. The vast majority of the EZLN members are indigena coffee growers. The insurgents do not represent all of the people of the Eastern

Lowlands; they represent the most marginal of those who have colonized the Lacandon in the past forty years.

The *campesinos* usually speak Spanish as their first language. As with the *indigenas*, they are generally subsistence farmers who produce their own food on their own small plots, on commonly owned plots, or on illegally occupied land. Their monetary income is derived from several sources, including raising cattle for large ranches in the region, producing small tradable items, working in tourist industries, engaging in seasonal labor in developing areas of the state, and growing cash crops that are sold to local marketing boards or directly exported.

The *latifundistas* are a relatively small class of landowners that has long controlled vast territories in the state. In the Eastern Lowlands, most of this land is devoted to capital-intensive cash crops for export: mainly coffee, cocoa, and citrus fruits. Distinct from but similar to the *latifundistas* are the *rancheros*, a relatively new group that has taken control of huge tracts of land with the encouragement of state subsidies. They are largely responsible for converting forestland into pastures for grazing, particularly around Palenque at the northern edge of the Lacandon. In Chiapas, both groups have withstood federal attempts at political reform and land redistribution and have retained control of state politics. Working for the PRI, affiliated parties, and the *latifundistas* are the *caciques*, political bosses who mobilize communities to support the PRI, exact tithes for traditional festivals, and benefit economically by containing opposition to the ruling regime.

Finally, a group of intellectuals and church and opposition leaders has helped organize *indigenas* and *campesinos* and encouraged them to express dissatisfaction with the unfulfilled political promises of the *caciques* and the oppression of the *latifundistas*. Many of this group fled political persecution in other parts of Mexico, and some sought refuge in the Chiapan Central Highlands after the 1968 student massacre in Mexico City.

<b>Four Main Forms of Landholding in Chiapas</b>	
<i>Ejidos</i> : Land vested in peasant communities by agrarian reform, portions of which are often worked by individual <i>campesinos</i> . Until a constitutional change in 1992, the land could not be sold, rented, or used as collateral	<i>Private landholdings</i> : Throughout Mexico, privately owned estates not exceeding five thousand hectares, except in Chiapas, where state legislators extended the limit up to eight thousand hectares. In Chiapas, illegal renting or 'name lending' (assigning neighboring land titles to family member) increases the actual size of many estates beyond the legal limit
<i>Official bioreserves and national parks</i> : Areas set aside for the conservation of local ecology, often superimposed upon already existing land titles	<i>Comunidades agrarias</i> : Primarily land reclaimed by <i>indigena</i> communities from private owners who had seized their land in the late nineteenth and early twentieth centuries.

According to the National Statistics and Geographical Information Institute (INEGI), in 1992, 44 percent of Mexico's 84 million people lived in poverty, with 16 percent in

extreme poverty. Fifty-six percent of the extreme poor are engaged in agriculture in rural areas.<sup>9</sup> Class distinctions in Chiapas are acutely evident in statistics on the distribution of education, infrastructure, fuel supplies, wages, and economic activities (see Appendix on selected statistics).

**Race Relations.** Distinctions of race in Chiapas are even more sharply defined than those of class. Statistics show that subordinate racial groups systematically receive less public investment in infrastructure, education, and health than the state or national average. Indigena populations are rigidly confined to a limited number of occupations, mainly in agriculture; most indigena workers earn the minimum wage or less. Poverty statistics reveal striking economic marginalization: in municipios where the indigena population is less than 10 percent, 18 percent of the people are at or below the poverty line; for municipios where the indigena population is between 10 and 40 percent, 46 percent of the people are poor; and for those where more than 70 percent of the population are indigena, over 80 percent are poor.<sup>10</sup> These figures suggest that racism has consistently affected the design and implementation of public policy in Chiapas. Policy elites have rarely consulted indigena communities during the planning of welfare programs.

The combined effect of class and racial barriers faced by indigenas and campesinos drives them to rely increasingly on wage opportunities within the rapidly expanding market economy. The market generates an incentive structure that redirects this labor into the production of cash crops or into local industry to supplement subsistence agriculture. As a result, smallholders become bound to the prices and economic fluctuations of distant markets. In addition, the labor demands of oil exploration and production in the north, of industrial and hydroelectric projects on the coast and in the Central Highlands, and of latifundios on the coast provide many with seasonal cash income.<sup>11</sup> Some workers use this income to buy consumer goods or fertilizers and herbicides for their farms. Elites - especially plantation owners and industrialists - have often profited from this increasing supply of cheap, competitive, and largely unorganized labor. Labor competition is accentuated by migrations from other states and Guatemala.

### **Environmental Scarcities in Chiapas**

There are three types of environmental scarcity: *Demand-induced scarcity* is caused by population growth or increased per capita resource consumption; *supply-induced scarcity* is caused by degradation and depletion of environmental resources; and *structural scarcity*, the type most often stressed by political analysts, is caused by an unbalanced distribution of resources that severely affects less powerful groups in the society.<sup>12</sup>

#### **Demand-Induced Scarcity: A Growing Population on a Limited Land Base**

From 1970 to 1990, the population of Chiapas doubled, from 1,570,000 to 3,200,000, with an average annual growth rate of 3.6 percent. During this period, the growth rate for indigena populations was a percentage point higher, with the total almost tripling, from 288,000 to 716,000. Although these indigenas are spread throughout the state, many are concentrated in the Eastern Lowlands, especially the Lacandon. There, migrations of poor farmers from other parts of the state and of indigenas from Guatemala have combined

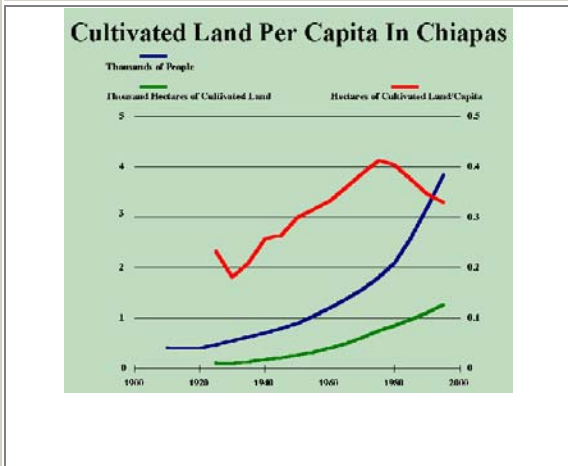
with natural population growth to boost the total from 12,000 in 1960 to over 300,000 today.<sup>13</sup>

The 1983 eruption of the Chicon volcano in the northern Central Highlands displaced thousands of people into the Eastern Lowlands. Over the next few years, as many as 300,000 Guatemalans moved across the border during the civil conflicts in that country. Additionally, before several huge hydroelectric projects flooded high-quality farmland in the Grijalva basin, the government forcibly relocated tens of thousands of smallholders into the Eastern Lowlands.<sup>14</sup> These people now live in one of the most marginal parts of the state, often without potable water, electricity, or infrastructure.<sup>15</sup> In the 1960s and 1970s, the movement of seasonal labor to other parts of Chiapas relieved the increased population pressures on small farms, but with economic downturns in the mid-1980s, this option was no longer as easily available.

Although anecdotal evidence suggests that the Eastern Lowlands and the Central Highlands suffer the highest demand-induced scarcities of cropland, good data are available only for the state as a whole, as shown in Figure 3. This graph demonstrates that land availability per capita increased for much of this century as new lands, especially forestlands, were opened to cultivation. Around 1975, the curve turned sharply downward. There are significant regional differences, however, among the Soconusco Coast, the Central Highlands, and the Eastern Lowlands. Great plantations of coffee and maize have existed in the coastal region since before the Revolution, and labor demands of the coastal latifundios have helped absorb population growth and migration. In contrast, the Central Highlands have seen ever-higher population densities on marginal farmland.<sup>16</sup>

Particularly in and around San Cristobal, the growing population has consumed much of the forest and occupied most of the potentially arable land, greatly changing the local landscape. Even the expansion of municipio boundaries by some ten-thousand hectares every twenty

**Figure 3: Decline in Cultivated Land per Capita in Chiapas**



Sources: Thomas Benjamin, *A Rich Land a Poor People* (Albuquerque, NM: University of New Mexico Press, 1989), 225, fig. 4, and 231, fig 5; Instituto Nacional de Estadística, Geografía e Informática, *Anuario Estadística del Estado De Chiapas, Edición 1991 and Edición 1994* (Mexico, D. F.: Instituto Nacional de Estadística, Geografía e Informática, 1991 and 1994); Instituto Nacional de Estadística, Geografía e Informática, *VII Censo Egidial* (Mexico, D. F.: Instituto Nacional de Estadística, Geografía e Informática, 1994); Coordinación General de Estadística, Geografía e Informática, *Chiapas Básico 1987* (Coordinación General de Estadística, Geografía e Informática; 1987); and George Collier, Personal Communication, 25 May 1995.

years has not offset the demand for cropland reflected in the dramatic rise in the percentages of worked and pastoral land and the decrease in the percentage of forested area (see Table 1).<sup>17</sup>

<b>Table 1: Population Size, Density and Land Use in San Cristóbal and Periphery, 1950-1990</b>						
	<b>1950</b>		<b>1970</b>		<b>1990</b>	
<b>POPULATION</b>						
San Cristóbal	23,054		32,833		89,335	
Periphery	86,541		132,606		278,191	
<b>Total</b>	<b>109,595</b>		<b>165,439</b>		<b>367,526</b>	
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<b>DENSITY</b>	<b>PEOPLE/Km<sup>2</sup></b>		<b>PEOPLE/Km<sup>2</sup></b>		<b>PEOPLE/Km<sup>2</sup></b>	
SanCristóbal	47.6		67.8		228.3	
Periphery	38.8		54.9		81.9	
<b>Total</b>	<b>45.4</b>		<b>68.5</b>		<b>97.0</b>	
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<b>LAND USE</b>	<b>HECTARES</b>	<b>%</b>	<b>HECTARES</b>	<b>%</b>	<b>HECTARES</b>	<b>%</b>
Worked Lands	66,264.9	28.5	71,479.9	29.8	103,956.9	41.5
Pastoral Hills and Plains	43,223.2	18.6	70,569.7	29.5	80,993.2	32.3
Forests	103,466.1	44.5	59,095.5	24.7	45,535.7	18.2
Other/Unproductive	17,135.8	7.4	40,099.7	16.7	19,973.0	8.0
<b>Total</b>	<b>230,090.0</b>	<b>100.0</b>	<b>241,245.0</b>	<b>100.0</b>	<b>250,458.8</b>	<b>100.0</b>
<i>Sources: Compiled from Censo Agrícola Ganader y Ejidal, 1950, 1970 (Dirección General de Estadística) and VII Censo Ejidal (INEGI, 1994). San Cristóbal's periphery includes the municipios of Amatenango, Chalchihuitan, Chamul, Chanal, Chenalho, Huixtan, Larrainzar, Mitontic, Oxchuc, Pantelho, Tenejapa, Teopisca and Zinacantan.</i>						

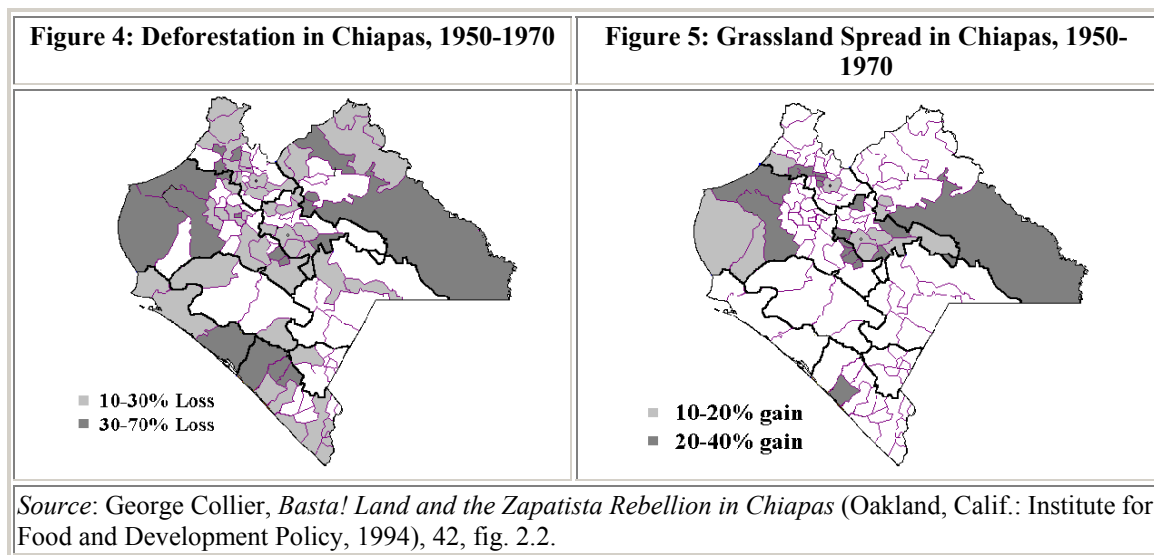
### **Supply-Induced Scarcity: Deforestation and Soil Erosion**

Supply-induced scarcity arises from degradation or depletion that shrinks the pool of resources. In Chiapas, the critical environmental resources are forests and cropland. Land degradation often begins with forest removal, continues with unsustainable agricultural practices, and ends with overgrazing by cattle, sheep, and goats.

