

AGENCY FOR INTERNATIONAL DEVELOPMENT

AMERICAN EMBASSY

**PASEO DE LA REFORMA No. 305
COL. CUAUHEMOC
06500 MEXICO, D. F.**

**U.S. Mailing Address:
AMEMB Mexico City
P.O. Box 3067
Laredo, TX 78044**

1 of 3

**Ing. Andres Marcelo Sada Zambrano
President, Consejo Directivo
PRONATURA, A.C.
Avenida Nuevo Leon No. 144, Planta Baja
Colonia Hipodromo Condasa
Codigo Postal 06100, Mexico, D.F.**

August 20, 1990.

*Gov-**
SUBJECT: Grant No. 598-0784-~~523~~-0035

Dear Mr. Sada:

Pursuant to the authority contained in the Foreign Assistance Act of 1961, as amended, the Agency for International Development (hereinafter referred to as "AID" or "Grantor") hereby awards Grant Agreement No. 598-0784-523-0035 to PRONATURA Asociacion Mexicana Pro Conservacion de la Naturaleza, A.C., (hereinafter referred to as "PRONATURA" or "Grantee") for the sum of \$133,000.00 U.S. (One Hundred Thirty Three Thousand U.S. dollars). This support is provided under the Mexico component of AID's Global Climate Change Project (598-0784).

This grant agreement supports the implementation of the Calakmul Biosphere Reserve Management Project by the Peninsula de Yucatan Chapter of PRONATURA, as described in the "Schedule" of this grant and in Attachment II, entitled "Proposal for Multi-Institutional Support for Natural Resources Management in the Calakmul Biosphere Reserve, Campeche, Mexico".

This Grant Agreement is effective and obligation is made as of the date of this letter, and shall apply to commitments made by the Grantee in furtherance of program objectives during the period beginning with the effective date and ending August 31, 1993.

This grant is made to the Grantee on condition that funding is used in accordance with the terms and conditions set forth in Attachment I, entitled the "Schedule", Attachment II, entitled "Program Description", and Attachment III, entitled "Standard Provisions", which have been agreed to by your organization.

TELEFONO: 211-00-42 EXTS. 3450/3451/3452/3453/3457

TELEX Nos: 01773091 & 01775685 AEMXME

TELEFAX No.: (905) 511-9980

AGENCY FOR INTERNATIONAL DEVELOPMENT

AMERICAN EMBASSY

**PASEO DE LA REFORMA No. 305
COL. CUAUHEMOC
06500 MEXICO, D. F.**

**U.S. Mailing Address:
AMEMB Mexico City
P.O. Box 9067
Laredo, TX 78044**

2 of 3

Subject to the availability of funds to AID for this purpose and the mutual agreement of the parties to proceed at the time of such availability, AID's total contribution to the project will be provided in increments not to exceed a total of Two Hundred Ninety Thousand United States Dollars (\$290,000.00) as described in the Schedule. Total AID contribution for FY 1990 will be One Hundred Thirty Three Thousand United States Dollars (\$133,000.00). As noted above, subsequent increments will be subject to the availability of AID funds for this purpose and the mutual agreement of the parties to proceed at the time of such availability.

Please sign the original and three (3) copies of this letter to acknowledge your agreement with and receipt of the grant, and return the original and two (2) copies to the undersigned AID office, Room 212, U.S. Embassy, Mexico City.

Sincerely,


Gerald Bowers
AID/Mexico

Representative
Mexico D.F.

U.S. Embassy,

ACCEPTED:

PRONATURA A.C., Mexico, D.F.

By: _____


Ing. Andres Marcelo Sada Zambrano

Title: _____

President, Board of Directors

Date: _____

Agosto 27, 1990

TELEFONO: 211-00-42 EXTS. 3450/3451/3452/3453/3457

TELEX Nos: 01773091 & 01775685 AEMXME

TELEFAX No.: (905) 511-9980

25

**AGENCY FOR INTERNATIONAL DEVELOPMENT
AMERICAN EMBASSY**

**PASEO DE LA REFORMA No. 305
COL. CUAUHEMOC
06500 MEXICO, D. F.**

**U.S. Mailing Address:
AMEMB Mexico City
P.O. Box 2087
Laredo, TX 78044**

3 of 3

Fiscal Data:

**AMOUNT: \$133,000.
BUDGET ALLOWANCE: LDNA90-25523-KG12
APPROPRIATION: 72-1101021
PROJECT NUMBER: 598-0784.23-523-0035**

Attachments:

- I. Schedule**
- II. Program Description**
- III. Standard Provisions**
- IV. Grant Proposal by PRONATURA Yucatan, A.C.**

**TELEFONO: 211-00-42 EXTS. 3450/3451/3452/3453/3457
TELEX Nos: 01773091 & 01775665 AEMXME
TELEFAX No.: (905) 511-9980**

ATTACHMENT I

SCHEDULE

A. The purpose of this Grant is to provide support for the PRONATURA A.C., Yucatan Chapter "Proposal for Multi-Institutional Support for Natural Resources Management in the Calakmul Biosphere Reserve, Campeche, Mexico", as more specifically described in Attachment II of this Grant entitled, "Program Description" and the attached PRONATURA grant proposal (Attachment IV.).

B. The effective date of this Grant is August 28, 1990. The expiration date of this Grant is August 31, 1993.

C. Amount of Grant and Payment

1. AID hereby obligates the amount of \$133,000.00 US for purposes of this grant. This is the initial obligation and additional funding is expected to be added to the Grant as it becomes available.

2. Payment shall be made to the Grantee in accordance with procedures set forth in Attachment III -Mandatory Standard Provisions for Non-U.S. Nongovernmental Grantees, entitled Payment-Periodic Advance.

D. Financial Plan

The following is the Grant Budget for FY 1990. Revisions to this budget shall be made annually and in accordance with Standard Provisions of the Grant, entitled "Revision of Grant Budget". More detailed estimates of expenditures for each of these activities/line items are provided in the grant proposal.

Baseline Studies for the Reserve

1. Data Base Development	\$ 8,240.
2. Botanical Studies	9,850.
3. Avian Studies	14,850.
4. Mammalian Studies	15,000.
5. Subsistence Hunting	6,000.
Buffer Zone Management	
6. Socio-Economic Studies	6,000.
7. Community Outreach	25,000.
8. Forest Management Studies	2,000.
9. Honey Production	13,900.
10. Ecotourism	4,000.
11. Administration/Institutional Support	28,160.

