Con el apoyo de la Alianza

FOREST LOSS AND DETERIORATION IN THE MONARCH BUTTERFLY BIOSPHERE RESERVE 2005-2006

REPORT PREPARED BY WWF

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EXECUTIVE SUMMARY

1. The 2005-2006 forest cover analysis of the Monarch Butterfly Biosphere Reserve indicates an alarming loss and deterioration of the Monarch butterfly hibernation forests.

2. The analysis conducted by the Instituto de Geografía of the Universidad Nacional Autónoma de México (UNAM) to support the annual evaluation of the Monarch Butterfly Conservation Fund, compared aerial photographs from 2005 and 2006 in the core zone. Results indicate the loss and deterioration of 576.5 hectares of forest, which represent an increase of 140% in comparison to the 239.5 hectares lost annually during the 2003-2005 period.

3. The greatest loss or deterioration occurred in the state of Michoacan, in the Ejido Crescencio Morales (427.2 ha affected) (not participating in the Monarch Fund) and in the Indigenous Community Nicolas Romero (95.1 ha affected). These two properties suffered 90% of the 2005-2006 changes.

4. The results of this analysis document the critical situation of illegal logging and forest deterioration, in spite of increased protection activities implemented since 2004.

INTRODUCTION

The Monarch Butterfly Biosphere Reserve is a protected area which is emblematic for Mexico in national and international scope (CONANP 2001, Galindo-Leal y Rendón-Salinas 2005). The forests loss and deterioration of this Reserve, as a consequence of illegal logging and land use change (Ramirez *et al.* 2003), not only represent the greatest threat for the Monarch hibernation sites, but also the greatest challenge for everyone interested in its conservation and the well-being of local inhabitants (Rendón-Salinas *et al.* 2005, 2006).

At present, the Reserve includes 56,259 hectares in the border between the states of Mexico and Michoacan, and it has a core zone (the forests where the Monarch hibernates) and a buffer zone where sustainable forestry is allowed to diminish human pressures on the butterfly hibernation habitat. The Reserve decree (2000) was accompanied by the Monarch Butterfly Conservation Fund, the "Monarch Fund" (Reyes y Contreras 2005), which offers two types of economic incentives for forest conservation for 32 of the 40 land owners in the core zone. The Monarch Fund is jointly managed by WWF and the Mexican Fund for Nature Conservation.

One of the main criteria for the participating properties to be subject to the economic support is the conservation of the forest. To assess this criterion, an analysis of the forest cover change is conducted, using aerial photographs of the core zone. The Technical Committee, the government body of the Monarch Fund, uses the results of this analysis as one of the main criteria to award these incentives. In this report, forest cover loss and deterioration in the Reserve is documented during 2005-2006, and trends from 2001 are analyzed.

MONARCH BUTTERFLY BIOSPHERE RESERVE

The Reserve is located in the Mexican Neovolcanic Axis and includes four municipalities of the State of Mexico (Donato Guerra, Villa de Allende, San Jose del Rincon y Temascalcingo) and, six of the state of Michoacan (Zitacuaro, Ocampo, Aporo, Angangeo, Senguio y Contepec) (Fig. 1).

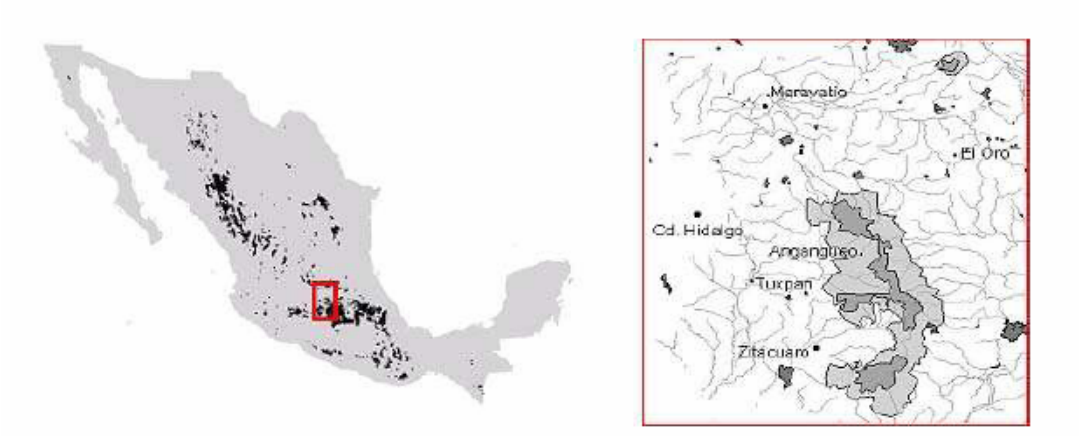

Figure 1. Monarch Butterfly Biosphere Reserve

METHODOLOGY

The Monarch Fund requires a periodic evaluation of forest cover changes, as criteria of economic incentives award (Reyes y Contreras 2005, www.wwf.org.mx). The results presented in this report were obtained using interpretation of aerial photographs with a scale 1:10,000 (high resolution) obtained in February 2005 and March 2006. Three hundred core zone photographs of both years were interpreted to delimit forest "strata" or areas with different forest cover quality (Table 1).

