Testing the Community Forestry Hypothesis in Mexico: Poverty Alleviation and Forest Protection

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• For decades, many have argued that devolution of control over forests to local communities will reduce deforestation, conserve biodiversity and alleviate poverty.

"The Community Forestry Hypothesis"

• But it has been difficult to find evidence to support the hypothesis…

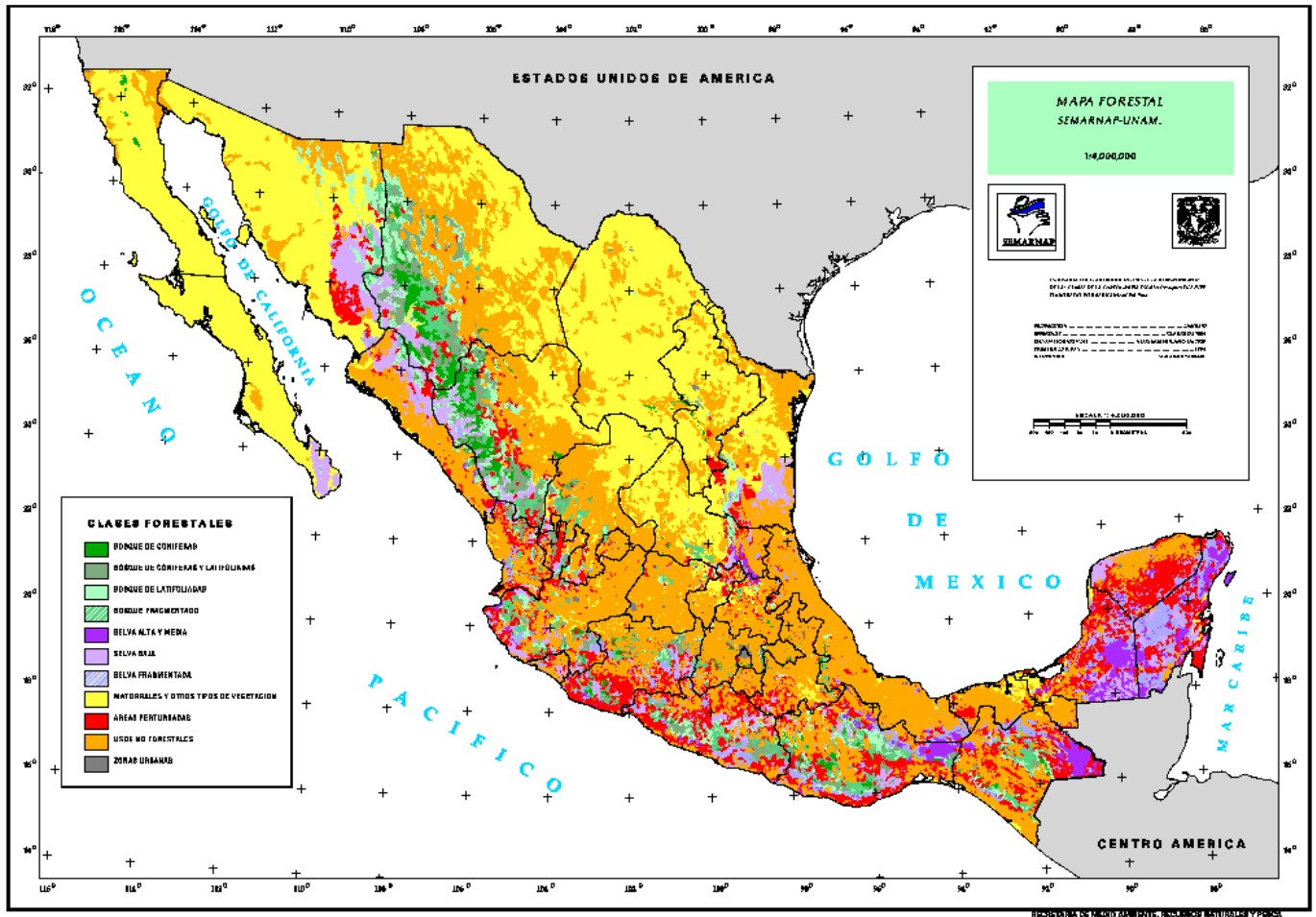
Testing the Community Forestry Hypothesis with Timber Production: The Case of Mexico

- Arguments against:
- One of a suite of community-based approaches that haven't worked: ntfps, bushment, timber.

  but timber is very different from other forest commodities
- Logging inherently damaging to forests

  but low intensity logging characteristic of community logging regimes has been shown to do little damage to biodiversity (Putz,

MAPA FORESTAL DE LA REPUBLICA MEXICANA



Mexican Community Forestry: Origins

Mexican Revolution (1910-1917): Agrarian-Based; Launched Land Distribution Process (1920s-1992)

Redistribution of *Natural Assets* from the State and Private Sectors to Communities

- 1940-18% of all forest lands.
- 1950-23% of all forest lands.
- 1980-65-80% of all forest lands in community hands

Agrarian Governance: *Ejidos* and *Comunidades*

- *Ejidos*: Grants of land distributed from private and public sector. System of governance established by agrarian law. Community authorities elected by General Assembly of community. State supervision diminished after reform to Article 27 of Mexican constitution in 1992.