TOTAL \$ 133,000

4'

E. Reporting and Evaluating

1. The Grantee shall submit fiscal and technical reports to AID/Mexico on a quarterly basis. The Grantee shall adhere to the specifications and timetables established by AID for Financial reporting requirements. Reports should be addressed to:

AID/Mexico
Paseo de la Reforma 305
Colonia Cuauhtemoc
06500 Mexico, D.F.

2. An internal mid-term financial review and technical evaluation will be carried out by qualified persons representing PRONATURA Yucutan. The results of these evaluations, which may be carried out jointly with other donor organizations (such as World Wildlife Fund/ US) collaborating with PRONATURA Yucatan in Calakmul, will be shared with AID/M.

3. AID/M may opt to assess the project's significance, effectiveness and performance by means of a final external audit and technical evaluation. These factors will need to be assessed prior to consideration of a continuation proposal. If these external evaluations are required, the necessary funding will be provided via future increments to the grant.

Attachment II

PROGRAM DESCRIPTION**Multi-Institutional Support for
Natural Resources Management in the Calakmul
Biosphere Reserve, Campeche, Mexico****PRONATURA, A.C.****To be Implemented by: PRONATURA Peninsula de Yucatan, A.C.****598-0784-523-0035**

Since 1981 the national office of PRONATURA A.C., headquartered in Mexico City, has been active in conservation and the protection of biological diversity in Mexico. In 1988 the PRONATURA Yucatan Chapter was established to promote and coordinate conservation efforts on the Yucatan Peninsula and to involve more directly its local citizens in this work.

One of PRONATURA Yucatan's principal projects has focused on promoting the rational planning and management of the Calakmul Biosphere Reserve in southern Campeche. This Reserve is of great national and international importance because of the large (1,786,990 acre) expanse of tropical forests and unique biological and archaeological diversity protected within its boundaries. Furthermore, Calakmul is contiguous with protected natural areas in Belize and Guatemala, which together constitute one of the largest (5 million acres) and richest tropical forest complexes in the Americas. Because of its size and state of preservation, the wise management of this trinational natural area takes on global and hemispheric significance, including the buffering against global warming.

The approach being used by PRONATURA Yucatan integrates both conservation and development disciplines and facilitates the participation of numerous public and private institutions. The proposed initiative will focus on inventory and baseline studies, community outreach targeted at communities in and around the Reserve, protection of core areas, the introduction of economic alternatives, and promotion of the Reserve on the regional, national and international level to access financial and technical support.

To date PRONATURA Yucatan has experienced extraordinary success in the development of a multi-institutional and integrated program. Effective collaboration with SEDUE, (the Mexican Secretariat of Urban Development and Ecology), and a host of other Mexican and international organizations, has allowed much progress to be made toward the establishment of a master/management plan and the consolidation of local institutional capabilities for the conservation and development of the Reserve.

6

PRONATURA Yucatan proposes to consolidate its program under two components, each composed of a series of activities: inventory and baseline studies (which will contribute to the development of the master and operational plans for the Reserve), and buffer zone management. The inventory and baseline studies component includes database development, and botanical and zoological investigations. The buffer zone management component includes socio-economic studies and the development of a community conservation/outreach program. As part of this outreach program PRONATURA Yucatan will seek to determine economic feasibility of promising development activities and will promote community acceptance of forest management as well as honey and ecotourism microenterprises. The grant also provides financial support for project administration by PRONATURA Yucatan and limited institutional strengthening.

Detailed descriptions of the activities, methodologies and expected outputs of each of these components are provided as part of the grant proposal (Attachment IV.). These details will be used as a basis for project monitoring and evaluation.

BUDGET:

The amount of funding provided by AID for the project in FY 1990 is \$133,000.00 U.S. dollars. A summary budget is provided below, indicating the amounts allocated for each of the line items listed below. The breakdowns of estimated costs for each of these line items are presented in the detailed grant proposal and will be used as a basis for accounting and financial control.

Baseline Studies for the Reserve	
1. Data Base Development	\$ 8,240.
2. Botanical Studies	9,850.
3. Avian Studies	14,850.
4. Mammalian Studies	15,000.
5. Subsistence Hunting	6,000.
Buffer Zone Management	
6. Socio-Economic Studies	6,000.
7. Community Outreach	25,000.
8. Forest Management Studies	2,000.
9. Honey Production	13,900.
10. Ecotourism	4,000.
11. Administration/Institutional Support	28,160.
TOTAL	\$ 133,000

FZ



FAX 270739

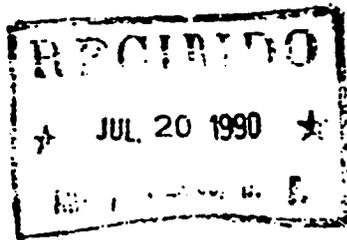
TEL: 25-10-04

Asociación mexicana
proconservación de la naturaleza ac.
CAPITULO YUCATAN

CALLE 13 No. 203-A, GARCIA GINERES, MERIDA, YUC., MEX.

16 July 1990

Mr. Gerry Bowers
USAID Representative
U.S Embassy
Reforma 305, Mexico DF 06500



Dear Gerry,

I am enclosing the PRONATURA A.C. proposal for the Calakmul Biosphere Reserve. The proposal, which Frank Zadroga and I worked on during the Encuentro Maya in May 1990, incorporates projects which directly affect the buffer zones as well as the Reserve itself. The base line studies are selective and represent the fauna and flora of most concern to the conservation community as well as future use to the settlements in or around the Reserve. All projects are directed at the preservation of the extensive tropical forest which should help mitigate global warming effects on the North American Continent.

Some of these projects are partially supported by WWF and work will commence this month. However, the funds are very limited for the ambitious objectives of the projects; AID support will guarantee that these projects are carried out in the most effective manner.

Probably the most urgently needed activity is community outreach. During a recent visit to Merida of Dr. Mario Ramos, he mentioned to me that we could solicit an additional \$5,000. for an environment educational program. That would be used for the purchase of audiovisual material which the PRONATURA team is ready to use in communities near or in the Reserve. We do need a vehicle of some sort and you will see that I have requested \$6,000. for a second hand pickup for this purpose. Wildlife Conservation International through the good offices of Dr. Archie Carr, has offered us \$18,000. for the purchase of a 4X4 vehicle for use in the Reserve, but that will not be available for the community outreach program.