Table 1. Forest cover categories used in the analysis

Code	Category	Forest cover
1	Closed	>80%
2	Semiclosed	55-79%
3	Semiopen	30-54%
4	Open	5-29%
5	Very open	<5%
6	Deforested (without tree cover)	0%

The resulting forest segments were restored, that is, they were copied on printed maps at the same scale (1:10,000). Once the map segments were in placed, the information was digitalized using a geographical information system (GIS), and the results of both years were compared to identify cover quality differences of the segments during this period. Finally, the results were corroborated in with field surveys in those areas where changes were detected.

RESULTS

During the period analyzed (2005-2006), negative changes in forest cover were detected in 576.4 ha in the core zone (Lopez Garcia 2006). This means a 140% increase, in relation to the 239.5 hectares which were lost or deteriorated annually in the 2003-2005 evaluation (479.0 total hectares). During 2001-2003, 70.6 hectares were lost or deteriorated each year (141.3 total hectares) (Lopez Garcia 2005, Lopez Garcia 2006, Honey *et al*. 2004, WWF 2004). The five-year period analyzed suggests an increasing forest loss and deterioration trend in the Reserve core zone (Fig. 2).

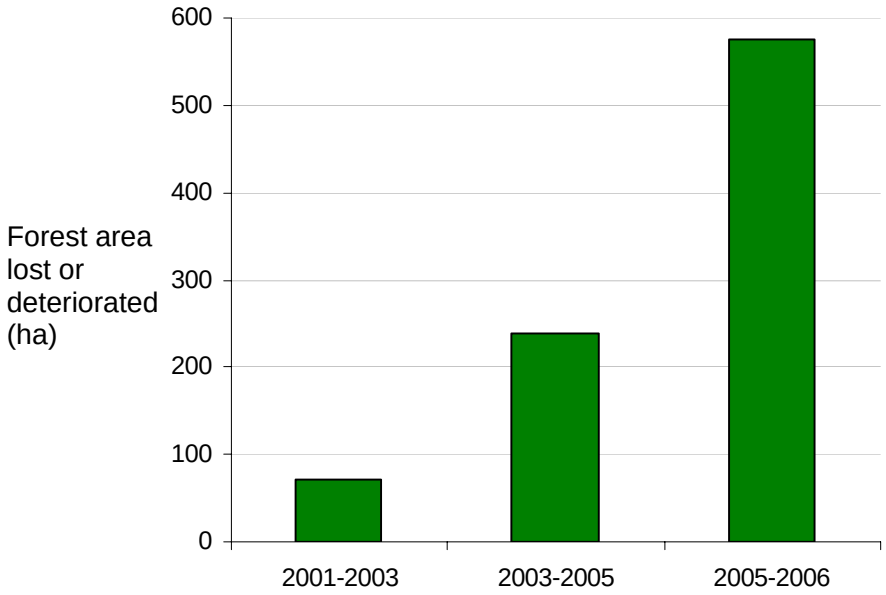

Figure 2. Annual forest loss or deterioration in the core zone of the Monarch Butterfly Biosphere Reserve

The most important loss or deterioration during 2005-2006 was detected in two Michoacan properties: Crescencio Morales (427.2 ha) (not participating in the Monarch Fund) (Fig. 3) and the Indigenous Community (I.C.) of Nicolas Romero (95.1 ha). Forest cover changes during this period were evident in six properties of the State of Mexico (37.1 ha), and seven properties in Michoacan (539.2 ha) (Table 2).

In six of the 13 properties with forest cover loss and deterioration during 2005-2006, negative changes have been documented previously. Properties with greatest changes during this assessment (Crescencio Morales and the I.C. Nicolas Romero, Michoacan) have also presented large changes in previous years. In contrast, I. C. Francisco Serrato and I.C. Donaciano Ojeda (Table 2) stand out for reducing their annual forest cover change.

Table 2. Properties with forest loss or deterioration 2001-2006.