- *Comunidades*- Indigenous Peoples. Recognizes millenial occupation-land titles from colonial period. Governed by mixtures of agrarian law and tradition.

Both together occupy around 50% of national territory

Evolution of Forest Policy

- 1941-1973. Under Mexican Constitution, State claimed rights over forests.
- Policies of logging concessions and bans
- Communities received little benefit
- 1973-1986. Government policies favorable to community management. Community mobilizations against logging concessions and bans.

1992 reform to Mexican constitution supported transition from state-led to community-led community forestry.

Community Management for Timber Production

- In most of world, community forest management = management of non-timber forest products on state lands.
- In Mexico, community forest management has led to the establishment of *community forest enterprises* for the production of timber from community owned common property- a unique enterprise form

Magnitude of the Sector

- Existing figures suggested no more than 700+ community forest enterprises.
- Research carried out 2004-2006 showed a far larger sector. National data collection N= 2389; more intensive 10 state study N= 1730 (most important forest states)
- Data sources: state delegations of federal environmental agency, forest engineers

Table I: Mexican Communities with Logging Permits (1992-2002)

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State	*Comunidades*	*Ejidos*	Total
Total	***429***	***1960***	***2389***

Other Characteristics: 10 State Study

Industrial Vertical Integration Typology.

Type I: Not currently logging

Type II: Roundwood Production (on the stump)

Type III: Have Extraction Equipment

Type IV: Sawmills

	Type I	Type II	Type III	Type IV	Not Classified	
Total	306 (17.7%)	480 (27.7%)	375 (21.7%)	122 (7.1%)	447 (25.8%)	1730 (100%)

Production Type	Average Forested Area	N
Type 1	4,948.23	281
Type 2	3,555.16	471
Type 3	5,454.03	365
Type 4	15,193.38	120
Total		1,237

- A Small Percentage of Mexican Community Forest Enterprises have accumulated substantial fixed assets and have become internationally competitive timber businesses

- Common property systems can be competitive in the markeplace

El Balcon, Guerrero: 4.2 million dollars in fixed capital assets

Community Forest Enterprises are Profitable at all Levels of Vertical Integration

Table II: Costs and Benefits in 42 CFEs in Oaxaca-1998 (in Pesos)

	Stumpage Communities	Roundwood Communities	Sawmill Communities	Finished Products Communities
Profit from Sales	573,549	1,688,274	3,020,021	9,578,861
Salaries	1,440	406,718	306,388	774,227
Total Costs	304,125	1,010,740	1,462,620	1,462,620
Profits	311,386	870498	1,557,401	3,056,819
Percentage of profits over sales (%)	54%	52%	52%	32%
Percentage paid in Salaries (%)	10	44	29	28

Source: adapted from Antinori, 2000: 167

The Accumulation of Assets-Benefit Flows

The accumulation of assets occurs through four benefit flows 1) capital investments in the CFE (community) 2) Capital investments in community infrastructure (community) 3) Direct employment (household) 4) Profit-sharing (household)

Does Community Forest Management for Timber Alleviate Poverty?

- Household-level study of six forest production communites in tropical state of Quintana Roo (N=200 households)
- Stratified by level of mahogany production (high, low, none) and ethnicity.
- Hypothesis: the higher mahogany production, the more likely that poverty will be alleviated