We are working closely with Dr. Gonzalo Solis, Director for the Peninsula of Yucatan for the National Indigenous Institute (INI). The idea of sharing a modest locale in Xpuhil with INI would require an agreement between PRONATURA and INI, that presents no problem. We have just started working together on another project in Punta Laguna, Q.R. with a small Maya community there.

9



CONSEJO NACIONAL
DE INVESTIGACIONES CIENTÍFICAS

Please excuse the delay in submitting this project. It has required a great deal of coordination among many institutions, but I feel we have built a good team. PRONATURA Perinsula de Yucatan will take on the responsibility of the coordination.

If you have any questions about any facet of the proposal, please call or fax us. Or if you feel necessary I could come to Mexico City.

I want to emphasize the importance of the projects proposed. Because they will be coordinated by PRONATURA, we can economize in the field studies by making them joint efforts. All members of the team can help with the community outreach program, as well as the SEDUE representatives, Campeche with whom we work very closely.

I very much look forward to hearing from you.

Warmest personal regards,

Joann M. Andrews
Joann M. Andrews
President

cc: Ing. Lorenzo Sada
Dr. Juan Carlos Seijo

**PROPOSAL FOR MULTI-INSTITUTIONAL SUPPORT FOR
NATURAL RESOURCE MANAGEMENT IN THE
CAKALMUL BIOSPHERE RESERVE, CAMPECHE, MEXICO**

PRESENTED BY:

**PRONATURA A.C.
PENINSULA DE YUCATAN CHAPTER
JOANN M. ANDREWS, PRESIDENT
Calle 13 #203-A, Garcia Gineres
Merida, Yucatan, Mexico
TEL: 25-10-04 FAX 27-07-39**

**PROPOSAL: MULTI-INSTITUTIONAL SUPPORT FOR NATURAL RESOURCE
MANAGEMENT IN THE CALAKMUL BIOSPHERE RESERVE, CAMPECHE, MEXICO**

TABLE OF CONTENTS

ABSTRACT	1
I. Background information on and capability of PRONATURA PENINSULA DE YUCATAN A.C.	2
II. Significance of area	4
III. Problems to be solved or mitigated	5
IV. Objectives of proposal	7
V. Actions needed	8
VI. Proposed activities	9
1. Baseline studies of the Reserve	
1.1 Database	9
1.2 Botanical studies	9
1.3 Zoological studies	10
2. Buffer zone management	
2.1 Socio-economic studies	11
2.2 Community conservation/outreach	11
2.2.1 Community outreach program in the buffer zones	11
2.2.2 Forestry Pilot Program	12
2.2.3 Microenterprise development	13
→ 2.2.3.1 Honey production and marketing	13
2.2.3.2 Ecotourism	13
VII. Schedule of Activities	14
VIII. Administration	14
IX. Budget	14
X. Other support	16
XI. Evaluation	16
XII. Reporting	17
XIII. References	17

**PROPOSAL: MULTI-INSTITUTIONAL SUPPORT FOR NATURAL RESOURCE
MANAGEMENT IN THE CALAKMUL BIOSPHERE RESERVE, CAMPECHE, MEXICO**

APPENDICES:

**APPENDIX I. PRONATURA PENINSULA DE YUCATAN A.C. ASAMBLEA DE
ASOCIADOS 31 March 1990**

APPENDIX II. RESULTADOS TALLER SOBRE CALAKMUL

**APPENDIX III. DIRECTORY OF PARTICIPANTS IN INFORMAL MEETING
ESTABLISHING COMMITTEE "GREATER PETEN" (Belize,
Guatemala, Mexico)**

**APPENDIX IV. MAP INDICATING PROTECTED AREAS IN MESOAMERICAN
FORESTED AREA**

APPENDIX V. 1.1 Database

1.2 Botanical studies

1.3.1 Ornithological studies

1.3.2 Identification mammals

1.3.3 Subsistence hunting

2.1 Socio-economic studies

2.2.1 Community outreach

2.2.2 Management of Forestry Resources

2.2.3.1 Microenterprise development-Honey

2.2.3.2 Ecotourism in Buffer zone

3.0 Administration

12
A

TITLE: PROPOSAL FOR MULTI-INSTITUTIONAL SUPPORT FOR NATURAL RESOURCE MANAGEMENT IN THE CALAKMUL BIOSPHERE RESERVE, CAMPECHE, MEXICO

APPLICANT: PRONATURA, A.C.

**CONTACT: Ing. Lorenzo Sada
Director, PRONATURA A.C.
Nuevo Leon 144 Col. Hipodromo Condesa
06100 México, D.F.
Tel. 286 96 42 FAX: 286 94 80**

**Joann M. Andrews
President, PRONATURA PENINSULA DE YUCATAN A.C.
Calle 13 #203-A, Garcia Gineres,
Mérida, Yucatán, México
Tel. 25 10 04 FAX: 27 07 39**

ABSTRACT: Stretching like a wide belt across southeastern Mexico from Chiapas to Quintana Roo, south into the Department of Peten, Guatemala and east to Belize's northern zone is the largest stand of tropical forest in Mesoamerica. Its significance as a haven for neotropical species and as a vast buffer against global climatic change is already recognized. Less than one year ago, the Mexican Government decreed a large part of it (1,786,000 acres) as the Calakmul Biosphere Reserve. Largely because of the inaccessibility and the lack of sufficient funds for proper study and management, the Reserve is in danger. Illegal logging, illicit hunting, and squatter invasion of national territory threaten its natural resources.

PRONATURA PENINSULA DE YUCATAN A.C., in collaboration with the Ministry of Urban Development and Ecology (SEDUE), proposes a multi-institutional and integrated approach for the management of the Calakmul Biosphere Reserve. This will be initiated through a series of basic cartographic and biological studies, a community outreach program targeted at communities in and around the Reserve, protection of core areas, the introduction of economic alternatives, and promotion of the Reserve on the regional, national and international level to access technical and financial support.

**I. BACKGROUND INFORMATION ON AND CAPABILITY OF
PRONATURA PENINSULA DE YUCATAN A.C.**

PRONATURA A.C. was established in 1981 as a non-profit, tax-exempt organization registered with the government of Mexico and with the AID/Mexico. With Headquarters in Mexico City, the organization recently has focused on the development of state chapters to implement its main objective: the conservation of biological diversity in Mexico.

In 1985, PRONATURA nominated Joann Andrews as its representative on the Yucatan Peninsula. In 1988 the PRONATURA Yucatan Chapter was established to coordinate regional conservation activities on the Peninsula and to involve more directly the local citizens in its programs. In March 1990 a regional civil association was formed, PRONATURA Peninsula de Yucatan A.C., linked to the Mexico City Headquarters but responding more directly to the needs of the Peninsula and the aims of its own Board of Directors.