**Deforestation.** When the Spanish found the Lacandon Rain Forest along the Usumacinta River and its tributaries, they called it the Desierto de los Lacandones - a "desolate" forested area of about 1.5 million hectares. Five hundred years of use have reduced the virgin forest by two-thirds, to about 500,000 hectares. Much of this deforestation has taken place in the last twenty-five years. The largest unfragmented tract of forest - and the largest remaining tract of tropical rain forest in Mexico - is in the Montes Azules Bioserve. The reserve is also the most diverse ecosystem in Mexico and contains the only Mexican habitats for many endangered mammals.<sup>18</sup>

Over the years, the Lacandon Rain Forest supplied wood for local harvesting and international export and topsoil for monocultural production and cattle grazing. Each of

these natural services is now seriously taxed. While the average annual rate of deforestation for tropical forests since the 1950s in Mexico has been 2.44 percent, some parts of the Eastern Lowlands have been deforested at 4 percent per year, and Palenque in the northeast has lost a total of 76,000 hectares at 12.4 percent per year (Figure 4).<sup>19</sup> Moreover, the Lacandon Rain Forest has been increasingly fragmented by squatters' settlements and rancheros, boosting the amount of pastureland within the forest by 200 percent between 1980 and 1988.<sup>20</sup> According to the most comprehensive study of forest loss, between 1974 and 1986 the Lacandon Rain Forest was reduced by 7.7 percent a year. In all, 42 percent of the newly exposed area was converted to pasturelands, 42 percent was overtaken by secondary forests, 6.7 percent was lost to severe soil erosion, and only 3.7 percent was ever used for agriculture.<sup>21</sup> The fragmentation of forests by road construction, hydroelectric and oil projects, logging, and slash-and-burn or pastureland agriculture has also disrupted the overall integrity of the forest ecosystem. In general, as forests are lost, grassland spreads, as indicated in Figure 5.



In the Central Highlands, deforestation has led to firewood shortages. Highland Mayan communities use oak, madrona, and cedar to cook, to fire ceramic goods, and to distill moonshine.<sup>22</sup> Many communities have exhausted nearby supplies and must travel high into the hills for wood. These "cloud forests," which are home to flora and fauna only found at the crests of hills permanently engulfed by tropical mists, are now the prime target of firewood gatherers.

**Soil Erosion.** Soil erosion occurs when land is stripped of vegetative cover, tilled or overgrazed and exposed to the energy of the wind, rain, and runoff. Highland soils are particularly vulnerable to erosion, because the steepness of the land makes it easier for wind and rain to dislodge soil particles. Fine-grain eroded soil often contains three times more organic matter and nutrients than the coarse-grain soil left behind. Erosion also reduces soil depth, the diversity of soil biota, and water infiltration and holding capacity.<sup>23</sup>

The rate of erosion is strongly influenced by the kind of processes that expose land to the elements. Logging, road construction, swidden agriculture, and prolonged overgrazing, especially by goats and sheep, all make erosion worse. For example, long-term study of the hillsides of La Fraylesca and Motozintla on the Chiapan border with Guatemala found high levels of soil loss - twenty-five tons per hectare per year - for maize fields that have been stripped of forests, burned, and grazed; losses of fifteen tons for fields that were burned but not grazed; and losses of less than three tons for fields that were neither burned nor grazed.<sup>24</sup>

Much peasant farmland in Mexico is vulnerable to degradation. Neil Harvey notes that the *ejidos* and *comunidades agrarias* make up about half of Mexico's land area, but most of this land is "rain-fed, undercapitalized and of poor quality."<sup>25</sup> In Chiapas, he finds a sharp drop in milpa output: 19.6 percent for maize and 18 percent for beans between 1982 and 1987.<sup>26</sup> This drop has occurred despite increases in the area of land dedicated to production (20.6 percent and 10 percent over same period, respectively), because, Harvey contends, much of this expansion had been into the Lacandon, where "tropical soils are notoriously unsuited for sustainable agriculture once the biomass has been destroyed."<sup>27</sup> There has been no credible long-term study of soil erosion in Chiapas,<sup>28</sup> but by piecing together available data and anecdotal evidence, we can clarify the story of supply-induced scarcities of cropland in the state.

In 1990, the United Nations Environment Program in Nairobi, Kenya, and the International Soil Reference Center in Wageningen, the Netherlands, issued a set of maps of soil degradation around the world.<sup>29</sup> Although the data for any specific region are highly aggregated, the maps do provide provisional soil degradation information for Chiapas. They indicate that moderate topsoil loss due to water erosion affects 20 to 50 percent of the Central Highlands and that 5 to 10 percent of the Highlands suffer from moderate terrain deformation caused by water erosion.<sup>30</sup> This damage is caused by farming and forestry practices, and its severity is increasing rapidly.

The maps further indicate that up to 5 percent of the area of the Eastern Lowlands is moderately degraded by terrain deformation due to water erosion as a result of deforestation. This damage is, in the maps' terminology, increasing at a "medium" rate. In a twenty-kilometer-wide strip along the Soconusco Coast, roughly corresponding to the major coffee-producing area of the state, 10 to 25 percent of the land is moderately degraded by loss of topsoil due to wind erosion, and up to 5 percent is strongly degraded (which means the land is "unreclaimable at the farm level") by waterlogging. The cause of this damage, which is increasing at a medium rate, is farming. Finally, the maps identify a sixty-kilometer-wide strip of land between the Coast and the Central Highlands that is affected by conditions similar to those in the Eastern Lowlands.

In a 1975 study of farming techniques in a subregion of the Chiapan Central Highlands, George Collier analyzed the causal links between soil erosion and agricultural production.<sup>31</sup> Land abuse was occurring elsewhere in the Central Highlands, he argued, but the growing population of Chamula (a municipio north of San Cristobal) particularly tested the ecological limits of highland soils. Collier noted that the region's population

grew from 16,010 in 1940 to 22,029 in 1950 and to 26,789 in 1960. Farmers in the region engaged in swidden agriculture: every few seasons, they cut down and burned the forest and brushland to supply fresh fields; once their crop yields fell, farmers fallowed the tired fields or turned them into pastureland. Since the population in Chamula now exceeds 51,000, these degradation processes have probably worsened. Although swidden agriculture is often ecologically sound, if population densities are too high - as they have been now for many decades in Chamula - fallow periods are neglected and the soils do not regenerate adequately. As Collier describes it:

The water supply in hamlet water holes becomes variable, the soil having lost its capacity to maintain a high water table through the dry winter season. Heavy summer rains erode the edges of trails that crisscross the grasslands, silting in the natural limestone sinks, which alternatively flood and dry as mud flats according to the season. Continued shepherding takes its toll. Because of constant clipping off at the roots, grass gives way to gullies of erosion, which spread out from trails along the hillsides. In a matter of years a hill can erode from grazing land to a heap of rocks devoid of top and subsoil.<sup>32</sup>

Since Collier's 1975 study, Chamula's pattern of declining agricultural production due to environmental scarcities has been replicated, with some variation, in parts of the Eastern Lowlands as structural scarcities have forced hundreds of thousands of people from the Central Highlands and the Soconusco Coast on to the largely unclaimed lands of the Lacandon frontier. This process sharply accelerated in the early 1990s. The new colonizers often use upland swidden agricultural techniques not suited to a tropical ecosystem.<sup>33</sup> The forested land that they clear for subsistence agriculture quickly loses productivity and is converted into pastureland for cattle.

**A Model of Soil Erosion in Chiapas.** We illustrate the impact of supply-induced scarcity on campesinos and indigenas in the Central Highlands and Eastern Lowlands by adapting a general model of the economic costs of soil erosion developed by David Pimentel and his colleagues.<sup>34</sup> The model begins with several assumptions: seven hundred millimeters of rainfall a year, soil depth of fifteen centimeters, land slope of 5 percent, loamy soil with 4 percent organic matter, and a soil erosion rate of seventeen tons per hectare per year. Under these conditions, the study estimates, the loss of agricultural yield after one year is 8 percent and that after twenty years is 20 percent. The Pimentel study further calculates that in the United States it costs \$196 per year in extra fertilizer and water to replace the soil resources depleted by erosion and thereby to compensate for the yield loss. In developing countries where such funds are not available, the economic cost is paid in lower food production.

Table 2 compares the starting assumptions in Pimentel's model with estimates of conditions in the Central Highlands and Eastern Lowlands of Chiapas. This allows us to gauge the relative severity and cost of soil erosion affecting exposed land in these regions. The differences between Pimentel's starting assumptions and our estimates for Chiapas suggest that yield loss and resource replacement costs are significantly higher in

Chiapas. Not only is annual rainfall two, three, and sometimes four times greater, depending on the location in the state, but the type of rainfall - torrential, heavy tropical rains coupled with high winds - significantly increases soil erosion. The slope of land in the Highlands is often much greater than 5 percent, which means that water runoff is substantial and more likely to carry away the soil. In the Lowlands, the soil is fine. The amount of organic matter in this soil is higher than that of the Highlands, but because of the thinness of lowland soil the extra nutrient content is quickly depleted by successive seasons of production. Taking all these factors into consideration, we estimate that erosion rates in the Central Highlands and the Eastern Lowlands are probably in excess of the baseline rate of 17 tons per hectare per year found by Pimentel et al.<sup>35</sup> Of course, communities that use large amounts of fertilizer may temporarily relieve the effects of erosion, but often at the expense of groundwater pollution and attendant health problems.<sup>36</sup>

**Table 2:** Comparison of the Cost of Soil Erosion in the Central Highlands and Eastern Lowlands with Pimentel's Base Projection

ECOLOGICAL FACTOR	PIMENTEL	CENTRAL HIGHLANDS	EASTERN LOWLANDS
Annual Rainfall	700mm	1500mm	2100mm
Top Soil Depth	15cm	=	-
Slope	5%	++	=
Top Soil Quality	loamy	loamy	fine
Organic Matter	4%	=	++
Erosion Rate on Exposed Land	17 tons/ha/yr	+	+
AFTER 20 YEARS, AVERAGE ANNUAL PER HECTARE			
Yield Loss	20%	+	++
Replacement Costs	US\$196	+	++

In this Table, a "+" means that the factor in question contributes more to erosion than it does in the Pimentel base projection, a "-" means the factor contributes less; and an "=" means the factor contributes about the same amount to erosion.

Base Projection from Pimentel et al., "Environmental and Economics Costs of Soil Erosion and Conservation Benefits," *Science* 267, February 24 1995, pp. 1117-1123.