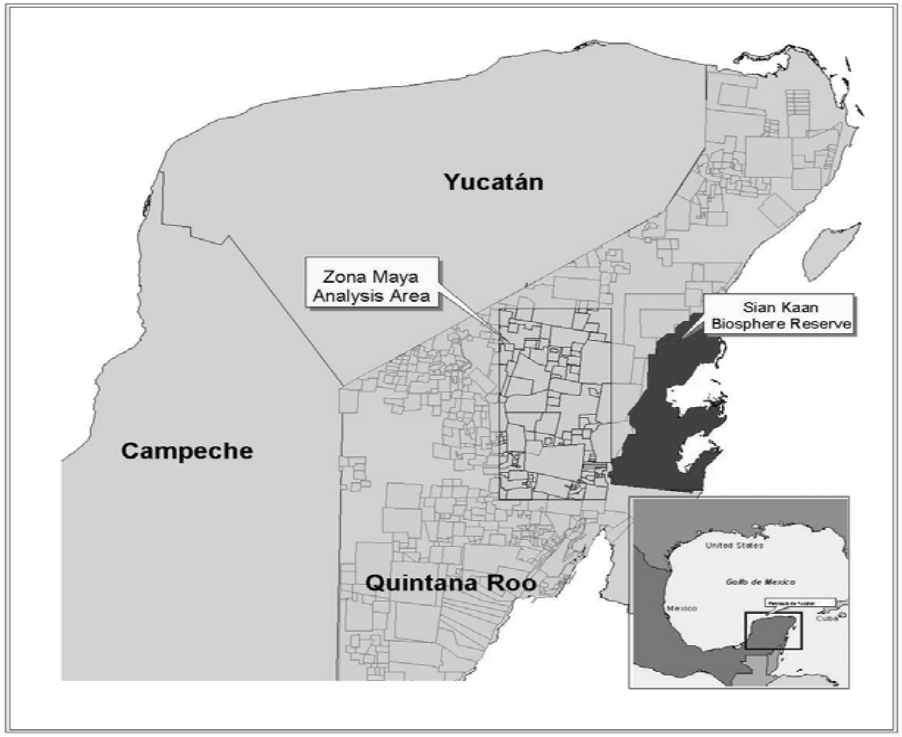


Table: Three Official Poverty Thresholds in Mexico

Table I: Levels of Poverty Classification by Income Per Person Per Day in Rural Areas of Mexico (in Year 2000 Pesos)

Level of Poverty	Income Level Per Person Per Day in Rural Areas	Percent of Rural Households Below Line (2000)
Nutritional Poverty Threshold	15.4	34.1
Development Capacity Threshold	18.9	41.4
Asset Development Threshold	28.1	60.7

(Adapted from Cortés Caceres, 2002)

Table: Household Incomes by Activity-Percentages and Gross Income (mexico pesos)-Six Forest Community Study (N=199)

Activity *Percentage of Mean Incomes*	*CFE*	*NTFP*	*Agri*	*Wage & SE*	*Remit.*	*Gov. Programs*	*Total*	*N*
High Timber Volume								
Noh Bec	.66	.06	.04	.14	.01	.08	.99	30
Naranjal Poniente	.44	.04	.12	.11	.02	.27	1.00	22
Low Timber Volume								
Caobas	.29	.05	.14	.16	.04	.32	1.00	43
X-Maben	.08	.05	.10	.23	.04	.5	1.00	66
No Timber Volume								
Cuauhtémoc	0	.06	.24	.33	.04	.33	1.00	19
Kampokolche	0	.06	.22	.15	0	.56	.99	19
Total Income in pesos							Total	199
High Timber Volume								
Noh Bec	34,460	3,481	3,543	8,418	973	3970	55,045	30
Naranjal Poniente	8,492	877	2,845	3,337	323	5,943	21,816	22
Medium Timber Volume								
Caobas	6,074	2,067	3,951	5,255	1,240	7,819	26,405	43
X-Maben	1,134	1,050	2,076	7,202	1,337	8,477	21,275	66
No Timber Volume								
Cuauhtémoc	5	1,369	4,606	7,342	1,034	6,926	21,283	19
Kampokolche	0	1,058	3,076	4,296	0	7,042	15,472	19

Table II: Mean Cash Income per Person per Day- Six Quintana Roo Forest Communities Compared to Mexican Government Nutritional Poverty Line (in unadjusted pesos per person)

High Tim. Vol.	Mean Income Per Person Per Day (2002)	Nutritional Poverty Line* (2000)	Development Capacity Poverty Line* (2000)	Asset Poverty Line* (2000)
Noh Bec	38	15.4	18.9	28.1
Naranjal Pon.	13	15.4	18.9	28.1
Low. Tim. Vol.				
Caobas	23	15.4	18.9	28.1
X-maben	12	15.4	18.9	28.1
No Tim.Vol.				
Cuauhtemoc	17	15.4	18.9	28.1
Kampokolche	10	15.4	18.9	28.1

- SEDESOL, 2002

Observations: Quintana Roo Forest Incomes Study

- One community with “high” mahogany not poor at any threshold, one community with “low” mahogany volume over two poverty thresholds.
- One “high” volume community very poor, one “low” volume community very poor.
- Two most prosperous communities both have sawmills-sawnwood sells for 100% more than roundwood and generates employment.

Results of Logistical Regression

- **Having a high volume of mahogany and a sawmill makes you not poor**. Each incremental increase in volume of mahogany production is associated with a 56% increase in annual per capita income measured in raw form) on average.
- **Two "prosperous communities" have twice as many income-earners per household**. Every 26% increase in share of household members with jobs is an 11% increase in annual per capita income (measured in raw form) on average.

- **"Poor" communities have 25% more household members**. Associated with having 4-7 members is 61% less, and with 8-12 members 81% less, annual per capita income (measured in raw form) on average than households having 1-3 members.

- Mestizo households have 46% more annual per capita income (measured in raw form) on average than do Santa Cruz Maya households.