Since its inception, the Yucatan Chapter has channeled most of its energies toward habitat protection, species conservation and environmental education. Its projects, which number 16 at present, span the Peninsula of Yucatan and receive support from Peninsular businesses and private citizens; American governmental agencies like Fish and Wildlife Service (USFWS), and USAID Mexico; American conservation groups like World Wildlife Fund (WWF), Wildlife Conservation International (WCI), The Nature Conservancy (TNC), the Center for the Study of Tropical Birds, and the National Audubon Society. In its efforts to protect species and habitats and in its expanding environment educational programs, it works very closely with both Mexican federal and state government agencies. (See Appendix 1 for summary of its projects and organization as of 31 March 1990.)

The rich archaeological and biological zones in southern Campeche have received special attention over the past 20 years, first from the President of PRONATURA Peninsula de Yucatan and later from the organization as well. Mrs. Andrews worked in the area from 1968 to 1972 as head of logistical support for the Tulane University Middle American Research Institute's archaeological expedition in Becan and Chicana, Campeche. (Andrews, 1976). At that time she started a continuing study of the Orchidaceae on the Peninsula which has so far resulted in the identification of over 50 species of orchids in the southern Campeche (Andrews and Gutierrez, 1988).

Before the decree establishing the Calakmul Biosphere Reserve in May 1989, PRONATURA sponsored five trips into the area, resulting in invaluable data on the flora and fauna of Calakmul. In April 1989, World Wildlife Foundation-US awarded PRONATURA a grant of \$24,500. to initiate the preliminary studies for a management plan for the Reserve. This plan is being developed for the Ministry of Urban Development and Ecology (SEDUE), in coordination with

ECOSFERA A.C., universities (University of Yucatan and University of Southeast-Campeche), and with scientific institutions (Center for Advanced Studies -CINVESTAV and Center for Advanced Investigation and Studies in Anthropology-CIESAS). An additional grant (\$10,000.) has been received from The Nature Conservancy (TNC) to mark the boundaries in the southeastern zone of the Reserve, where there are settlements in and close to the Reserve. PRONATURA has a very active partnership relationship with TNC, as indicated by the Calakmul Biosphere Reserve's being designated by TNC as one of its "Parks in Peril". Friends of PRONATURA, its U.S. affiliate, and the National Audubon Society have supported logistical expenses and given equipment. Important support for threatened species studies has been received from Wildlife Conservation International and the Center for the Study of Tropical Birds. Lighthawk, Wings of Conservation have provided the project with aerial photography. These studies have been undertaken during this past year and represent major contributions to our knowledge of this vast, largely inaccessible area.

Convinced of the Reserve's importance and comfortable in their relationship with PRONATURA, all of the biologists and other researchers now working in the Calakmul Biosphere Reserve under the PRONATURA umbrella want to continue their investigations, if funds can be secured.

The approach which PRONATURA Peninsula de Yucatan has begun this year and wishes to continue during the challenging next few years is an integration of efforts to produce sound management of the Reserve. Toward this end, during the 1989-90 period, PRONATURA has coordinated the studies of seven different institutions supporting projects in the area, as well as sponsored various workshops designed to encourage an integrated approach. In late May 1990 PRONATURA organized a workshop with 17 of the government representatives and investigators working in the area for the purpose of preparing an operative plan for presentation to the appropriate government ministry (SEDUE). (Appendix II) Later that same month, together with Maya Sustainability Project (University of California-Riverside) and the State of Yucatan's Ministry of Ecology, PRONATURA organized an international workshop on Protected Areas in the Maya Zone, which drew together many of the investigators and planners in the contiguous areas of Calakmul Biosphere Reserve, Mexico, the Reserva de la Biósfera Maya, Guatemala and Belize's Programme for Belize (Appendix III). With AID/Mexico support, PRONATURA organized the participation of the Calakmul Reserve Manager, three park guards, together with the PRONATURA Technical Director, in a workshop in the Reserva de la Biósfera Maya, Guatemala to discuss common problems and seek solutions. In addition to the profitable interchange of ideas that results from such meetings, the intangible but significant fostering of improved international relations is an important byproduct.

II. SIGNIFICANCE OF AREA:

The Calakmul Biosphere Reserve represents an opportunity to save one of the last remaining large expanses of tropical forest in Mesoamerica. The 1,786,990 acres included in the Reserve extend over a large part of the state of Campeche, southward to the Guatemala border. The Reserve presents biological richness similar to that found in the Peten of Guatemala and northern Belize. In the past two years, all three countries, Mexico, Guatemala and Belize have put into protected area status contiguous forests which altogether represent over 5,000,000 acres, one of the largest and richest tropical forest complexes in the Americas. The creation of these three reserves, in addition to offering a unique opportunity to help safeguard against global warming, to protect rare and endangered neotropical species uncommon in most of the world and to save a vast forest area, can help forge a common bond among these nations.

The Calakmul Biosphere Reserve takes on an added significance when put in a bigger picture. There remain large forested areas in southeastern Mexico, including the Selva Lacandona in Chiapas, sections of southwestern Campeche, and much of southern Quintana Roo. Considered along with the Peten forest of Guatemala and Belize, these areas form one of the largest extensions of tropical forest on the American continent. (Appendix IV map). As Ignacio March commented in his report on the Expedition to the Lacandon Forest in Chiapas, ECOSFERA, March 1990, this vast stretch of forest which cuts across southern Mexico, northern Guatemala and Belize, most likely plays an important role in world climatic stability, more specifically in the northern Hemisphere. Because of its size and state of preservation, its conservation takes on global and hemispheric significance.

The Calakmul Biosphere Reserve contains a wide variety of tropical vegetation, the most important of which are the extensive forested areas of semi-evergreen tropical woods. From north to south, it extends over 153 km. with precipitation increasing by 100 % as one travels at the border with Guatemala. Because of the unusual geological characteristics of the region, most water is found underground or in unique limestone depressions, called aguadas and inundated low lying areas called akalchés. These surface waters serve as invaluable water resources for the wildlife of the area and migratory species, the significance of which is only partially known. Floristically, their importance was first noted by Lundell in his study (Lundell, 1934).