The Pimentel model applies to a temperate ecosystem. Although erosion rates may not always be higher in tropical zones than in temperate zones, the consequences for agricultural productivity are often more severe. Rattan Lal notes that "the drastic erosion-caused productivity decline in soils of the tropics is due partly to harsh climate and partly to low-fertility."<sup>37</sup> Because of the shallow topsoil, we estimate in Table 2 that productivity losses from erosion will be greater in the tropical Eastern Lowlands than the more temperate Central Highlands.

It is also important to distinguish between the rate of soil erosion on exposed land and the total quantity of eroded soil in a given region. Since more land is exposed in the Central Highlands, this region has suffered from more total erosion than the Eastern Lowlands; yet it is not clear that the erosion rates for exposed land in the two regions differ that markedly. So far, soil erosion in the Lacandon is only evident on the steepest slopes at the highest elevations, but given that the population of the Highlands and several other areas

is spilling over into the Lacandon, it is likely that erosion there will worsen and will be accompanied by economic consequences of a magnitude suggested by the model in Table 2.

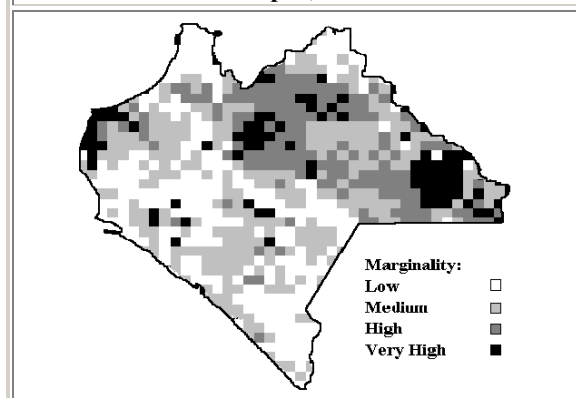
### Structural Scarcity

In Chiapas, the average land endowment for subsistence production is two hectares, while for commercial production it is twenty hectares.<sup>38</sup> This structural scarcity of land for poorer farmers arises from the domination and manipulation of land-tenure arrangements by a wealthy elite of agricultural producers. It is reinforced by the political hegemony of this elite, by the economies of scale and commercial success of large agricultural producers, and by corrupt and inequitable credit and social-spending programs managed by the state. In many areas of the state, prices for agricultural products do not accurately reflect the products' market value, because PRI representatives and caciques control the transportation sector, manage many produce-purchasing programs, and in general manage the market access of smaller producers. This control permits them to secure political support and to enforce the regime of unequal land distribution.

The impact of structural scarcity of land on peasants in Chiapas is magnified by inadequate access to credit and by limited infrastructure. Since the 1980s, access to government and private agricultural credit has increasingly benefited beef producers; on the other hand, small commercial and subsistence farmers have had increasing difficulty getting credit. From 1985 to 1989, almost 80 percent of all agricultural producers in Chiapas had no access at all to government credit. By 1990, the figure was over 87 percent.<sup>39</sup> In addition, economic liberalization has reduced government subsidies for fertilizer, tools, and other inputs. In response, small commercial farmers have set up their own credit agencies, returned to subsistence farming, or left agriculture altogether.

As people spill into the Eastern Lowlands, they move into a situation of deeply institutionalized economic marginalization. Figure 6 shows the per capita distribution of key infrastructural services on a ten-square-kilometer grid of the state for 1990. The darker the area in the map, the lower the availability of potable water, electricity, and educational and health services. For the large black region in the Eastern Lowlands, low population density

**Figure 6: Infrastructural Marginality in Chiapas, 1990**

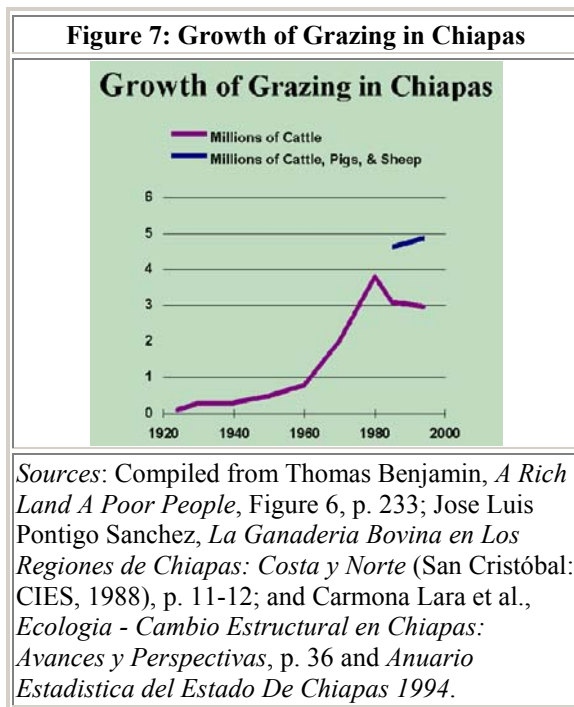


*Sources:* From the GIS system developed by P. Farias, I. March and M. Fuller at the Centro de Investigaciones Ecologicas del Sureste, San Cristóbal de las Casas, Chiapas, Mexico, 1995. Marginality is determined by data on communities with drainage and piped water and on the use of electricity and cooking fuel, some of which are also presented in the table titled "Relative Social Marginality: Comparative Statistics on Indigenous Populations of Mexico, Total Population of Chiapas and Indigenous Population of Chiapas." The data are provide at the *municipio* level, generalized into 10 square kilometer quadrants.

is the main cause for the paucity of infrastructure. However, what is most telling about this map is the strip of "high" marginality (represented by dark gray) that runs from the Central Highlands in the northwest to the Eastern Lowlands in the southeast. This part of Chiapas has a significant and rapidly growing population in areas of marginal infrastructure.

Sixty percent of the productive territory in Mexico is pastureland, producing meat for a population 50 percent of whom never eat meat.<sup>40</sup> The rapid expansion of the economically powerful cattle industry has made structural scarcities of environmental resources worse for many peasants and small farmers. In recent decades in Chiapas, the cattle industry has grown very quickly (see Figure 7), and it now occupies 30 percent of the state's total land area. Between 1950 and 1970, the population of grazing animals quadrupled, with 75 percent of the total on private lands.<sup>41</sup> By 1990, the population of grazing animals had doubled again, for the most part still on private lands.

In popular accounts, Latin American beef production for export inevitably causes environmental destruction - especially loss of forests - and various social ills. However, recent scholarship suggests that this "hamburger thesis" is misleading and that it must be heavily qualified by accounts of the specific demand-induced and structural scarcities in each area.<sup>42</sup> In Chiapas, deforestation is only an indirect result of the activities of the rancheros. Particularly in the Highlands and around Palenque, rancheros are responsible for buying, illegally renting, or taking over land that has been cleared of its forest by smallholders and squatters. The slash-and-burn agriculture of these smallholders initially provides rich ground for their crops, but as fields lose productivity, rancheros take over, and their cattle make an already existing erosion problem worse.



Serious structural scarcities can also be found in coffee production. Most of the best land for coffee lies along the Soconusco Coast and is controlled by a small number of large coffee estates. The largest 116 owners control 12 percent of the land devoted to coffee production. As one moves east across the state to land of generally lower quality, farm size drops and the land becomes predominantly public and communal (for example, ejidos) rather than private. The 91 percent of coffee growers in Chiapas who own less than five hectares are mainly located in the Central Highlands and the Eastern Lowlands. Table 3 shows that as of 1990, the distribution of coffee land was significantly more

skewed toward the wealthy in Chiapas than in Mexico as a whole: Mexico and Chiapas have virtually the same percentage of coffee producers with two hectares or less of land, yet in Chiapas the percentage of coffee growers with more than fifty hectares is twice as high. Additionally, two-thirds of Mexico's producers with over one hundred hectares operate in Chiapas.

**Table 3:** Distribution of Coffee Producers by Plot Size, 1990

HECTARES	CHIAPAS	MEXICO
up to 2	48,762	194,538
2 - 5	18,248	64,377
5 - 10	5,102	17,881
10 - 20	1,202	4,291
20 - 50	208	808
50 - 100	104	246
over 100	116	178
<b>Total</b>	<b>73,742</b>	<b>282,319</b>

*Source:* Harvey, "Rural Reforms," Table 2, p. 10.

In sum, Chiapas' population - especially its poorest members - has been affected by all three types of environmental scarcity: demand-induced, supply-induced, and structural. Demand-induced and structural scarcities are the most severe; the former are driven by the large increases in the indigena and migrant populations living in the Eastern Lowlands on the frontier with the Central Highlands. The limited evidence available suggests that supply-induced scarcities are sometimes harsh but are generally not as severe or widespread as the other two types. Soil erosion affects the ability of some parts of the Central Highlands to support agriculture; forest resources are particularly taxed near urban areas. The perceived differential between the availability of land and forest resources in the Central Highlands and that in the Eastern Lowlands stimulates the migration of resource-poor peasants into the Lacandon. Unfortunately, the migrants do not escape the impact of the three types of scarcity and of the dislocations caused by economic reform. This is especially true in the Canadas region of the Eastern Lowlands, the region that spawned the EZLN insurgency.<sup>43</sup>

### **Resource Capture and Ecological Marginalization in Chiapas**

The history of Chiapas is a chain of multiple yet discrete instances of resource capture and ecological marginalization. *Resource capture* occurs when powerful elites - partly in response to the pressures of population growth and resource depletion - shift in their favor the laws and property rights governing local resources, thereby concentrating ecologically valuable resources under their control. *Ecological marginalization* occurs when population growth and severely unequal resource distribution in resource-rich regions force poor people to migrate to ecologically fragile areas; as the population density of these migrants increases, they damage local environmental resources, which deepens their poverty.<sup>44</sup>

This chain has most harshly affected the rapidly growing population of indigenas and campesinos. As pressures have mounted on agricultural land in Chiapas, elites and wealthy farmers have often taken control of the best land and have perverted land reform and redistribution policies. Many peasants affected by these degradations have migrated to the periphery of the Lacandon Rain Forest. There they have cleared new land, only to be forced - either by the quick depletion of soil nutrients or by more land seizures by wealthy farmers - to move further into the vulnerable forest.

### **Period 1: Conquest to Revolution, 1519-1910**

From the time of the arrival of the Spanish in the fifteenth century, the indigenas of southern Mexico have fought in countless riots and rebellions against those who would make them slaves and subservient. At the core of each indigena uprising has usually been the demand for land.<sup>45</sup> During this time, the class distinctions that persist to this day began to take shape:

Within the landscape of haciendas and republics of Indians there stood the cities, the seats of the merchants who supplied both haciendas and mines, of officials who regulated privileges and restrictions, of priests who managed the economy of salvation. From their stores, offices, and churches extended the communal networks which supplied the mines and drew off their ores; the bureaucratic network which regulated life in the hinterland; and the ecclesiastic network which connected parish priests with the hierarchy at the center. In the shadow of palace and cathedral, moreover, there labored the artisans who supplied the affluent with the amenities and luxuries of a baroque colonial world, the army of servants, and the enormous multitude of the urban poor.<sup>46</sup>

During the tumultuous nineteenth century, Mexico City did not firmly establish sovereignty over Chiapas, and the state remained quasi-autonomous because of its isolation. Elites would regularly threaten to alter their allegiances in favor of Guatemala if they received insufficient backing for their plans to manage state resources.

Logging began in the Lacandon in 1859, with the first large cedars and mahoganies felled at the junction of the Usumacinta and Jatate Rivers. In 1880, three large companies cornered the world market for mahogany by controlling the most accessible supplies along the Usumacinta River. Over the next twenty years, other firms joined in, and by the end of the nineteenth century private companies and individuals owned all the shorelines of the major rivers in southern Mexico.<sup>47</sup> By the beginning of this century, four entrepreneurs were allowed to parcel up and purchase much of the remaining 1.2 million hectares of forest at the encouragement of President Porfirio Diaz's investment-hungry regime.