Conclusions: Community forest management for timber can alleviate poverty (and generate economic development)

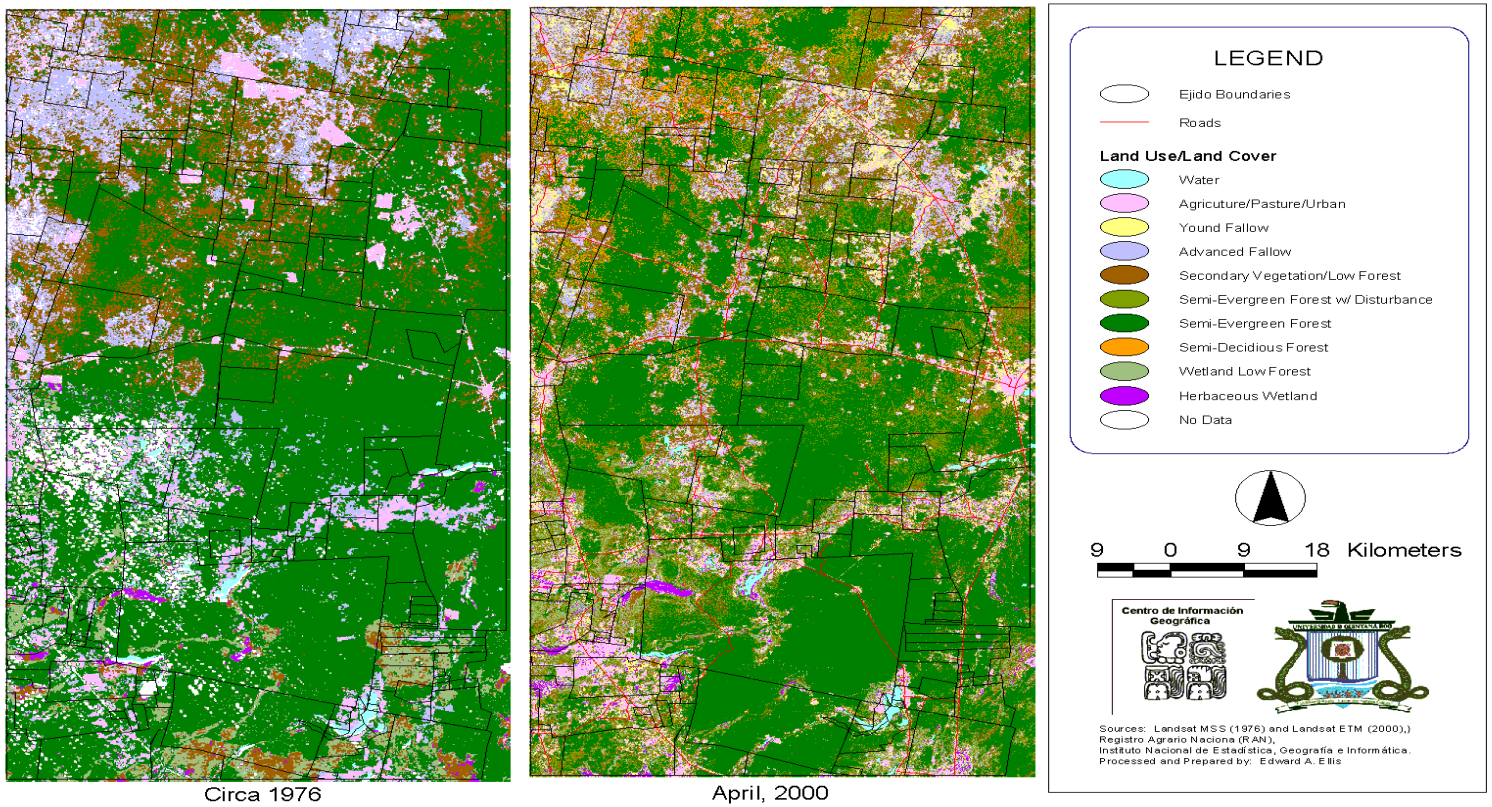
but value-added processing is key, and factors associated with social and demographic issues (ethnicity, large household size, number of works in household) inhibit poverty-alleviating effects of timber production.

Does Community Forest Management For Timber Protect Forests/Reduce Deforestation?

- Parks without human habitation advocated as the “most reliable instrument” for preserving forests and biodiversity against agricultural encroachment (Niesten, Rice et al., 2004)

Two studies in Mexico suggest that regions dominated by community forests have similar or lower rates of deforestation to strict protected areas.

Land Use/Land Cover in the "Zona Maya" of the Municipio Felipe Carrillo Puerto, Quintana Roo, Mexico



Circa 1976

April, 2000

central Quintana Roo, a region dominated by community forests managed for timber, had the lowest recorded rate of deforestation in southeastern tropical Mexico (.1%), and lower than any protected areas in the region. (Bray et. al. 2004).