In the region are found a variety of endemic species both floral and faunal. The diversity of the plants and animals, thus studied, is impressive (Espejel, Correa, Lira, y Flores, in press). There are, for example, 10 species of mammals in the Reserve considered in danger of extinction, including 5 of the 6 known felines found in Mexico. Over 300 species of birds have been identified in the

zone so far. At least 30 birds of prey, including the king vulture and the ornate hawk eagle, as well as the crested guan, great curassow, the endemic ocellated turkey, toucans, macaws and 8 species of parrots reside in the Reserve. The heavy seasonal rains and rich variety of arboreal vegetation present favorable conditions for numerous species of epiphytic ferns, cacti, bromeliads and orchids, including important colonies of the highly valued, endemic orchid, Rhyncholelia digbyana.

In addition to its distinctive biological diversity, the Reserve also includes numerous Maya archaeological ruins including the impressive site of Calakmul. Archaeological investigations under the direction of Dr. William Folan have demonstrated the intensive use of the area by a large precolumbian population and their establishment of an elaborate hydraulic system.

III. PROBLEMS TO BE SOLVED OR MITIGATED:

Some of the major resource conservation problems identified in the Calakmul Biosphere Reserve are the following:

1. Lack of sufficient geographic, biological and socio-economic information necessary for the proper management of the Reserve.

Because of the vastness of the Reserve, its inaccessibility and lack of sufficient financial support for investigation, much basic information on the environmental significance of the Reserve remains to be gathered. Although geographic and cartographic studies are now being undertaken, much information is still needed. Lack of roads and inundation during the six month rainy season make investigation very difficult and expensive. As a result, faunal and floral compositions in large areas of the Reserve are virtually unknown. Nevertheless the minimal presence of humans during almost half of the year in many areas of the Reserve has fostered its faunal and floral richness and diversity.

Even though it is estimated that there are no more than 6,000 people in and around the Reserve, their nature and distribution have not been thoroughly studied. We know that their presence has had a serious impact, mainly because their subsistence puts pressure on the Reserve. It is difficult to convince these settlers of the importance of conservation when they lack most of the basic community services and their own resources are marginal. Many of the settlers come from other parts of Mexico and have had no experience with managing the dry tropical forest as the Maya have had in the past. Areas not adaptable to slash and burn agriculture have undergone dramatic changes, in many cases becoming sterile land. Quite a few settlers who have come to try their luck, when their hopes fade, move on, leaving behind deserted fields and abandoned homes. The role these settlers play in the ecology of the area is largely unknown. The impact of the yearly intrusions into the forest of the hunters and chicle gatherers (chicleros) has

not been adequately studied.

2. Lack of boundary markers for most of the reserve. Because of the absence of natural boundaries, like rivers or mountain ranges, large sections of the Reserve are unmarked. In some areas the core zones have populations near or within them, a situation which is causing uncertainty and resentment on the part of the settlers.

3. Lack of a significant community outreach program targeted at the settlers within the reserve and in areas nearby. The Reserve cannot function successfully as a Biosphere Reserve without the commitment by the local inhabitants. Due to lack of funds little has been done by the Mexican Government to foster interest. Rather there is a growing uneasiness about the Reserve, especially as rumor substitutes for fact.

4. Lack of basic community services. Health care, family planning services, veterinary assistance, and educational centers are all very limited. The small settlements have an atmosphere of frontier life, many of them out of touch with the rest of the world during the protracted rainy season.

5. Lack of long-range planning and coordination among the various users, government agencies and investigators. In order to avoid the improper use of the Reserve's resources and to study the possibility of viable economic alternatives, a well-coordinated approach is necessary.

5.1. Unplanned and misdirected agricultural efforts in the Reserve. Many of these efforts have resulted in stretches of exhausted and abandoned pasture-lands and corn fields with low productivity. The area, which suffers from fragile soils and highly erratic rainfall, has just experienced a three year drought of such severity that many settlers have left. The soil composition, where the land has been cleared and used for several years, is such that the natural rejuvenation of the forest (even secondary growth species) is very limited.

5.2. Lack of potable water for human settlement in the area. Not only is the water table at such a depth (frequently 180-200 ms) as to make the perforation of wells exorbitant in cost but often the water found is so high in sulphur and other minerals as to be unacceptable for consumption. This is true as well of the several springs found in the Reserve. Water resources are very scarce within the Reserve and severely limit any expansion of the cattle industry. In spite of these constraints, plans abound to increase cattle raising, encourage settlers to move into the area and initiate other agricultural schemes without the necessary studies.

5.3. Continued overexploitation of the hard and precious woods in the Reserve as well as the lack of agroforestry practices. This is causing the rapid depletion of the lumber products of the

Reserve. Little thought has been given to exploiting the forest in a sustainable manner. In addition there is a substantial illegal trade in mahogany and Spanish cedar from the Peten of Guatemala into Mexico.

6. Lack of financial resources on the part of the Mexican Government to provide for the proper management of the Reserve.

There are not enough guards, guardhouses, vehicles, radio communication and other equipment needed for protection of the Reserve. No training programs have been established.

7. Lack of sufficient exchange of information, and collaboration with the neighboring reserves in Guatemala and Belize. The May 1990 Encuentro Internacional sobre Las Areas Protegidas en la Zona Maya, sponsored by PRONATURA and Sostenibilidad Maya, is a first attempt to bring investigators together from the three countries involved. At this meeting, a committee was established to facilitate the interchange of information and foster a regional approach to the area's critical needs.

IV. OBJECTIVES OF PROPOSAL:

As a means of solving or alleviating the problems mentioned above, the overall objective of the proposal can be defined as follows:

- To produce with the citizens of the Calakmul Reserve and its area of influence, the conditions for protection of the core zone and sustained exploitation of natural resources in the buffer/multiple use zone in a manner that minimizes damage to the environment, protects bio-diversity and provides the means for equitable and sustainable economic growth.

More specifically, the principal objectives of this proposal are: to support some of the most urgently needed studies for the management of the Reserve, to facilitate the coordination of the various institutions' efforts in the Reserve and to stimulate additional support on the part of national and international organizations.

PRONATURA received a grant from World Wildlife Fund (WWF-US) in 1989 to start the preliminary studies of the Calakmul Reserve needed for development of a management plan. This Plan is to be presented for consideration to SEDUE. At the end of the first year's grant, 30 June 1990, PRONATURA will submit to World Wildlife Fund-US an operative plan for the Reserve. It will be based on the information collected by the investigators during the year for presentation to SEDUE for its use.