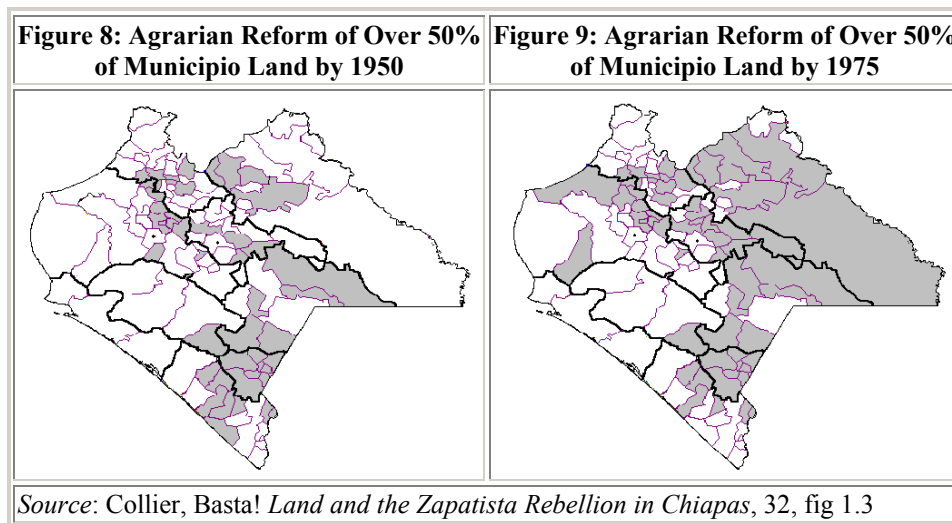
Until the Revolution began in 1910, Diaz also promoted the creation of great latifundios - private agricultural estates varying in size from tens to many thousands of hectares. With the construction of a Pacific railroad, the economic advantage of a strong alliance with

Mexico became clear to Chiapan elites, especially to the latifundistas who owned large coffee plantations along the Soconusco Coast.

### Period 2: Revolution to Liberalization, 1910-1982

Two motivations strongly influenced the character of the new Mexican Constitution of 1917: first, a need for political stability in a country that had experienced hideous violence since 1910, and, second, a desire to redistribute land to peasants who had lived without secure access to land since the sixteenth century. Article 27 provided clear principles for the redistribution of Mexican territory among the three categories of ejidos, comunidades agrarias, and private landholdings. The authors of the Constitution entrenched the right of peasants to petition for legal recognition of their title to land that was being used by their communities, whether the land was formally part of a private holding or an extension of an existing community title. In the following decades, significant parcels of land were expropriated from large estates and redistributed.

In Chiapas, the best lands are around the Grijalva Valley, the Soconusco Coast, and areas of the Central Highlands close to transportation routes, but these areas were seldom subject to redistribution. In fact, the government often met its land reform obligations by promising, usually without actually granting, titles to unused lands in the rain forest with difficult market access. Land reform favored landowners by allowing them to choose which lands to sell and by allowing the owners to retain capital investments in supplies and equipment.<sup>48</sup>



By the late 1950s, the trickle of migrants into the Central Highlands and the Eastern Lowlands had grown to a steady stream from other parts of the state, from neighboring states, and also from Guatemala.<sup>49</sup> People came to participate in the state's logging and agricultural booms. When migrants arrived from outside of Chiapas, they found the PRI's network of caciques strongest in the Highlands and the Soconusco Coast. As population densities rose in the Central Highlands, many people chose to move on to the Lacandon frontier, often with the active encouragement of government officials. They settled in the frontier areas of the Lacandon Rain Forest, occupying lands usually managed by ejido

members and coming into conflict with more established communities. This pattern is evident in Figures 8 and 9, which show that the Eastern Lowlands saw most of the state's land redistribution while a large proportion of the agriculturally productive lands between the Soconusco Coast and the Grijalva River basin remained private.

The Lacandon Rain Forest absorbed the high population growth of peasant communities in the state. The rapidly expanding cattle industry in the Eastern Lowlands, however, did not require labor so much as land, and ranchers arriving from the states of Tabasco and Veracruz established large ranches at the northern frontier of the rain forest by clearing new forest or assuming control - by rent or repression - of areas already cleared by migrant farming communities. These communities also competed with state and private logging companies that did not want the forest felled without profit. "By 1971," writes James Nations, "the individuals who controlled these companies realized that the farm families they had pushed into the [Lacandon] were clearing and burning the forests before the commercial hardwoods could be extracted."<sup>50</sup> As competition for land and forest resources increased, the pressure to realign the distribution of resources in the state also grew.<sup>51</sup> In many cases, this realignment occurred under the guise of land reform.

Land seizures by indigenas and campesinos became common as communities fought to obtain a basis for subsistence living. The creation of the Montes Azules Bioserve at the heart of the Lacandon in 1978 did not discourage the flood of people from central and northern Mexico from making their home at the edge of the forest. The government distributed lands that latifundistas were eager to sell off, often giving the same piece of land to several competing peasant communities, creating patchworks of overlapping land titles that still exist around the bioserve. As populations grew, large landowners were forced to expel squatters, often violently, if only to prevent them from petitioning the federal government for land titles. When the federal government did decree land reform and redistribution, the intended effects were undermined by this resource capture process: special exemptions were issued by the state, landowners surrendered the most marginal lands at high prices, and people were moved into the Lacandon and assigned titles there.

In short, the PRI and the elites of Chiapas redistributed just enough land in marginal areas of the state to accommodate a growing population within an inegalitarian resource regime. However, once a community had cleared forestlands to which they had no legal title, landowners with political clout would buy, rent, or otherwise claim the land for their livestock; by 1983, one hundred thousand campesinos and indigenas were completely landless.<sup>52</sup>

### **Period 3: Economic Liberalization to Rebellion, 1982-1994**

Some analysts believe that Mexico's import substitution industrialization strategy of the 1950s and 1960s had served the nation relatively well and produced a period of stable development during which wages and productivity rose. By the late 1970s, however, wages had begun to lag, and external debt had reached crippling levels. Following the debt rescheduling of 1982, the ruling PRI turned to export-led growth.

In the years following the 1982 debt crisis, Mexico proceeded with economic liberalization by selling its state owned corporations and by reducing market controls, subsidies, and public credits. These policies shifted power from labor and peasants to private capital, financial institutions, export manufacturers, and multinational corporations. Despite problems of inflation, capital flight, and unstable financial and foreign-exchange markets, the country's economic planners managed to engineer a recovery that continued until the end of 1994 and that was driven by strong private-sector growth.

Many observers argue that the real crisis in Mexico occurred with the erosion of its neocorporatist political system caused by this economic restructuring.<sup>53</sup> Even though the PRI successfully reduced inflation and renewed the interest of foreign investors, economic reform forced the ruling party to reduce its patronage of key client groups - especially labor and peasants - that had reinforced the political system's stability since the Revolution. The PRI has been forced to renegotiate, ignore, or break the economic and political pacts that had maintained relative stability in Mexico since the 1910 Revolution.

Party and class elites at the national, state, and local levels managed the transition in different ways, revealing the remarkable resilience and adaptive power of the PRI's co-optive mechanisms. Restructuring required a speedy capitalization of agriculture, because government farm credits and subsidies for fertilizers, tools, and transport were drying up. In Chiapas, smallholders with significant off-farm earnings could make their agricultural production more capital intensive. Those with little or no capital, however, had to turn to bare subsistence production, or they leased their lands and their labor to wealthier producers.

Furthermore, a massive backlog of land claims had built up within the state bureaucracy as people sought title to lands that they had tilled for decades. Land claims were rarely resolved, and claimants appealing for legal control were often punished and coerced by caciques and private armies.

As peasants found good land increasingly scarce in the Eastern Lowlands of Chiapas, they began to sell their labor as seasonal workers, causing large migrations from the Eastern Lowlands to the great latifundios of the Soconusco Coast. By one estimate, several hundred thousand Chiapan and Guatemalan campesinos and indigenas migrated through the Lacandon each year, destroying over ten-thousand hectares annually as they moved through the forest, cleared small plots, gathered fuelwood, and built temporary residential sites along the way.<sup>54</sup> Labor migrants from the Central Highlands and the Eastern Lowlands returned to their communities with money and the expectation that chemical fertilizers and herbicides would coax another season's growth out of tired soils. This was an important step in bringing the economic reforms to the peasants, for, as Collier and his colleagues observe, traditional agricultural methods were supplanted by modern ones or abandoned in favor of microbusinesses.<sup>55</sup>

Because peasants often had to sell their labor to supplement their meager household incomes, latifundistas had a supply of cheap labor. Trapped by indebtedness, peasants

frequently settled marginal lands at the edge of great estates. From the 1960s through the 1980s, the PRI regime (often with World Bank funding) used subsidies to encourage peasants to participate in the growing cattle industry. Ultimately, however, large rancheros manipulated smallholders into raising calves, by far the riskiest part of ranching; many smallholders also found it profitable to rent their ejidos illegally for cattle grazing.

At the edge of the Lacandon, severe land scarcities produced fierce competition among farmers, rancheros, squatters, loggers, and indigena communities.<sup>56</sup> Conflict grew increasingly frequent and violent from 1972 on as the pace of expulsions and intercommunity competition quickened. In the 1980s, campesino and indigena communities - often in alliance with church members of all ranks and denominations - were involved in many protests, marches, and riots, mostly against the lack of respect for land rights by state elites. The peasant groups sometimes broke into factions marked by bitter rivalries. To protect private land, particularly land owned by rancheros, the governor issued special *certificados de inafectabilidad* to keep land reform from affecting individual properties. By 1988, 4,714 certificados, 95 percent of the total number distributed in the state since 1934, protected 70 percent of the land used for cattle grazing from agrarian reform.<sup>57</sup> Communities and families continued to be evicted from private and ejido land. As PRI caciques lost their ability to sustain their corporatist obligations with anything other than repression, many communities shifted their political allegiances to opposition parties; however, in doing so, the communities again invited eviction from their land.

As the liberalization policy faltered in the mid-1980s, President Carlos Salinas sought to force its pace in late 1987 with more cuts in the fiscal deficit and tighter monetary policy.<sup>58</sup> He also presented an Economic Solidarity Pact to the labor, agricultural, and business sectors. The pact promised sweeping structural changes in the agricultural sector, including the phased elimination of most food and agricultural subsidies and price controls, the opening of markets by shutting down marketing boards and parastatal purchasing arrangements, and an end to ejidos. In 1991, the PRI amended article 27 of the Mexican Constitution, introducing in 1992 an Agrarian Law that drastically changed the land-tenure system. Campesino and indigena organizations perceived that they were not properly consulted as the Agrarian Law was designed.

Consistent with the government's economic reform program, the new Agrarian Law disbanded the institution of public land titles. Members of the ejidos and the comunidades agrarias were given the legal right to purchase, sell, rent, or mortgage the individual plots and communal lands that constituted each title. If government-endorsed cash crops were grown, private companies of as many as twenty-five individuals could purchase twenty-five times the area allowed by single-land permits. Also, the constitutional mechanism allowing squatters to make land claims was removed.