Table 2: Regional Rates of Deforestation in Mexico (1970's-2000)

Region	Years	Annual Rate (%)	Notas	Source
SE México	1970's-1990's	4.3-12.4		Banco Mundial (1995)
Estados del SE de México	1977-1992	1.9		Cairns et al. (2000)
Tuxtlas Veracruz	1976-1986	4.3		Dirzo & Garcia (1992)
Marqués de Comillas Bosque Lacandona (1ra Región)	1979-1989	2.8		O'Brien (1998)
Bosque Lacandona (2da Región)	Mediados 1970's-1990's	2		De Jong et al. (2000)
State of Morelos	1973-1989	1.4	Dry Tropical Forest	Trejo & Dirzo (2000)
Bosque Lacandona (3ra Región)	1970's-1990's	.3	80% Protected Area	De Jong et al. (2000)
Península de Yucatán (South)	1969-1997	.32 - .39	Calakmul Biosphere Reserve included	Turner II et al. (2001)
Quintana Roo (Central)	1984-2000	.1	No Protected Area	Bray et al. (2004)

Community Forest Regions in Quintana Roo and Guerrero compared to National Sample of Protected Areas

Land Unit	% Forest Cover Maintained	% Change Anthropogenic Cover (regrowth)
Protected areas (74)	98.8	.06
Guerrero community forests (10)	96.0	29.0
QR community forests (12)	95.0	94.8

Source: Duran, Mas, Velazquez

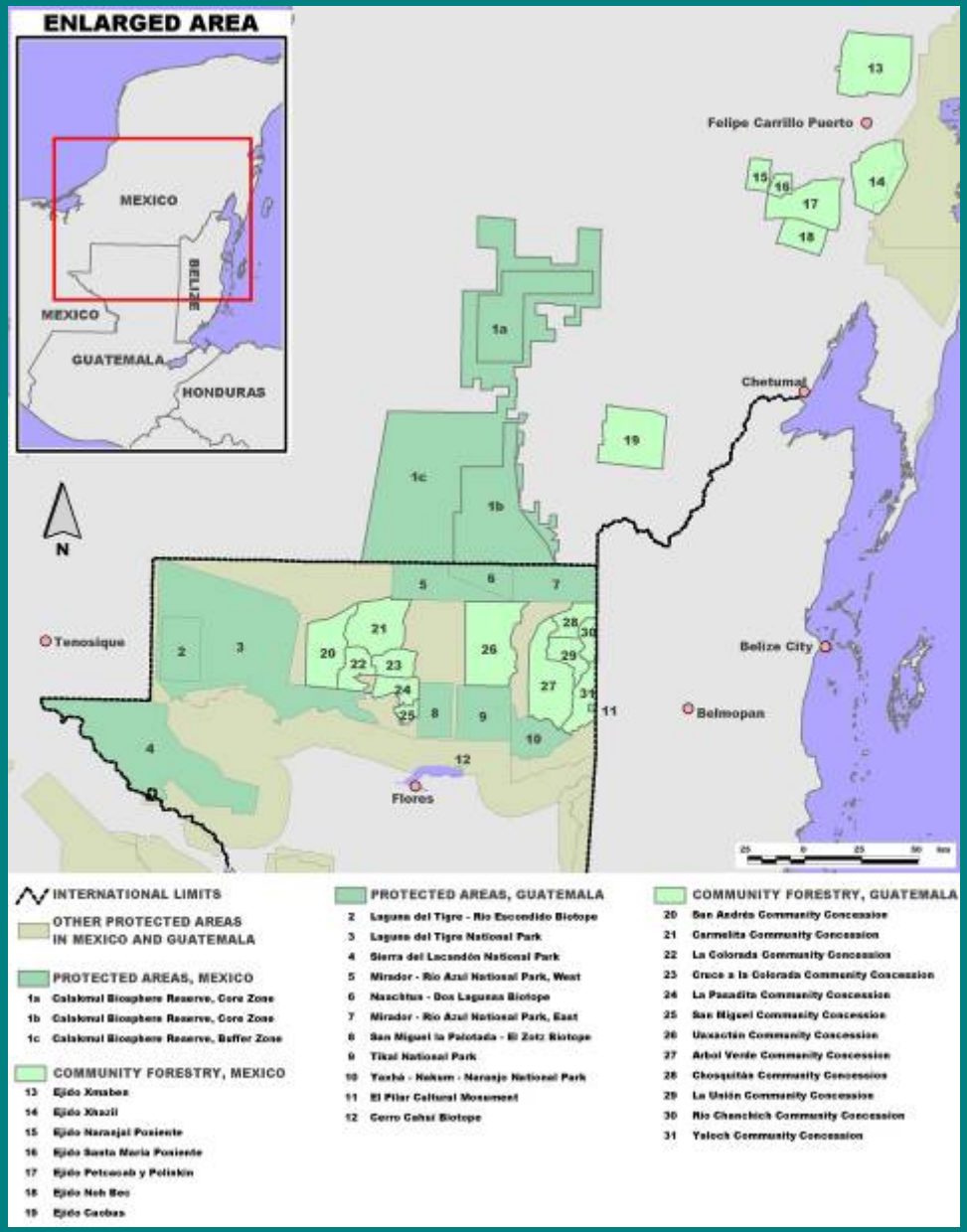
Current Study: Comparing Deforestation in Community Forest Regions and Protected Areas in the Maya Forest of Mexico and Guatemala