The elaboration of an effective Management Plan requires good information and a solid understanding of the state of the Reserve. Currently our knowledge of the Reserve is woefully lacking. Only as a result of intensive surveys can we do a good job of zoning the

Reserve, e.g., the protection of areas richest in biodiversity, those regions with agricultural potential, those populated areas most suitable for microenterprises. We need to identify economic alternatives for local inhabitants which would provide them with increased employment and income. The economic and social data needed for these programs would also be very useful for community outreach programs.

For that reason, we are proposing a multi-institutional approach for the protection of the area, coordinated by Pronatura Peninsula de Yucatan. Not one of the above cited objectives alone can resolve the major problems in the Reserve. However, using a team approach involving coordination of the local populace, scientific and university resources, governmental agencies, national and international conservation groups, and interested members of the private sector, we can provide positive steps towards the proper management of the Reserve.

V. ACTIONS NEEDED:

Listed below are activities considered priorities by the group of scientists working with PRONATURA on the Calakmul projects as well as the responsible SEDUE officials. A more detailed description of the activities requiring funding follows.

1. Baseline studies of the Reserve:

1.1 Database

1.2 Botanical studies

1.3 Zoological studies

1.3.1 Identifications of mammals

1.3.2 Subsistence hunting

2. Buffer zone management:

2.1 Socio-economic studies

2.2 Community conservation/outreach

2.2.1 Community outreach program

2.2.2 Forest Management Program including study of exploitation of forest byproducts

2.2.3 Microenterprise development

2.2.3.1 Honey

2.2.3.2 Ecotourism

vi: PROPOSED ACTIVITIES:

A brief description is given below of each activity proposed. Detailed descriptions of these projects, including methods to be used and detailed budgets are attached as appendices keyed to the above outline. Some of these projects require less than a year for completion; others as much as three years. The overall budget for the proposal is presented at the end of this proposal, as well as a narrative description of the financial, administrative and logistical support received by other institutions.

The activities described below are diverse and contemplate different types of approaches. Nevertheless, almost all of the investigators have worked together during the past year in the Reserve. PRONATURA Peninsula de Yucatan will coordinate their activities, so that their expeditions coincides as much as possible, field expenses and equipment are shared, and data acquired are available to all.

1. Baseline studies of the Reserve:

1.1 Database: Preparation of detailed cartographic and geographic material creating a GIS-based data framework, and development of an integrated data base system by which all investigators contribute to it. Cartographic and geographic studies and field assessments will emphasize the location of the areas with the richest biodiversity and least human intrusion and will help define the proper zonification of the Reserve, based on an analysis of the status of the forested areas, settlement patterns, etc. The Presidential decree establishing the Reserve delineates the core and buffer zones. In certain areas, however, the core zones are populated. If these zones are to be moved or the settlements relocated, more detailed cartographic/geographic-based information is necessary.

For the detailed geographic analysis needed, additional aerial photography and satellite imagery with the necessary ground truthing are required. Refined identification of the vegetation zones, location of the water resources and geological phenomena are other priorities to be undertaken. Efforts to share database information with the investigators working in the Department of Peten, Guatemala and with Belize organizations have been initiated and will continue to be encouraged through this project.

(See Appendix 1.1)

1.2 Botanical studies: In coordination with the cartographic studies, the major vegetation zones are to be determined and those zones of special interest because of their endemic, endangered or useful species will be noted. Special attention will be placed on species of plants and trees of actual or potential use. Selected areas will be studied to provide baseline data on the populations of endemic and threatened species.

Other studies will include an intensive study of the flora in and around the geological phenomenon of aguadas (seasonal rain water ponds) and akalches (inundated limestone depressions), already known as botanically noteworthy (Lundell, 1934). Because of their importance as water sources for the wildlife in the Reserve as well as their unique ecosystems, special attention will be given to them in both the northern and southern parts of the Reserve. The akalches which harbor at eye level over 35 species of orchids, at least 7 species of bromeliads and epiphytic ferns presents a unique opportunity to determine the pollinators of the several orchids (unknown at present) under very favorable circumstances.

Vegetation zones, including severely damaged areas, will be investigated to determine their importance to the reserve as well as mark the successive vegetal patterns in the damaged sections. Assessment of the impact on the standing forest of lumber extraction and recommendations for its recovery and eventual sustainability.

The identification of forest products of actual and potential human use (e.g., dyes, ornamental plants, nectar bearing plants and trees for increased honey production) will be made. In addition, all investigators will be requested to provide information on the importance of the local flora to the animals in the Reserve. A study of the hard and precious woods will be undertaken in collaboration with the lumber producers in the area, with a view of encouraging sustainable forestry within the Reserve. (Appendix 1.2).

1.3 Zoological studies: Emphasis on indicator species will be placed on certain species of animals: among the birds, raptors, understory species and migrants, mammals (felines) and reptiles (crocodiles); given the importance of the mammals in the Reserve, an inventory of the mammals with population estimates and preliminary migratory patterns will be made, as well as a study of the impact of subsistence hunting on fauna in the Reserve; the importance of aguadas and akalches for the fauna of the Reserve.

The ornithological studies undertaken under PRONATURA guidance in 1989-90 have demonstrated the avian richness of the Reserve. Over 300 species have been identified, including 70 migrants. The last study (March-April 1990) demonstrated the importance of the Reserve's extension and the varied vegetation zones. In two observation posts near the Guatemalan border, 70 kms. apart, over 50 species of birds were sighted in one zone and not in the other. One important study will be a follow up on these observations, as we try to determine what ecosystems within the Reserve are necessary for which species. Raptors and understory birds as well as migrants have been selected as indicator species. Inventory of them in certain designated areas of the Reserve can serve in future years as reference points. (Appendix 1.3.1) .

Again as a result of this season's study, we realize that within the Reserve and most certainly extending into Guatemala's protected areas, major faunal migrations take place during the rainy season. For days, entire tracts of land turn into lakes. Without a much greater knowledge of the movements of the terrestrial fauna during the dry season when they search for water and the rainy season when they search for high dry land, we cannot intelligently recommend the appropriate use of the core and buffer zones. Many of the mammals in the Reserve are on the threatened species list. To further their protection, a basic inventory needs to be made, with an estimate of their population and migratory patterns. Key species need special attention as indicator species. Predator-prey relationships need to be established, during the dry and wet seasons. (Appendix 1.3.2).

Human predation is a serious threat to wildlife, but its constancy and frequency are not known. Intelligent management of the Reserve's wildlife depends on the knowledge of the extent of subsistence hunting and its proper control. Its proper control can only be effective if it has been fashioned with community participation and with their approval. (Appendix 1.3.3).