In Chiapas, the sale and rental of public lands had long occurred illegally in response to environmental scarcities, the pressures of resource capture by elites, and market downturns. By the early 1980s, as a result, a significant portion of the state's ejidos were

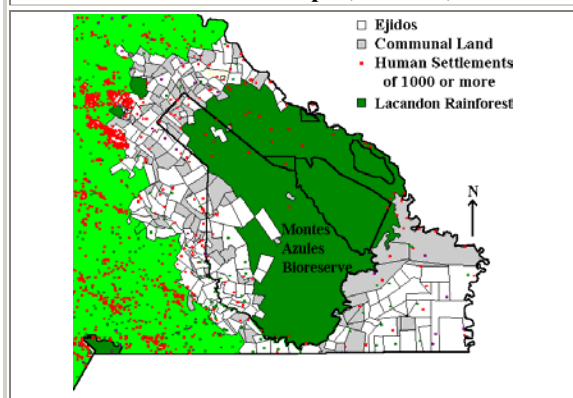
controlled by latifundistas.<sup>59</sup> Moreover, the original land-redistribution provisions of the Constitution had never been fully enforced, especially with respect to latifundios, which often contained the state's best land.<sup>60</sup> The 1992 changes facilitated further concentration of good land, since it was now possible to buy public land outright. Furthermore, large owners were given a year to sell off excess property that - under the terms of the new Agrarian Law - would eventually be redistributed.<sup>61</sup> The law had a particularly negative impact on the status of women, because the dispersal of family holdings had to be legally approved by the male head of the household, with the wife given the first option to buy released lands.<sup>62</sup> Around this time, EZLN organization began in earnest with the purchase of guns and supplies, the theft of fifteen hundred kilograms of dynamite from PEMEX facilities, and the significant influx of volunteers - almost one-third of whom were women.

In the late 1980s, Mexican and international environmental groups coordinated their actions to lobby for limits to the amount of forestland cleared annually at the edge of the Lacandon. As with many government policies, the limits were unevenly applied, and peasants in the Canadas region found themselves under a more rigorous regime, enforced by caciques, than that applied to the growing number of rancheros near Palenque. Still, logging of the rain forest continued: between 1983 and 1988, another 143,000 hectares were logged. In total, 665,000 hectares had been logged since the last century, with an astonishing 585,000 hectares logged after 1970.<sup>63</sup>

Figure 10 shows that in-migration, population growth, and government concession of contradictory and overlapping land titles resulted in serious encroachment on the Montes Azules Bioserve. This encroachment occurred despite expansion of the bioserve at various times and efforts by international environmental groups to reduce forest loss. In the lead up to the NAFTA negotiations, the government tightened regulations on community activities in the bioserve. Severe quotas on deforestation by smallholders were put into effect, and another 81,000 hectares were reclassified as bioserve lands.

Figure 11 summarizes the story we have outlined in this section. (Available in print version of this report). In Chiapas, latifundistas and rancheros invariably captured and controlled the best agricultural land. The land reform initiatives that Mexicans fought so hard to achieve during the Revolution were perverted to marginalize a large portion of the campesino and indigena population on ecologically vulnerable land. These groups settled at the periphery of towns on lands or in forests that appeared unclaimed. When local elites needed more land for cash crops, grazing, or industries, the peasants were evicted. Ironically, as the

**Figure 10: Human Settlements and Land Titles Encroaching on the Montez Azules Bioserve, Eastern Lowlands of Chiapas, Mexico, 1994**



From the GIS system developed by P. Farias, I. March and M. Fuller at the Centro de Investigaciones Ecologicas del Sureste, San Cristóbal de las Casas, Chiapas, Mexico, 1995.

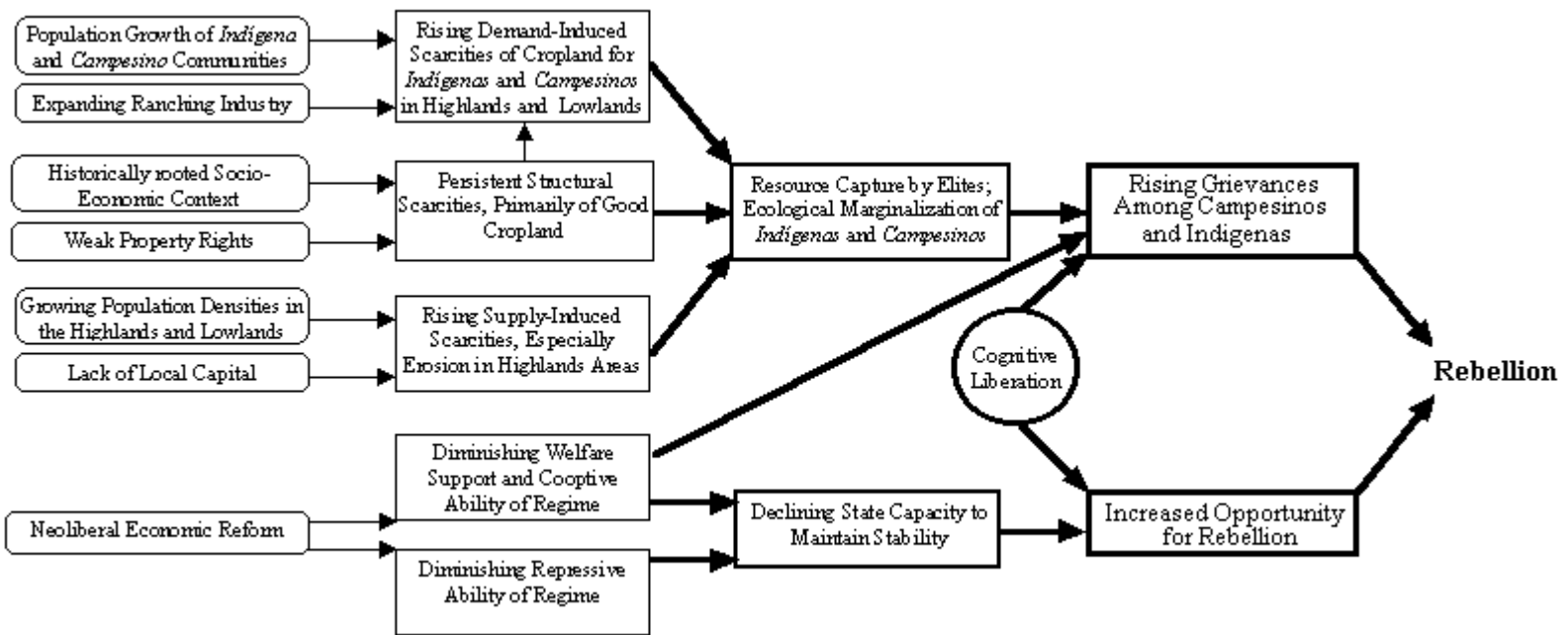
squatters cleared the forests and prepared the land for their crops, they made the land more desirable.

Since the 1950s, rapid population growth compounded the effects of these persistent structural inequalities to force more poor people into ecologically, socially, and economically marginal areas, particularly in the Canadas at the frontier of the Lacandon. In the Central Highlands, supply-induced scarcities of soil resources also provoked migration to the forest. Moreover, recent policies of economic liberalization reinforced structural inequalities, because the PRI regime embraced the interests of private capital and largely removed economic support for peasant agriculture.

### Anatomy of Conflict in Chiapas: Grievances and Opportunities

Civil strife is a function of both the level of unredressed grievance motivating challenger groups and the opportunities available to these groups to act on their grievances. The probability of civil strife is greatest when multiple pressures at different levels in society interact to increase grievance and opportunity simultaneously.<sup>64</sup> Drawing on the above analysis, Figure 12 shows how changes in grievance and opportunity occurred in Chiapas.

Figure 12: Environmental Scarcities and the Links to Rebellion in Chiapas



Population growth among peasants dependent on subsistence agriculture coupled with the expansion of land-intensive activities - such as ranching - increased the demand for cropland. A political economy deeply rooted in the region's colonial past combined with unstable property rights to produce persistent structural scarcities. In a context of limited land resources and a closing of the agricultural frontier (partly because of ever-greater restrictions on expansion into the Lacandon), these factors caused higher demand-induced scarcity of cropland, especially for marginal indígenas and campesinos. High

population densities and lack of agricultural capital contributed to land degradation in parts of the Central Highlands.

Demand-induced, supply-induced, and structural scarcities interacted to generate processes of resource capture and ecological marginalization of peasants. During the period of economic reform in the 1980s, these processes combined with the loss of agricultural subsidies and credits for small producers to sharply aggravate economic hardship and, in turn, the grievances of poor peasants. Economic reform also weakened the PRI's political control within the state, changing the structure of political opportunities facing potential challengers to the regime. Independent peasant organizations and segments of the church promoted the "cognitive liberation" of peasants, which heightened their perceptions of grievance and opportunity. Eventually, the simultaneous rise in grievance and opportunity produced the EZLN insurgency.

### **Rising Grievances**

We have shown above that in the years preceding the rebellion, demand-induced and structural scarcities of cropland were increasing for indigenas and campesinos in Chiapas, and these scarcities strongly contributed to chronic economic hardship for peasants dependent upon subsistence food production. We have also noted that the economic liberalization that occurred in the 1980s eviscerated the agricultural subsidies and credits upon which many of these smallholders depended. Unfortunately, peasants affected by acute land scarcity had only limited economic alternatives in the state economy, in part because the economic adjustments of the 1980s reduced labor absorption in key industries, such as oil, and also because new agricultural technologies reduced labor intensity on many latifundios.

These factors harshly affected indigenas and campesinos, causing sporadic outbreaks of violence. But harsh poverty did not, by itself, make the coordinated insurgency of the EZLN inevitable. Contrary to common belief, there is no clear correlation between poverty (or economic inequality) and social conflict.<sup>65</sup> Whether or not people become aggrieved and violent when they find themselves increasingly poor depends, in part, upon their notion of economic justice. For grievances to become severe, people must perceive that there is a substantial and widening gap between the level of satisfaction they have achieved and the level they believe they deserve.<sup>66</sup> The church and independent peasant organizations played a critical role in shaping the Chiapan peasants' shared conception of justice.<sup>67</sup>

To cause civil strife, economic crisis must be severe, persistent, and pervasive enough to erode the legitimacy or moral authority of the dominant social order and system of governance. System legitimacy is therefore a critical intervening variable between rising poverty and civil conflict. The Zapatista leadership articulated and channeled peasant grievances so as to focus blame for the peasants' hardship on the PRI regime.

Article 27 of the Mexican Constitution entrenched a commitment to land reform and redistribution. The PRI tied its legitimacy, in part, to these revolutionary principles, and through corporatist practices it has tried to channel opposition into political consensus

and regime support.<sup>68</sup> However, economic reform made both adherence to constitutionally mandated agrarian policy and corporatist politics too costly. The Zapatistas argued that the changes to article 27 and the new Agrarian Law signaled that the PRI would never honor its land reform and redistribution commitments. The goal of the insurgency, therefore, was to force the government to renew its land redistribution efforts with greater honesty; it also hoped to force the government to reform the electoral process so that democracy could provide an outlet for peasant grievances.

In important ways, the EZLN insurgency is different from other Latin American guerrilla movements. Unlike, for example, the Sendero Luminoso in Peru, the EZLN's leaders do not espouse a revolutionary dogma, they have not evoked in their followers a religious fervor, and they do not plan to seize control of the state. Instead, Zapatista demands are fundamentally local. The most important items on their agenda are relief from environmental scarcities and local democracy.

### **Changing Opportunity Structure and Declining State Capacity**

Since grievances felt at the individual level are not automatically expressed at the group level, the probability of civil violence is higher if groups are already organized around clear social cleavages, such as ethnicity, religion, or class. Moreover, serious civil strife is not likely to occur unless the structure of political opportunities facing these challenger groups keeps them from effectively expressing their grievances peacefully and only offers them openings for violence against authority. The balance of power among social actors affects the expected costs and benefits of different actions by the state, the state's supporters, and challenger groups, and therefore it affects the probability of success of violent challenges to authority. A state debilitated by corruption, falling revenues, rising demand for services, or factional conflicts within elites will be more vulnerable to violent challenges.<sup>69</sup>

In Chiapas, the Zapatistas have exploited long-standing social and class cleavages. They have explicitly mobilized the indigenas and campesinos against the elite classes of landowners, rancheros, and capitalists. Although peasant groups have had a long and unfortunate history of squabbling among themselves, the Zapatistas have successfully evoked class- and ethnicity-based collective identities. Furthermore, the weakening of the PRI has significantly influenced the structure of political opportunities for challenger groups. Economic reforms under way for almost a decade have eroded the regime's ability to bribe and co-opt opposition groups within the state. The national and state PRI governments have had less money to spend on maintaining political consensus, and in the absence of political consensus, groups negatively affected by economic reform have found it easier to organize ever more vociferous and violent opposition.