Mexico → **Common property forests (Ejidos)** vs. **Calakmul Biosphere Reserve**

Guatemala → **Community forest concessions in Maya Biosphere Reserve** vs. **Parks in Maya Biosphere Reserve**

Hypotheses

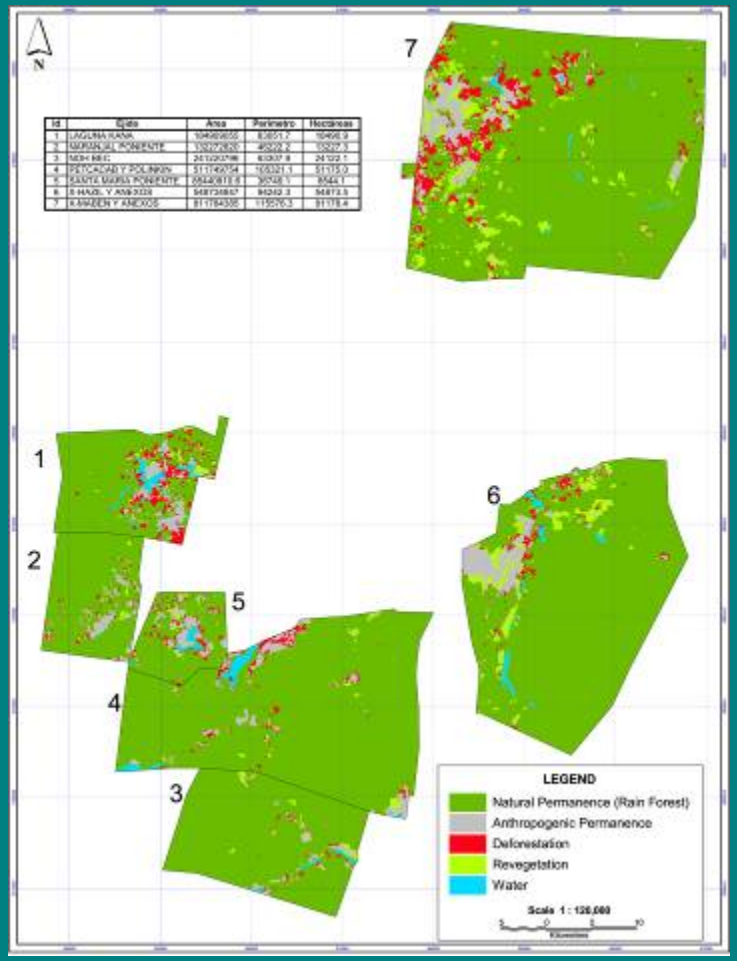
- Deforestation rates in Biosphere Reserve and community forest region *would both be low* (low colonization pressures) in Mexico portion of Maya Forest
- Deforestation rates *would be high in parks, and much lower in community forest concessions* (25 year renewable exploitation rights to all forest products) in Guatemala. (intense colonization pressures



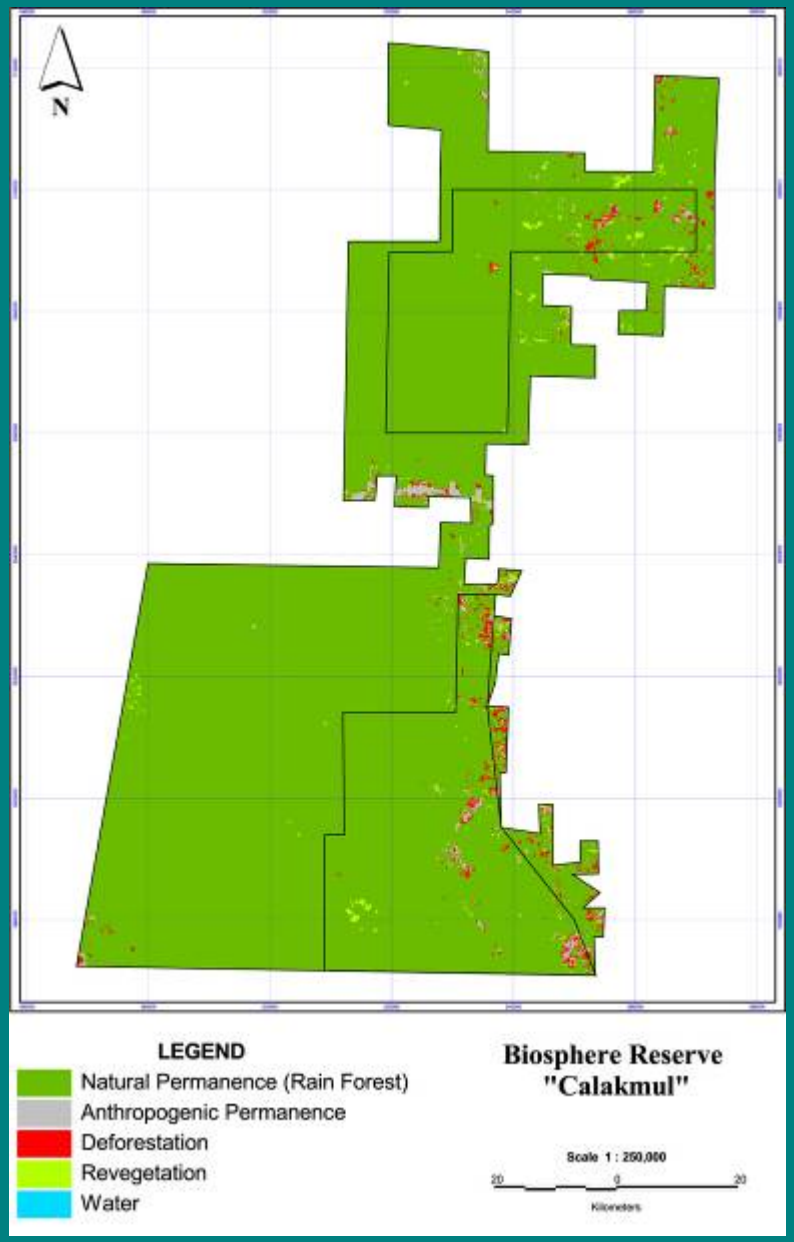
Management units studied in the Maya Forest of Mexico and Guatemala