State	Property	Loss or damage (ha)		
		2001-2003	2003-2005	2005-2006
State of México	La Mesa	20.60	51.70	11.41
	Rancho Verde	2.00		
	San Pablo Malacatepec			2.22
	El Deposito			18.20
	Los Saucos			2.59
	San Juan Xoconusco			2.50
	*Pending Property			0.20
Michoacan	*Crescencio Morales	49.90	118.10	427.20
	Francisco Serrato (C. I.)	42.50	77.50	0.74

	El Rosario	2.10		3.90
	Donaciano Ojeda	24.20	1.60	0.01
	Nicolas Romero (C. I.)		148.60	95.10
	*Property of the State		6.70	
	Cerro Prieto		5.70	
	*Federal Property		69.10	
	El Asoleadero			9.40
	Santa Ana			2.90
Total for the period		**141.30**	**479.00**	**576.37**
Total annual		**70.65**	**239.50**	**576.37**

*Note: Properties that do not participate in the Monarch Fund

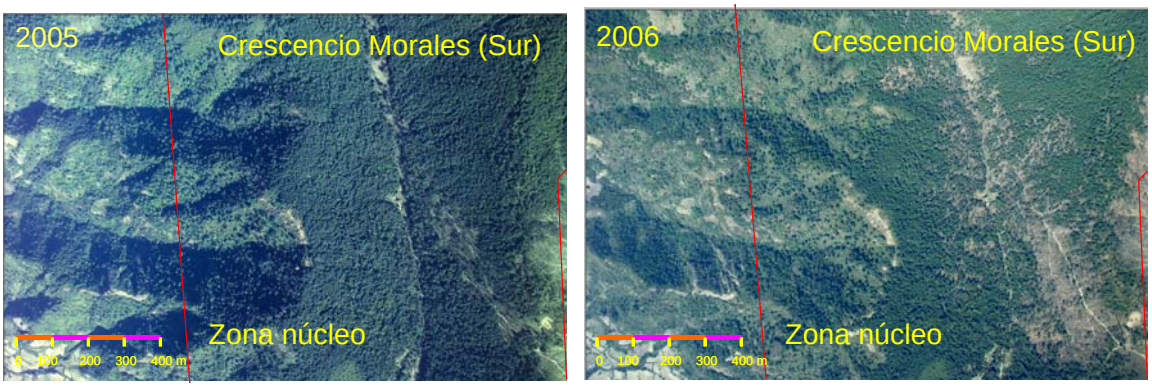

Figure 3. Forest loss and deterioration in the core zone in Crescencio Morales, Michoacan.

DISCUSSION

Forest loss and deterioration due to illegal logging and land use change in the region of the Monarch Butterfly has been documented for many years (CONANP 2001, Ramirez *et al.* 2003, WWF 2004). In spite of efforts to conserve this Reserve, from the government, civil society and private sector, forest loss continues (Galindo-Leal y Rendón-Salinas 2005, Rendón-Salinas *et al.* 2005).

In 2000, with the establishment of this protected area, the Monarch Fund was created to provide economic incentives to land owners in the core zone, to contribute towards forest conservation. There are also various programs of the Michoacan and State of Mexico governments, of civil society and private sectors aimed to promote conservation of this protected area. However, forest monitoring by the Monarch Fund has consistently documented forest cover loss and deterioration in the core zone of the Reserve during the last five years: 141.3 ha in the period 2001-2003, 479.0 ha from 2003 to 2005 and 576.4 ha during 2005-2006.

The results of this report are consistent, in terms of increased forest loss and deterioration of the core zone, with other analyses conducted using satellite images. The first analysis using Landsat images, estimated a forest loss and deterioration for the whole Reserve of

291 ha and 660 ha per year in the periods 1993-2000 and 2000-2003, respectively. The forest loss in the core zone was estimated from 124 ha to 167 ha and from 167 ha to 493 ha in the buffer zone for the same periods (Ramirez y Zubieta 2005). The second analysis using SPOT images from October 2004 to February 2006, reports negative changes of 1,539 ha en the core zone and 8,240 ha in the buffer zone (Lopez Garcia 2006).

In 2004, WWF handed in to the federal and state authorities the technical report "Illegal logging and its impact in the Monarch Butterfly Biosphere Reserve", with evidence on forest cover change, documenting the efforts of land owners (ejidos and communities) to stop illegal logging in their forests. Also, in 2005, the WWF-Telcel Alliance provided to the Federal Environmental Protection Agency (PROFEPA) and to the state governments (i) the analysis of the road network in the Reserve, to support enforcement activities, (ii) the forest loss analysis up to 2005, with a map locating the sites affected by illegal logging.