The PRI regime, however, has some powerful weapons in its fight to retain its legitimacy and social control. Mexicans have a deep desire for civil stability; they widely agree that the violence of revolution should never again be allowed to consume Mexican society. This desire for stability is often said to be the bedrock of the PRI's legitimacy. Indeed, during the most recent national election campaign, the PRI effectively played on the danger of social instability.<sup>70</sup> Zedillo won the election by equating the opposition parties

with uncertainty and instability and by convincing the electorate that no party other than the PRI would be able to guide the country through its economic and social turmoil.

Chiapas and other southern states are a crucial power base for the PRI's national political strategy. In past presidential elections, the PRI has been able to claim that solid votes in its favor by southern peasant constituencies legitimized the entire country's electoral result, despite serious fraud in urban centers, such as Mexico City, and in the industrial northern states. In Chiapas, the PRI has used co-optive methods, and sometimes outright coercion, to secure voter support: caciques establish political ties with influential landowners, business people, and union bosses that guarantee votes from the people they oversee, commercial and transportation licenses are granted and removed according to political allegiance, and even basic judicial procedures, such as divorce, can be used to isolate community members who support opposition parties.<sup>71</sup> But economic reforms have weakened this structure of co-option and coercion, and there are indications that the regime has had to rely more and more on outright electoral fraud to maintain its political control of the state.<sup>72</sup>

In adjusting to liberalization in the 1980s and 1990s, the PRI has tolerated a more open dialogue throughout Mexico about the country's ailments, and it has even conceded some high-level electoral victories to the center-right party, the National Action Party (PAN). It has conceded few victories, however, to the center-left party, the Democratic Revolutionary Party (PRD), a party that has never fully recovered from its loss in the 1988 presidential election. Even though the PRD has been the main opposition voice in Chiapas for a long time, it has had less and less to offer its supporters, and for many aggrieved groups - such as the EZLN - it has not been radical enough. These aggrieved groups long ago gave up on the state's democratic institutions, and they perceive no peaceful opportunities to express their rising dissatisfaction.

### **Cognitive Liberation**

The probability of civil strife is also strongly influenced by whether challenger groups have adequate organization and leadership capacity. Leaders are important in causing the members of a challenger group to believe that the group's situation should and can be changed. Doug McAdam calls this a group's "cognitive liberation."<sup>73</sup> Leaders define the categories through which challenger groups see their situations and themselves. By developing and exploiting a particular view of the "social good" or of distributive justice, leaders can shift the preferences of the members of the challenger group so that they come to view their situation as illegitimate and intolerable, thus increasing their grievances. In addition, by altering group members' self-perceptions, their understandings of the nature of power, and their assumptions about the possible means to achieve change, leaders can change the perceived opportunity structure.<sup>74</sup>

The Catholic and Protestant Churches have provided key venues for the discussion of political repression in Chiapas. Relations between the Catholic Church and the Mexican state have been strained since before the Revolution, because the state expropriated church lands and enforced a separation of responsibilities in such areas as education. However, the Catholic Church remains a tremendously powerful social institution for

many rural communities. The Diocese of San Cristobal (which includes all municipios east of San Cristobal), led by Bishop Ruiz, has drawn heavily on liberation theology to inspire the faith of the region's peasants. Liberation theology emphasizes the basic material needs of the poor, including adequate food and shelter; it argues that peasants must be free from exploitation. The Protestant evangelicalism that has taken root in some communities in the Eastern Lowlands has similar principles. However, it has more seriously strained relations with caciques, by disavowing the need for the alcohol and festival tithes that are used to keep campesinos indebted to the caciques and to reinforce PRI loyalties. In response, the caciques drive Protestant families and communities from their land when they refuse to participate in traditional religious and cultural practices. In the end, the effect of the activities of both the Protestant and the Catholic Churches has been to create networks of lay preachers and catechists with parishes that cooperate remarkably well across denominations.<sup>75</sup>

There has been a large rise in Protestant affiliation among Chiapan peasants. Many municipalities, especially in the indigena communities of the Eastern Lowlands, have over 20 percent of their population in evangelical parishes.<sup>76</sup> Protestantism and liberation theology have encouraged indigenas and campesinos to set up non-PRI social organs. The Emiliano Zapata Peasant Organization (OCEZ), the Independent Confederation of Agricultural Workers and Peasants (CIOAC), and the Union of Ejido Unions of Chiapas (UU) are the most active and independent organizations working for land reform, labor rights, and fair credit programs. Such grassroots organizations experiment with community development, create networks among different ethnic groups, and foster regional and class identities.<sup>77</sup> Since the mid-1970s, these peasant groups have become increasingly radical.<sup>78</sup>

President Echeverria's attempt in 1972 to expel occupants from the Lacandon turned the sympathies of many peasants in the Eastern Lowlands toward liberation theology and the Protestant churches. It also encouraged land claims and provoked radical new groups to form and resist co-option by the PRI. Twenty years later, in 1992, the Salinas government gave a decisive push to the cognitive liberation of the campesinos and indigenas when it abolished the institution of ejido land titles. Not only did the radical peasant groups see the last legal safeguards for their property fall to economic liberalization, but some realized that rebellion was necessary. The EZLN was formed and began quietly acquiring weapons, medical supplies, uniforms, and members. Subcomandante Marcos writes:

It strikes me that what most radicalized our companions were the changes to Article 27. That was the door that was shut on the Indian people's ability to survive in a legal and peaceful manner. That was the reason they decided to take up arms, so that they could be heard, because they were tired of paying such a high blood tax.<sup>79</sup>

The intellectual leadership provided by such figures as Subcommandante Marcos gave the peasants an insurgent consciousness. They acquired an interpretation of the economic, social, and ecological forces that entrapped them. Many peasants who support the EZLN have intimate ties to local resources and have long lived with inadequate, marginal lands.

Their awareness of "environmental scarcities" is shown by their repeated demand for healthy land and their refusal to accept land titles in state bioreserves.<sup>80</sup> Zapatista leaders have built on this ecological awareness by explaining to the peasants not only why the best lands in the state have gone to the elites, but also how the economic reforms have damaged the "ecological bases" of indigena and campesino culture.<sup>81</sup>

### **Conclusions**

Two central conclusions can be drawn from our analysis of environmental scarcities and the EZLN rebellion. First, the situation in Chiapas in the early 1990s represented a particularly explosive combination of factors: a rapidly growing peasant population, structural imbalances in resource distribution that were deeply embedded in the social and economic character of the society, and weak property rights that were easily abused by powerful interest groups. Throughout the state's long history, elites regularly violated constitutional and statutory property rights by capturing the best resources for themselves and marginalizing others to ecologically fragile areas. Elites circumvented land redistribution and hindered efforts by local communities to organize crop production for subsistence and export. Without clear and vigorously enforced property rights, resource capture was easy.

It is not easy, however, to improve this situation. Clear and enforced property rights are not enough. If the distribution of resources is not changed, strong property institutions will simply reinforce the dominance of predatory elites. Land redistribution must therefore play a major role in any future development strategy that hopes to gain support from campesinos and indigenas. Indeed, most developmental models recognize that land redistribution and strong property laws are together essential to the success of late industrializing countries.<sup>82</sup> So far in Chiapas, however, the PRI's spasmodic and halfhearted efforts at land redistribution have only produced chaos.

Second, EZLN activities are part of a larger "wedge" splitting open the authoritarian character of Mexico's corporatist regime. This wedge includes diverse social groups working on issues ranging from human rights to the environment, external and internal investors concerned about Mexican political stability, and PRI technocrats who hope to promote meritocracy and democracy within Mexican society in order to salvage a future for their party.

The EZLN insurgency has had a profound impact on the PRI corporatist regime, catching it at a particularly sensitive moment of transition. Movements such as the EZLN disrupt "traditional patterns of presidentialism, official-party dominance, patrimonialism, clientelism, and corporatism across the whole terrain of government urban planning and policy."<sup>83</sup> Even though the EZLN's demands are mainly focused on issues in Chiapas, the insurgents have successfully coaxed out similar demands in other parts of the country.<sup>84</sup> Moreover, the PRI executive that ruthlessly crushed violent uprisings in the past is now more sensitive to national and international opinion. George Phillip notes that the international community is not always willing to isolate the economic prospects of a society "from the nature of its political system or the willingness of its rulers to respect human rights."<sup>85</sup> The regime finds itself scrutinized by multiple external and internal

groups, each with access to different pressure points and each pursuing diverse, but not always opposed, agendas.

The uprising has brought new hope for democracy in Mexico, though Chiapas remains a highly militarized zone. The EZLN and other grassroots organizations held a national plebiscite on issues of justice and land reform; they have used modern communication technologies to encourage widespread public dialogue; and they are offering the policy alternatives necessary for a healthy democracy. However, there are still victims of 'passive military engagement' by the Mexican and private armies - sexual assaults, assassinations, disappearances and kidnappings are tactics of this engagement.<sup>86</sup>

Zedillo has chosen to negotiate with the EZLN and, for the most part, has kept the dialogue open. His regime confronts a growing internal meritocracy, an ever-better-educated and -informed polity, and a restructuring international economy. As a result, the pressures on the Mexican regime for real democracy and an adequate livelihood for the poor will only grow stronger. For the indigenas and campesinos of Chiapas, this livelihood requires sustainable access to healthy environmental resources.

#### **Endnotes**

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1. The recent Zapatista uprising takes its name from Emiliano Zapata, a leader of poor peasants at the turn of the century who led the Mexican Revolution from the south. The insurgency has invoked his memory to focus the minds of today's peasants in Chiapas on decades of oppression by large landowners and ranchers.

2. To achieve this goal, land availability and electoral reform have remained the key demands of the EZLN from the beginning of the insurgency. In one of his "declarations," Zapatista spokesperson Subcomandante Marcos presented a clear set of demands to President Ernesto Zedillo in twelve words: "work, land, shelter, bread, health, education, democracy, liberty, peace, independence, and justice."

3. See Andrew Reding, "Chiapas Is Mexico," *World Policy Journal* 11, no. 1 (spring 1994): 11-24, and Joseph Whitmeyer and Rosemary Hopcroft, "Community, Capitalism, and Rebellion in Chiapas" (draft paper, Department of Sociology, University of North Carolina, December 1995).

4. See Hilary French, "Forging a New Global Partnership," chap. 10 in *State of the World 1995*, eds. Lester Brown et al. (New York: Worldwatch Institute, 1995), and Greenpeace reports and popular discussion on the World Wide Web; for the argument that environmental degradation in Chiapas seriously affected agricultural production between 1982 and 1987, see Maria del Carmen Carmona Lara et al., *Ecologia - Cambio Estructural en Chiapas: Avances y Perspectivas* (Tuxtla Gutierrez, Mexico: Universidad Autonoma de Chiapas, 1988).

5. See George Collier, *Basta! Land and the Zapatista Rebellion in Chiapas* (Oakland, Calif.: Institute for Food and Development Policy, 1994); Neil Harvey, "Rural Reforms, Campesino Radicalism and the Limits to Salinismo," in *Transformation of Rural Mexico 5* (La Jolla, Calif.: Ejido Reform Research Project, Center for U.S.-Mexican Studies, University of California at San Diego, 1994); and "Chiapas: Challenging History," *Akwe:kon - Journal of Indigenous Issues* 11, no. 2 (summer 1994).

6. The latter growth rate is a conservative estimate, yet it is astonishingly high compared with other population growth rates around the world. Demographers generally accept a 4 percent annual growth rate as near the upper bounds of biologically possible human reproduction.

7. Luis Raul Salvado, *The Other Refugees: A Study of Nonrecognized Guatemalan Refugees in Chiapas, Mexico* (Washington, D.C.: Hemispheric Migration Project, Georgetown University, 1988), 13.