Study Design

Study Design			
Land Use	**Human Presence**	**Guatemala**	**Mexico**
Parks	Decree	1990	1989
	Uninhabited	6 National Parks (core zone): - *Tikal* - *Mirador* - *San Miguel* - *Dos Lagunas* - *Cerro Cahui* - *El Pilar*	Calakmul Biosphere Reserve (core zone or total area)
	Inhabited	4 National Parks (core zone): - *Sierra Lacandon* - *Laguna del Tigre I* - *Laguna del Tigre II* - *Yaxha Nakum*	---
Community Forests	Uninhabited	6 Community Forestry Concessions: - *Chosquitán* - *La Unión* - *Rio Chanchich* - *San Andres I* - *Yaloch* - *Arbol Verde (Ventanas)*	---
	Long-settled	2 Community Forestry Concessions: - *Carmelita* - *Uaxactún*	7 Forestry Ejidos: - *Caobas* - *Naranjal Poniente* - *Noh Bec* - *Petcacab* - *Santa Maria Poniente* - *X-Hazil y Anexos* - *X-Maben*
	Recently settled	4 Community Forestry Concessions: - *Cruce a la Colorado* - *La Colorada* - *La Pasadita* - *San Miguel El Zotz*	---

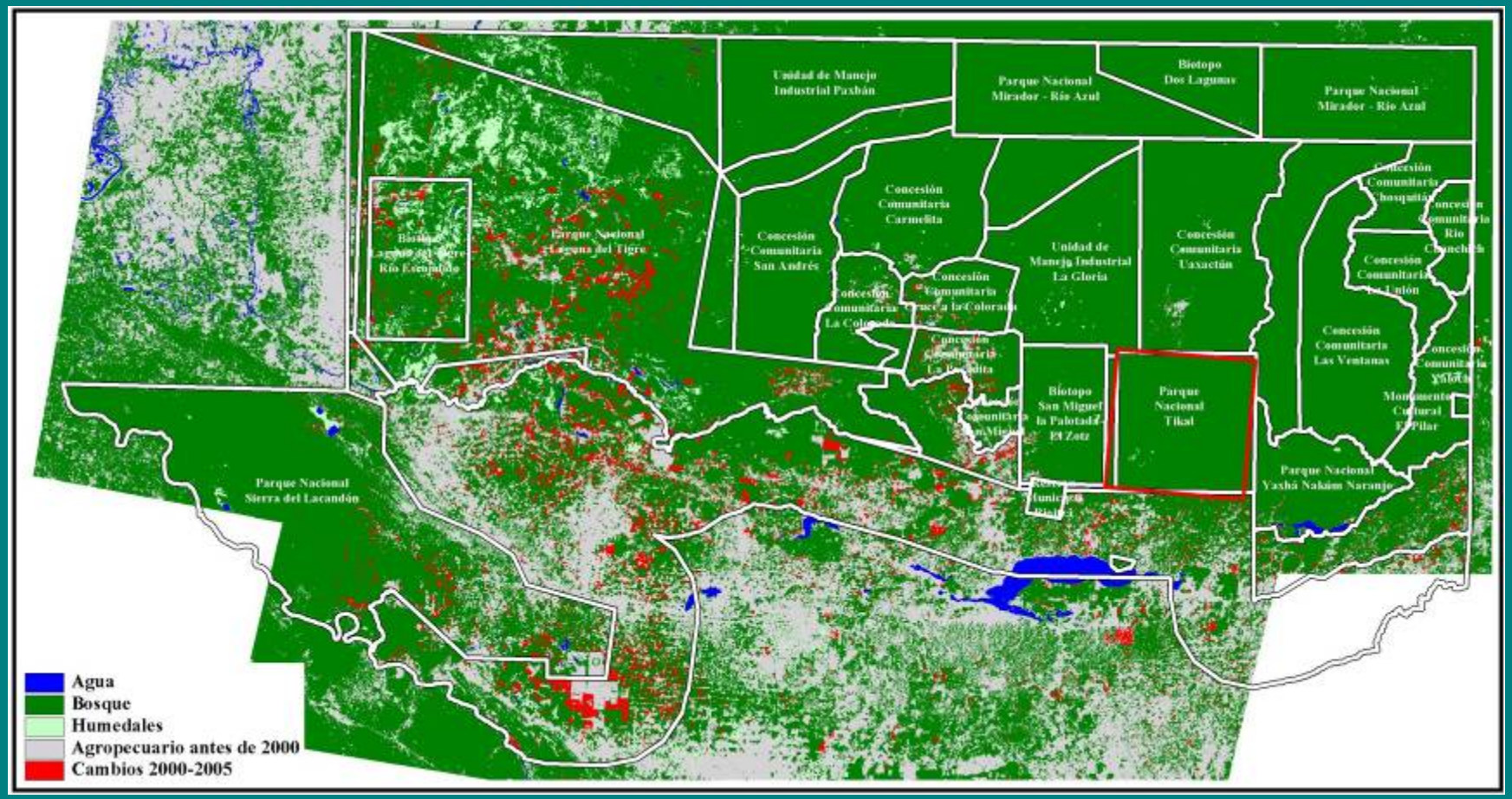


Deforestation and Revegetation in seven forest ejidos, central Quintana Roo, 1990-2000



Deforestation and Revegetation in Calakmul Biosphere Reserve, Mexico, 1988-2000

Deforestation in the Maya Biosphere Reserve-Guatemala (Parks and Community Forest Concessions-2005)



Deforestation rates in Mexico and Guatemala-By Degree of Human Presence

Table 3. The logistic regression analysis.

a) Guatemala study case.

Variables	Coefficient	Coefficient Standard Error	Wald Chi square	P	"odds" Coefficient	Standardized Coefficients
Flooding vegetation	-1.514	0.3010	25.286	0.000	0.220	-5.029
Soil deep	0.392	0.1377	8.081	0.004	1.479	2.843
Humid topographic index	1.401	0.5192	7.287	0.007	4.061	2.699
Human settlements distance	-0.632	0.0829	58.094	0.000	0.532	-7.622
Deforested areas distance	-0.085	0.0252	11.519	0.001	0.918	-3.394
Road distance	-0.144	0.0411	12.354	0.000	0.866	-3.515
Forestry concessions	4.036	1.0405	15.048	0.000	56.612	3.879
Buffer zone	5.247	1.0116	26.900	0.000	189.906	5.186
Use multiple zone	4.754	1.0174	21.833	0.000	116.021	4.673
Core zone	4.586	1.0094	20.644	0.000	98.117	4.544
Constant	-1.676	1.5581	1.157	0.282	0.187	-1.076

b) Mexico study case.