In this context, WWF concludes that protection actions from competent authorities have not been sufficient. In spite of increased protection activities, particularly from 2004, direct economic incentives to forest owners since 2000 by the Monarch Fund, and recent joint investments (2003-2006) from the private sector and civil society organizations, the state and federal sectors, deforestation is increasing and is seriously altering the core zone of the Reserve.

RECOMMENDATIONS

The 10 recommendations presented by WWF (2004) are still valid:

1. Establish permanent presence of the Army in strategic areas.
2. Control access to the Reserve.
3. Establish infrastructure and communication mechanisms to improve productive activities -including tourism.
4. Organize regular inspections of the Reserve and sawmills.
5. Strengthen community vigilance committees.
6. Inform local residents and visitors on forbidden and permitted activities in the Reserve.
7. Implement an environmental campaign addressed to residents in order to make them aware about forest conservation importance.
8. Conduct assessments of site damage and restoration.
9. Conduct an analysis of underlying causes of illegal logging.
10. Follow the recommendations of the First Monarch Butterfly Regional Forum (2004).

In addition, we recommend implementation of the following measures:

Core Zone

- Establish permanent presence of the Army. Land owners have continuously requested the permanent presence of the army in order to stop illegal logging.
- Strengthen Community Vigilance Committees and their close coordination with state and federal authorities, to halt forest deterioration due to illegal logging.
- Identify illegal logging promoters and wood buyers, and apply the corresponding maximum penalties.

Buffer Zone

- Strictly supervise forest management programs and apply maximum control to the Reserve timber flow, so that extraction from buffer area does not exceed sustainable limits.
- Cancel forest use authorizations to the ejidos and communities involved in illegal logging.

Monarch Butterfly Biosphere Reserve personnel (CONANP)

- Thoroughly restructure human resources (technical and administrative) in the Reserve (CONANP) –to strengthen their management, coordination and leadership capacities.

Monarch Butterfly Regional Forum

- Fulfill agreements of the First (2004), Second (2005) and Third (2006) Monarch Butterfly Regional Forums, a coordination initiative among committed stakeholders to the Monarch Reserve conservation, the local residents livelihood and the regional social and economic development

REFERENCES

Galindo-Leal, C. y E. Rendón-Salinas. 2005. Danaidas: Las Maravillosas Mariposas Monarca. WWF-Telcel. Publicación Especial No. 1. WWF México Telcel. México, D. F. 82 pp.

Honey-Rosés, J., E. Rendón, J. López García, A. Peralta, P. Ángeles, I. Contreras y C. Galindo-Leal. 2004. Monitoreo Forestal del Fondo Monarca 2003. Reporte de WWF-México. 23 pp.

López García, J. 2003. Reportes técnicos de los mapas de coberturas forestales 2001-2003, 2003-2005, 2005-2006. Informes para el Fondo Monarca. WWF-FMCN, México D. F.

López García, J. 2006. Análisis de Cambio de la Cobertura Forestal en la Reserva de la Biosfera Mariposa Monarca (2005–2006). Reporte al Fondo Monarca, México, D. F.

Ramirez, M. I., J. Azcárate, and L. Luna. 2003. Effects of human activities on monarch butterfly habitat in protected mountain forest, Mexico. *The Forestry Chronicle* 79(2):242-246.

Ramirez, M. I. y R. Zubieta. 2005. Análisis regional y comparación metodológica del cambio en la cubierta forestal en la Región Mariposa Monarca. Informe Final para WWF.

Rendón E., J. Pérez, A. Ibarra y C. Galindo-Leal (Editores). 2005. Memorias del Primer Foro Regional Mariposa Monarca, 2004. México, D. F. 102 pp.

Rendón E., A. Valera, G. Ramirez, J. Pérez, y C. Galindo-Leal (Editores). 2006. Memorias del Segundo Foro Regional Mariposa Monarca, 2005. México D. F. 48 pp.

Reyes, J. A., e I. Contreras-Franco. 2005. Uso de los Recursos Entregados por el Fondo Monarca y su Impacto en Labores de Vigilancia Forestal y Beneficio Colectivo. Reporte WWF. 30 pp.

CONANP. 2001. Programa de Manejo de la Reserva de la Biosfera Mariposa Monarca. 138 pp.

WWF. 2004 "La Tala Ilegal y su Impacto en la Reserva de la Biosfera Mariposa Monarca". Informe de WWF. 37pp.