8. Ron Nigh and Felipe Vallagran, Personal communication, 25 May 1995.

9. World Bank, *Mexico: Second Decentralization and Regional Development Project Report* (Washington, D.C.: World Bank, 19 August 1994), 1.

10. Harry Patrinos and Alexis Panagides, "Poverty and Indigenous People in Mexico," *Akwe:kon - Journal of Indigenous Issues* 11, no. 2 (summer 1994): 73.

11. The drilling activities of the national oil monopoly, Petroleos Mexicanos (PEMEX), in the northern municipio of Reforma have drawn people from neighboring municipios and from out of state. The region has seen its population increase from 6,136 in 1960 to 30,875 in 1990. Many of the most accessible oil reserves in Mexico are beneath the soils of Reforma and the Lacandon; consequently, the Lacandon will support a growing number of drilling sites and an expanding population of labor in coming years. See Roberto Thompson, *Problematica Agraria y Politica Petrolera en Chiapas* (Tuxtla Gutierrez, Chiapas: Centro de Investigaciones Ecologicas del Sureste, 1983); Instituto Nacional de Estadística, Geografía e Informática, *Anuario Estadístico del Estado de Chiapas, Edición 1994* (Mexico, D.F.: Instituto Nacional de Estadística, Geografía e Informática, 1994), 35; and Steven E. Sanderson, "Mexico's Environmental Future," *Current History*, February 1993: 76.

12. See Thomas Homer-Dixon, "Environmental Scarcities and Violent Conflict: Evidence from Cases," *International Security* 19, no. 1 (1994): 8-9.

13. Jeffrey Wollock, "Globalizing Corn," *Akwe:kon - Journal of Indigenous Issues* 11, no. 2 (summer 1994): 57.

14. Hydroelectric energy from the Grijalva River is captured by a system of dams from Lake Angostura to its delta in the state of Tabasco. The dams have been responsible for the flooding of over one hundred thousand hectares of prime land in the basin. Further expansion of the dam system has not been possible, since peasant communities have increasingly anticipated relocation and mobilized opposition in time.

15. Salvado, *The Other Refugees*, 13.

16. In this paper, "marginal" land is land that is ecologically vulnerable; it is relatively susceptible to rapid degradation by erosion and overuse. It may be fertile and productive in the short term, but this productivity is difficult to maintain for more than a few years.

17. Analysts often inappropriately assemble and compare government census data in an effort to identify trends. Particularly in the case of Chiapas, marginal areas are often inadequately represented in these data or are given characteristics of neighboring communities. Political manipulation of municipio boundaries by the PRI hinders calculation of time-series data on environmental scarcity. In general, Chiapas data cover only some four million of the state's seven million hectares, or around 60 percent of the total. Thus, we stress trends in proportions and ratios; where census data must be used, we present as many alternative data sources as possible.

18. Rodrigo Medellín, "Mammal Diversity and Conservation in the Selva Lacandon, Chiapas, Mexico," *Conservation Biology* 8, no. 3 (September 1994): 780-99.

19. O. Mazera et al., "Carbon Emissions from Deforestation in Mexico" (manuscript, Centro de Ecología, Universidad Autónoma de México, México, D.F., 1990); Secretaría de Agricultura y Recursos Hidráulicos, as cited in Ronald Nigh, "Consecuencias de la Colonización Agropecuaria para las Selvas Tropicales del Sureste de México: Implicaciones Regionales y Globales" (working paper for the Centro de Investigaciones y Estudios Superiores en Antropología Social del Sureste, 1994), 15. Some of the best evidence on the impact of deforestation is subjective. A recent study showed that a large majority of Chiapans believe that campesinos and indígenas are more seriously affected by deforestation than rancheros, the Mexican government, or people in other nations. See Lourdes Arizpe et al., *Cultura y Cambio Global: Percepciones Sociales sobre la Deforestación en la Selva Lacandona* (México, D.F.: Centro Regional de Investigaciones Multidisciplinarias, 1993).

20. A. Cortez Ortiz, *Estudio Preliminar sobre Deforestación en la Región Fronteriza del Río Usamacinta* (Informe Técnico, Instituto Nacional de Estadística, Geografía e

Informatica, Mexico D.F., 1990), as cited in Nigh, "Consecuencias de la Colonizacion Agropecuaria," 15.

21. A. Cuaron, "Conservacion de los Primates y Sus Habitats en el Sur de Mexico" (master's thesis, Universidad Nacional de Costa Rica, Heredia, 1991), as cited in Nigh, "Consecuencias de la Colonizacion Agropecuaria," 15.

22. See "Maximo Lopez, Firewood Gatherer," *American Forests*, November/December 1988, 38, for anecdotal evidence of the impact of receding forests.

23. See Rattan Lal, *Soil Erosion in the Tropics* (New York: McGraw-Hill, 1990).

24. Olaf Erenstein, Centro Internacional de Mejoramiento de Maiz y Trigo, Private communication, 30 May 1995.

25. Neil Harvey, "Playing with Fire, the Implications of Ejido Reform," *Akwe:kon - Journal of Indigenous Issues* 11, no. 2 (summer 1994): 22.

26. Milpa agriculture is a traditional method of crop rotation among maize, beans or coffee, and fallow. In the Eastern Lowlands, despite the fallow period allowed by milpa production, land is still exhausted quickly.

27. Harvey, "Rural Reforms," 11.

28. A 1981 publication used LANDSAT images to generate soil erosion data for Chiapas; however, because of a typographical error, it is impossible to determine which year the data were collected. See Secretaria de Agricultura y Recursos Hidraulicos, *Inventario de Erosion en el Estado de Chiapas mediante Imagenes del Satelite Landsat* (Secretaria de Agricultura y Recursos Hidraulicos, Direccion General de Conservacion del Suelo y Agua, 6 March 1981). One study suggests that declining agricultural yields in Chiapas between 1982 and 1987 were caused by environmental degradation. However, this five-year period was marked by low rainfall, high currency inflation, and radical adjustment programs that better explain the sharp decline in yields, especially for small producers. The study neglected the effects of liberalized agricultural policy and structural scarcities; it is a good example of the hazards of not placing the analysis of environmental degradation in a political and economic context. See Carmona Lara et al., *Ecologia*.

29. Global Assessment of Soil Degradation, "North and South America," sheet 1 in *World Map on Status of Human-Induced Soil Degradation* (Wageningen, Netherlands: United Nations Environment Programme, International Soil Reference Center, 1990).

30. According to the maps, "moderate" degradation causes "greatly reduced agricultural productivity."

31. See George Collier, "Soil Erosion in Chamula," in *Fields of the Tzotzil: The Ecological Bases of Tradition in Highland Chiapas* (Austin, Tex.: University of Texas

Press, 1975), 121. See also Raul Garcia-Barrios and Luis Garcia-Barrios, "Environmental and Technological Degradation in Peasant Agriculture: A Consequence of Development in Mexico," *World Development* 18, no. 11: 1572.

32. Collier, *Fields of the Tzotzil*, 115.

33. Pablo Farias Campero, ECOSUR, Chiapas, Mexico, private communication, May 1995.

34. See David Pimentel et al., "Environmental and Economic Costs of Soil Erosion and Conservation Benefits," *Science* 267 (4 February 1995): 117-23, for an excellent review of the effects of soil erosion and its consequences for agricultural sustainability.

35. There are clear limitations to this use of the analysis of Pimentel et al. The most obvious is that they assume homogeneous terrain, whereas the Central Highlands and the Eastern Lowlands of Chiapas are extremely heterogeneous in elevation and soil type.

36. Pimentel et al., "Environmental and Economic Costs," 119; Maximiliano Huerta Cisneros et al., *Características Generales de la Vegetación y Su Utilización en 25 Municipios de Chiapas* (Chiapas, Mexico: Fomento de Corporación de Chiapas, 1986), 16; Carmona Lara et al., *Ecología* 28, 29; Olaf Erenstein, Centro Internacional de Mejoramiento de Maíz y Trigo, private communication, 30 May 1995.

37. Lal, *Soil Erosion in the Tropics*, 16.

38. Nigh, "Consecuencias de la Colonización Agropecuaria," 27.

39. Secretaría de Agricultura y Recursos Hidráulicos and Comisión Económica para América Latina y el Caribe, *Primer Informe Nacional sobre Tipología de Productores del Sector Social* (Mexico, D.F.: Subsecretaría de Política Sectorial y Concertación, 1992), 19.

40. Nigh, "Consecuencias de la Colonización Agropecuaria," 14.

41. *Ibid.*, 12.

42. Marc Edelman, "Rethinking the Hamburger Thesis: Deforestation and the Crisis of Central America's Beef Exports," in *The Social Causes of Environmental Destruction in Latin America*, eds. Michael Painter and William Durham (Ann Arbor, Mich.: The University of Michigan Press, 1995).

43. Average coffee yields in Canadas are under 300 kilograms per hectare, compared with the state average of over 500. Similarly, the average maize yield for the Canadas region is about 1,300 kilograms per hectare, but for the state it is over 2,000. A. Carlos Santos, "Development and Conservation of Natural Resources in the Las Canadas Region

of the Lacandona Rainforest," in *Population/Environment Equation: Implications for Security: Third Conference on Environmental Security*, 31 May - 4 June 1994.

44. Homer-Dixon, "Environmental Scarcities and Violent Conflict," 5-40, especially 8-16.

45. "Land hunger propelled the Chamulas [indigenas] forward as much as did their talking stones and living Saints. The *criollos* of San Cristobal so dominated cultivable land in these high pine mountains that the holdings of Chamulas - much as they still are today - were measured in rows and not hectares." John Ross, *Rebellion from the Roots*, (Monroe: Common Courage Press, 1994), 67. Pages 251-67 provide an excellent account of the role the jungle for Mayan and Chiapan history.

46. Eric Wolf, *Peasant Revolutions of the Twentieth Century* (New York: Harper & Row, 1969), 5.

47. Felipe Vallagran, "Forest Policies in Chiapas" (public communication to Oscar Gonzalez Rodriguez, Subsecretary of Natural Resources, Secretariat of Environment, 10 May 1995).

48. In 1974, a quasi-official committee of indigenas called the Indigenous Congress complained about injustices throughout the state: "We have problems with ranchers who invade our lands. . . . We need land, we don't have enough of it, so we have to rent it, or go away to work. The lands we have been given are infertile. We need to be taught our rights under the Agrarian Laws." Collier, *Basta!*, 63. For more on how state elites disrupted the land reform efforts of the Revolution, see Antonio Garcia de Leon, *Resistencia y Utopia* (Mexico, D.F.: Ediciones Era, 1985).

49. Ross writes: "The first wave of settlers were, like the 'new' Lacandones before them, Chol refugees pushed out of Palenque. They were soon joined by highland Tzotziles, squeezed off the undernourished soils of Chamula . . . . Non-Mayan Indians from Oaxaca, forced off their communal lands by government dams, arrived in the Desert of Ocosingo; indigenas [were] dislodged by the White Guards of southern Veracruz's murderous cattle kings, a regional industry sustained by World Bank credits; landless mestizo farmers from as far away as Guerrero and Michoacan joined the flow in pursuit of a patch on which to grow a little corn." *Rebellion from the Roots*, 255-56.