Variables	Coefficient	Coefficient Standard Error	Wald Chi square	P	Exp(B)
Tropical semideciduos forest	0.838	0.198	17.875	0.000	2.311
Tropical deciduous forest	-0.148	0.395	0.140	0.708	0.863
Buffer zone	0.130	0.116	1.259	0.262	1.139
Forestry Ejidos	-0.011	0.124	0.008	0.929	0.989
Deforested areas logarithmic distance	-1.401	0.045	971.695	0.000	0.246
Constant	7.425	0.337	485.039	0.000	1676.955

c) Regression model summary

Study case		Guatemala	Mexico
-2 Log likelihood		2015.955	2754.922
Cox & Snell R square		0.243	0.440
Nagelkerke R square		0.400	0.627
Hosmer & Lemeshow test	Chi-square	51.104	54.123
	d.f.	8	8
	P	0.000	0.000

Observations on the Regression Analysis

- In Mexico, Biosphere Reserve has slightly more propensity to be deforested than ejidos, but what is really important is distance to agriculture-suggests that both are regulating agriculture
- Parks vs community concessions not significant in explaining deforestation, but review of independent variables suggests that community forest concessions are controlling population growth (colonization) while two of the parks are not.

Comparisons of Benefits

	Protected Areas	Well-organized community forest management
Social	Incipient	Multiple
Economic	Negative	Positive
Forest Cover	Maintained	Maintained

In both cases environmental consequences are positive, but PAs can have higher and permanent costs to society, costs to society of CFM likely to be reduced over time.

Financial Situation

	Protected Areas	Well-organized community forest management
Responsibility	Government	Ejidos
Financial Investment	Government	Ejido + Others
Economic Balance	Negative	Positive

Community Forest Management may reduce cost to society for conservation

Testing the Community Forestry Hypothesis

- Farmers with little education can master complex industrial processes and administer community forest enterprises.
- When value-added processing is present, community forest management for timber can alleviate poverty and generate economic development
- Community forest management for timber conserves forest cover, under certain conditions better than parks, and generates income for local communities

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