2. Buffer zone management:

2.1 Socio-economic studies: The project will involve the continuation of the collection of socio-economic data: 1) determine the proper zonification of the core and buffer zones; 2) determine the present use by the communities of their natural resources; 3) identify community needs and the pressures these cause the Reserve; 4) identify communities and leaders capable of promoting the proper management of the Reserve; 5) identify communities where microenterprises can be successfully introduced. Of major importance for the sound management of the Reserve will be the reaction of the local inhabitants to their relocation or restraints put on their activities because of their proximity or their actual residence in the core zones. The study will focus on this issue and recommendations will be given for the effective readjustment to the new situation by the settlers. (Appendix 2.1)

2.2 Community conservation/outreach;

2.2.1 Community outreach program in the buffer zones

Although it is estimated that not more than 6,000 inhabitants live in or around the Calakmul Biosphere Reserve, they form a diverse group, composed of native Mayas and many immigrants from other parts of Mexico as well as Guatemala. Living standards are extremely low with social services in many highly inaccessible areas almost non-existent. The scarcity of potable water during the end of the dry season is the single most important limiting factor to additional settlement in the area.

Already conflictive situations are arising because of the creation of the Reserve. For example, chicle exploitation within the Reserve has been suspended; land tenure rights have been challenged; the boundaries of the Reserve are questioned.

Probably the most urgently needed activity proposed under this project is the establishment of a community outreach program, which involves the direct involvement of the inhabitants in and around the Reserve. It would complement programs to be carried out by other institutions to improve basic community services, especially health care and would employ recently graduated veterinaries completing their social service.

The community outreach program (Appendix 2.2.1) focuses on three aspects:

-Program of environmental information and dissemination. Required is equipment for slide shows and pamphlets to be distributed in the various settlements.

-Environment educational program directed at the children in the schools. Proposed is the design of a coloring book about the Reserve by the children as well as a simple catalogue of adult activities reported by the children with discussion about its impact on the Reserve.

-Animal health program. Because of the lack of basic services in the area, a favorable reception can be predicted for volunteers helping the local inhabitants solve one of their many problems. For this reason we are proposing the use of veterinaries completing their social service, as agents to instruct the local inhabitants in the value of the Reserve, and at the same time contribute to the improvement of the daily life.

No community outreach program can avoid the major problem facing the communities near or within the Reserve: the lack of potable water. Although PRONATURA does not intend to involve itself directly in the alleviation of this problem, it does intend to stimulate other capable non-governmental organizations to work with the Mexican Government on this problem by bringing these groups to the area for first hand analysis of the problem. In addition part of the PRONATURA compromise would be to stimulate community service organizations to work in this area.

2.2.2 Forestry Pilot Program:

With the vast expanse of forest still well preserved in the Calakmul Reserve, of immediate concern is the sound management of its forestry resources. Several aspects of forestry management need to be investigated:

1. current lumber production and its impact;
2. potential use of forestry resources, not being utilized at

- present, like xate palm, ornamental plants, ferns;
3. chicle exploitation, its potential value and its impact;
 4. establishment of a forestry pilot project within the Reserve, in cooperation with the ejido of Hopelchen.

(Appendix 2.2.2)

2.2.3 Microenterprise development:

In spite of the many factors limiting the development of microenterprises in the area (lack of potable water, high percentage of transient populations, high percentage of unskilled labor, lack of infrastructure, etc.), two areas offer real potential for the establishment of microenterprises: honey production and marketing and ecotourism.

2.2.3.1 Honey production and marketing

Honey production has been one of the major resources in southern Campeche, due principally to the plentiful year-round nectar-bearing flowers found in the area. Because of the invasion of the African bee and the severe drought in the area over the past three years, a drastic drop in honey production has taken place. The current situation needs to be assessed and if the honey industry can be revived, experts would be brought in to instruct the local bee keepers in the management of their "Africanized" hives. Partial funding for this project would come from an African bee program already established in Mexico.

A feasibility study on the marketability of export quality "Calakmul Reserve honey" for nature specialty shops will be undertaken. The feasibility of using attractive ceramic jars, made at a microenterprise in Campeche will be studied.

An opportunity to protect the local native bee (Meliphona beechi) and reintroduce the traditional Maya manner of collecting honey can be established in the Reserve. The honey famous in the Maya area for its curative properties is especially tasty; its pollen and wax are also used by the Maya. It is proposed that the bee, known to reside in the area, be cultivated by the local settlers and the honey, pollen and honey sold in specialty shops.

(Appendix 2.2.3.1)

2.2.3.2 Ecotourism

Because the area of southern Campeche is one of the richest archaeological zones in the Maya area, a study would be made to explore the possibility of combining visits to the Maya ruins in the area with the opportunity to enjoy its natural resources, including many species of tropical birds, orchids, endemic palms and ferns. The practical aspects of providing adequate facilities as well as an assessment of tourist impact in the area would be

presented. Identification of archaeological sites near or within the Reserve of tourist value will be identified. (Appendix 2.2.3.2)

VII: SCHEDULE OF ACTIVITIES:

Rather than provide a detailed schedule of activities for each project, the following general rules will be observed.

During the rainy season only those investigators who need to enter the highly inaccessible regions will be scheduled to use the four-wheel drive vehicle. For example, year-round observations will be required by the investigators studying faunal migrations. In addition the botanists will also need to collect during every month of the year. On a selected basis the team gathering socioeconomic data will also need to penetrate the isolated settlements during the rainy season in order to observe the quality of life in these villages.

During the rest of the year (November through April), most of the field expeditions will take place and will be coordinated by PRONATURA.

VIII ADMINISTRATION:

The administration of this project will be the responsibility of PRONATURA Peninsula de Yucatan. Its overall direction will be assumed by the President of PRONATURA Peninsula de Yucatan, Joann M. Andrews. A general coordinator, who will reside in Campeche and who will maintain close relationships with the governmental and private institutions active in the Reserve, will be assisted in the day to day operations by biologist Eduardo Galicia with residence in Merida, Yucatan.

Preliminary accounting will be undertaken in the Merida office of PRONATURA. Final accounting and audit will be done by PRONATURA A.C. Headquarters.

IX BUDGET:

This proposal involves many institutions, both private and governmental, which are contributing the services of their office equipment, their personnel and their expertise. This type of support has not been included in the budget.