50. James Nations, "The Ecology of the Zapatista Revolt," *Cultural Survival Quarterly*, (Spring 1994), 32.

51. Logging interests have strong historical ties to state and PRI elites. When demand increased substantially after World War II, entrepreneurial effort was channeled into buying up land and working around the rules established by the Constitution. For example, by 1949 the firm Vancouver Plywood had pasted together a territory of 600,000 hectares by a system of name lending between families and contractors. In 1957 and 1961, presidential decrees granted various privileges to logging companies to facilitate

the removal of precious hardwoods, such as mahogany, tropical cedar, oak, madrone, and pine. Then, in 1972, President Luis Echeverria Alvarez granted the small community of Maya Lacandon of the Eastern Lowlands - comprising only sixty-six families - communal title to a vast tract of over 600,000 hectares of the Lowlands containing much of the remaining Lacandon Rain Forest. The President and the state elites knew that this Mayan community would easily relinquish control of substantial portions of this land to rancheros and logging companies. He ordered the area's other occupants - campesinos and indigenas - to relocate to several larger communities or to move out entirely. Only after major protest by these occupants, who suddenly found themselves declared squatters, were some of their land titles recognized. Government relocation programs continued, however, and private loggers easily secured rights to extract the remaining hardwoods. In 1974, the Lacandona Forestal Company and Palenque Triplay Company were granted a concession of 1.3 million hectares of virgin, secondary and fragmented forest lands with permission to continue operations until 1986. Logging companies operating in the Lacandon were nationalized later that year, and operations were significantly expanded with public capital. Road construction into the forest increased again with a PEMEX study of the area's oil reserves. Although the Montes Azules Bioserve was created in 1978, campesinos, rancheros and commercial loggers continued to push in to the rain forest. Thus, in the decades leading up to economic liberalization, competition for forest resources grew fierce as firms were forced to work further up the Usumacinta River and cut deeper into the forests: between 1970 and 1975, 314,000 hectares was logged; another 128,000 hectares was lost between 1976 and 1980. Ross, *Rebellion from the Roots*, 255; Vallagran, "Forest Policies in Chiapas."

52. Burbach and Rossett, *Chiapas and the Crisis of Mexican Agriculture*, 6.

53. *Corporatism* is the state's practice of absorbing social movements into its bureaucracy or party apparatus before they organize independently. Opposition is thereby confined to local and marginal political spaces, if it poses little threat, or it is eliminated entirely if it seriously challenges elites. In the current Mexican context, neocorporatism means the PRI's practice of negotiating with various opposition groups and economic sectors - especially labor, peasants, and private capital - to produce economic and political pacts that maintain social stability; importantly, the regime is not assured of getting everything it wants from this process. Neocorporatism is a process of co-opting sectoral and opposition leaders into the policy process and opening up a little political space for groups not aligned with the PRI. The concession is offered in exchange for support of the PRI's policies, and the arrangement is managed by commissions, committees, and other political institutions designed to contain political dissent at a high level and dissuade local protest. However, both economic sectors and opposition groups may still be subjected to repression, including harassment, imprisonment, and assassination by the police, army, and private armed forces. Groups are thus paralyzed by threats, by diminishing resources, and by a lack of leadership during crucial moments of political action. See Neil Harvey, "The Difficult Transition: Neoliberalism and Neocorporatism in Mexico," in *Mexico: Dilemmas of Transition*, ed. Neil Harvey (London: Institute for Latin American Studies, 1993); Denise Dresser, *Neopopulist Solutions to Neoliberal Problems: Mexico's National Solidarity Program* (La Jolla, Calif.: Center for U.S.-

Mexican Studies, University of California at San Diego, 1991); Judith Adler Hellman, *Mexico in Crisis* (New York: Holmes & Meier Publishers, 1988), chap. 5; Frederick C. Deyo, "Economic Policy and the Popular Sector," in *Manufacturing Miracles, Paths of Industrialization in Latin America and East Asia*, eds. Gary Gereffi and David L. Wyman (Princeton, N.J.: Princeton University Press, 1990); and Wayne Cornelius, Judith Gentleman, and Peter Smith, eds., *Mexico's Alternative Political Futures*, Monograph Series, no. 30 (La Jolla, Calif.: Center for U.S.-Mexican Studies, University of California at San Diego).

54. Allan de Janvry and Raul Garcia, "Rural Poverty and Environmental Degradation in Latin America" (manuscript, Department of Agricultural and Resource Economics, University of California at Berkeley, 1988), 7; see also Salvado, *The Other Refugees*.

55. George Collier, Daniel Mountjoy, and Ron Nigh, "Peasant Agriculture and Global Change: A Maya Response to Energy Development in Southeastern Mexico," *Bioscience* 44, no. 6: 406; Collier, "The Toll of Restructuring on Lives and Communities," in *Basta!*, 107-24.

56. See Patricia Gomez Cruz and Christina Maria Kovic, *Con un Pueblo Vivo en Tierra Negada* (San Cristobal, Chiapas: Centro de Derechos Humanos, 1994), for a detailed account of the marches, land occupations, detentions, assassinations, demands for state assistance, and conflict among campesinos generated from agricultural conflicts; see Carlos Heredia and Mary Purcell, *The Polarization of Mexican Society* (Mexico, D.F.: Equipo Pueblo, 1994), for a general account of social friction in Mexican agriculture; see the epilogue of Thomas Benjamin, *A Rich Land a Poor People* (Albuquerque, N.Mex.: University of New Mexico Press, 1989), on how the PRI and landowning elites cooperate against peasants in Chiapas.

57. Harvey, "Rural Reforms," 22.

58. See Nora Lustig, *Mexico: The Remaking of an Economy* (Washington, D.C.: Brookings Institution, 1992).

59. Burbach and Rosset estimate that by 1983, 30 percent of the states ejidos were controlled by large land owners, "Chiapas and the Crisis of Mexican Agriculture," 6.

60. Statewide, a significant amount of land has been redistributed since the Revolution. Although this redistribution has produced a large statistical reduction in the level of land concentration, as we have noted in this paper, the majority of the land distributed has been of inferior quality, allowing persistently high concentrations of the most ecologically robust land.

61. In response to widespread peasant opposition to the new Agrarian Law, the PRI regime compromised, first, by permitting some further land redistribution and, second, by keeping the existing land appeals process in place for an interim period. As of 1994,

almost two thousand unresolved land claims - 30 percent of those filed in all of Mexico - were for tracts of land in Chiapas.

62. Harvey, "Playing with Fire," 23.

63. Vallagran, "Forest Policies in Chiapas." Calculating deforestation rates is often difficult, because definitions of what is meant by a "logged" region vary and because the contribution of forest regeneration to overall forest size is rarely taken into account.

64. Homer-Dixon, "Environmental Scarcities and Violent Conflict," 25, 27.

65. See William Ford and John Moore, "Additional Evidence on the Social Characteristics of Riot Cities," *Social Science Quarterly* 51, no. 2 (September 1970): 339-48, and Robert Jiobu, "City Characteristics and Racial Violence," *Social Science Quarterly* 55, no. 1 (June 1974): 52-64.

66. See Ted Gurr, *Why Men Rebel* (Princeton, N.J.: Princeton University Press).

67. See James Scott, *The Moral Economy of the Peasant: Rebellion and Subsistence in Southeast Asia* (New Haven, Conn.: Yale University Press, 1976), 1-11.

68. See Roberto Newell and Luis Rubio, *Mexico's Dilemma: The Political Origins of Economic Crisis* (Boulder, Colo.: Westview Press, 1984).

69. Homer-Dixon, "Environmental Scarcities and Violent Conflict," 26-27.

70. See Maria Luisa Tarres, "Middle-Class Associations and Electoral Opposition," in *Popular Movements and Political Change in Mexico*, eds. Ann Craig and Joe Foweraker (Boulder: Lynne Rienner Publishers, 1990).

71. George Collier, "The New Politics of Exclusion: Antecedents to the Rebellion in Mexico," *Dialectical Anthropology* 19, no. 1: 1-44.

72. See Christian Anglade and Carlos Fortin, "Accumulation, Adjustment and the Autonomy of the State in Latin America," in *State and Capital Accumulation* (Pittsburgh: Pittsburgh University Press, 1985).

73. Doug McAdam, *Political Process and the Development of Black Insurgency 1930-1970* (Chicago: University of Chicago Press, 1982).

74. Thomas Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict," *International Security* 16, no. 2 (1991): 110-11.

75. Father Pablo Romo Cedano, Diocese of San Cristobal, Personal communication, 4 April 1995.

76. See "Protestant Evangelization," in Collier, *Basta!*

77. Harvey, "Playing with Fire," 21.

78. On the radicalization of peasants in eastern Chiapas, see "The Building of Social Movements," in Collier, *Basta!* and Harvey, "Rural Reforms," and on the growth of social movements on rural reform, see Jonathan Fox, *The Politics of Food in Mexico* (Ithaca, N.Y.: Cornell University Press, 1993).

79. Subcomandante Marcos, *La Jornada*, 7 February 1994.

80. In some places in the Lacandon, indigenas and campesinos, with the support of local nongovernmental organizations, have successfully maintained the rain forest and generated some income for their communities through agroforestry projects that cultivate organic crops within secondary forests. Agricultura Organica and Dana, A.C., *Productive Reforestation: A Cooperative Project with the Lacandon Rainforest Community* (1995).

81. See Collier, *Fields of the Tzotzil*; Nations, "The Ecology of the Zapatista Revolt," 31-33; and Victor M. Toledo, "The Ecology of Indian Campesinos," *Akwe:kon - Journal of Indigenous Issues* 11, no. 2 (summer 1994): 41-46.

82. For a survey of the literature supporting this claim, see Anglade and Fortin, "Accumulation, Adjustment and the Autonomy of the State," 211-26.

83. See Juan M. R. Siaz, "Urban Struggles and Their Political Consequences," in *Popular Movements and Political Change in Mexico*, eds. Craig et al.

84. If "Chiapas is Mexico," as some have argued, in that environmental scarcities are appearing in other southern states, such as Oaxaca and Guerrero, and in that vast portions of central Mexico, including Puebla, Veracruz, Hidalgo, and Michoacan suffer similar neglect, the PRI can expect to receive demands from insurgent groups similar to those of the EZLN (see Reding, "Chiapas Is Mexico."). As in Chiapas, ejido titles throughout Mexico are often to land that is "marginal, hilly, eroded or otherwise not suitable for permanent agriculture" (Billie Dewalt et al., "The End of the Agrarian Reform in Mexico: Past Lessons, Future Prospects," *Transformation of Rural Mexico* 3 [La Jolla, Calif.: Ejido Reform Research Project, Center for U.S.-Mexican Studies, University of California at San Diego, 1994], 45). For studies of environmental scarcities in Chiapas and the prospects for other parts of Mexico, see Steven E. Sanderson, "Mexico's Environmental Future," *Current History*, February 1993; Dewalt et al., "The End of the Agrarian Reform in Mexico"; and Burbach and Rosset, "Chiapas and the Crisis of Mexican Agriculture."

85. George Phillip, *The Presidency in Mexican Politics* (Basingstoke, U.K.: MacMillan, 1992), 174.

86. The plebiscite, run entirely by volunteers in local committees, collected almost 1 million votes from around Mexico and over 80,000 votes internationally. A strong majority encouraged the EZLN to become an independent political party, a transition that is just beginning.

<b>Appendix (Excerpts): Relative Social and Economic Marginality: Comparative Statistics on Indigenous Populations of Mexico, Total Population of Chiapas and Indigenous Population of Chiapas</b>			
	<b>Indigenous Population of Mexico</b>	<b>Total Population of Chiapas</b>	<b>Indigenous Population of Chiapas</b>
<b>Population</b>			
1970	3 111 415	1 569 053	287 836
1990	5 282 347	3 210 496	716 012
Annual Growth Rate	2.6%	3.6%	4.6%
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Literate Population Over 15 Years	59.0%	69.6%	45.6%
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Homes Without Drainage	72.2	55.7	80.7
Homes Without Piped Water	46.5	40.5	49.6
Homes Without Electricity	37.0	33.1	61.3
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Infant Mortality	39.0/1000	39.0/1000	54.7/1000
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Unwaged Labour	21.0	19.0	32.5
Minimum Wage or Less	38.7	40.0	49.1
Minimum Wage or More	35.2	36.8	13.3
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Primary Sector	59.6	58.3	83.0
Secondary Sector	15.6	11.1	5.5
Tertiary Sector	21.9	27.4	8.6
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Women over 12 'inactive' economically	86.8	86.4	89.7
<i>Source: Compiled from Instituto Nacional de Estadística Geografía E Informática, Chiapas: Hablantes de Lengua Indígena (Aguascalientes, Ags., Mexico: INEGI, 1993).</i>			