MULTI-INSTITUTIONAL SUPPORT

CATEGORY & TITLE	CONTRIBUTOR	1990-91	1991-92	1992-93
1.1 Data base	USAID	8240.	8900.	2000.
	WWF	6800.	6000.	-
	PRONATURA	1000.	1000.	1000.
	ECOSFERA	1000.	1000.	1000.
	OTHER	-	10000.	10000.
	SUBTOTAL	17040.	26900.	14000.
1.2 Botanical	USAID	9850.	9850.	9850.
	WWF	6200.	6000.	5000.
	PRONATURA	1000.	1000.	1000.
	UADY-U.CAL	9000.	9000.	9000.
	SUBTOTAL	26050.	25850.	24850.
1.3.1 Avian	USAID	14850.	14500.	12000.
	WWF	7000.	7000.	7000.
	PRONATURA	1500.	1500.	1500.
	SUBTOTAL	23350.	23000.	20500.
1.3.2 Mammals	USAID	15000.	-	-
	PRONATURA	1000.	-	-
	OTHER	10000.	-	-
	SUBTOTAL	26000.	-	-
1.3.3 Hunting	USAID	6000.	-	-
	WWF	6400.	-	-
	PRONATURA	250.	-	-
	ECOSFERA	250.	-	-
	SUBTOTAL	12900.		
2.1 Socioeconomic	USAID	6000.	-	-
	WWF	4000.	-	-
	PRONATURA	700.	-	-
	SUBTOTAL	10700.		
2.2.1 Outreach	USAID	25000.	25000.	22000.
	WWF	5000.	2700.	2700.
	SUBTOTAL	30000.	27700.	24700.

- 21

2.2.2 Forestry	USAID	2000.	-	-
	PRONATURA	200.	-	-
SUBTOTAL		2200.	-	-
2.2.3.1 Honey	USAID	13900.	12900.	-
	SUBTOTAL		13900.	12900.
2.2.3.2 Ecotourism	USAID	4000.	-	-
	SUBTOTAL		4000.	-
3.0 Administration	USAID	27335.	20000.	20000.
	WWF	6000.	6000.	6000.
	PRONATURA	2000.	2000.	2000.
	SUBTOTAL		35335.	28000.
TOTAL		201475.	144350.	112050.
AID PORTION		132775.	91150.	65850.

X OTHER SUPPORT:

In addition to the organizations mentioned above, which are contributing to the project, other foundations and institutions, like Friends of PRONATURA, National Audubon Society, Lighthawk Wings of Conservation, are assisting the project with technical and logistical support. The Nature Conservancy has listed the Calakmul Biosphere Reserve as part of its Parks in Peril Program and expects to continue its support of projects directing involving the management of the Reserve. Currently it is supporting PRONATURA-SEDUE project marking the southeastern border of the Reserve.

All of these projects require close collaboration with government institutions, principal of which is SEDUE, which has specifically approved PRONATURA's projects supported by the WWF and TNC. As a result of conversations with SEDUE, INI and SEP, PRONATURA has secured preliminary approval for its community outreach programs and will work closely with these agencies.

XI EVALUATION:

The internal evaluation of the proposal will follow that used by the PRONATURA WWF-supported project during 1989-90. Two major meetings of all the participants in the project were held in January and May 1990. At those meetings a review of all the information collected to date was prepared, analyses of the problems encountered in the Reserve were made, recommendations for

future activities suggested. All reports submitted to PRONATURA by members of the project are circulated to other members of the team for comment. In addition, the interim and final reports are submitted to the sponsoring organizations and to SEDUE, Mexico and SEDUE, Campeche.

XII REPORTING:

Progress reports will be submitted on a six month basis with a final report submitted each year.

XIII REFERENCES:

Andrews, J. M., 1976. Reconnaissance and Archeological Excavations in the Río Bec Area of the Maya Lowlands. National Geographic Society Research Reports. pp. 19-27.

Andrews, J.M., 1988. Preliminary Checklist and Natural History of the Orchids of the Yucatan Peninsula. *Orquidea (Mex.)* 11:103-130.

Espejel, I.; Correa, J.; Lira, R. and Flores S., La Península de Yucatán: Su Diversidad Biótica. In press.

Lundell, C.L., Preliminary sketch of the phytogeography of the Yucatan Peninsula. Carnegie Institution, Publ. No. 436, pp. 253-355, 8 figs.

PROPOSAL: MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BASELINE STUDIES OF THE RESERVE

APPENDIX IV PROPOSED ACTIVITIES

BACKGROUND:

To establish a GIS-based data framework, the principal initial data to be entered are detailed cartographic and geographic material of the Reserve. This study will represent the second phase of the work to be completed by Gerardo Garcia and Ignacio March of ECOSFERA A.C. Their initial study is presented in *Elaboración de Cartografía Básica y Base Geográfica de Datos para la Zona de Calakmul, Campeche, Informe Final, 1990*, presented to the WWF-supported PRONATURA project.

OBJECTIVES:

The study will be aimed at providing detailed information on the current status of the physical resources and actual use of the soil in and around the Reserve. The second phase of the study is also expected to serve the designers of the management plan with precise information on areas which may require rezoning, due to human settlements. Satellite digital data will be introduced as part of the Geographic Information System. The third phase will be devoted to the proper recording of the data collected and entry into the GIS-based framework. Utilization of the most modern techniques will be carried out in collaboration with the Maya Sustainability Project-University of California (Riverside).

METHODS:

Based on the studies completed by May 1990, the following maps, at a scale of 1:100,000, will be prepared:

Base map with human and natural phenomena;

Vegetation map and actual use of soil;

Hydrological map emphasizing the distribution and permanence of hydraulic deposits on the surface;

Map with current land tenure;

Map with proposed rezoning, restoration, control and management of the Reserve in general.

The above described project is for one year July 1990 - June 1991. The funds requested from USAID are earmarked primarily for the purchase of the necessary satellite imagery and aerial photography as well as computer software. The study will serve as a base for an integrated data base system, which will be coordinated with the Centro de Ecología and which will be proposed jointly with Maya Sustainability (University of California-Riverside). Several students at the Universidad de Sureste-Campeche will be incorporated in the project as trainees. The GIS-based data

framework will require several more years for completion. Only approximate estimates of costs can be given at this time for the period 1992-3.

BUDGET:

	1990-1991
SUPPLIES AND SERVICES	
Maps and photographs	340.00
Office equipment use & purchase	1000.00
PURCHASE TECHNICAL SUPPLIES	8000.00
Aerial photos	
Satellite imagery	
Computer software for image analysis	
TRANSPORTATION EXPENSES	1000.00
FIELD EXPENSES	700.00
PARTIAL STIPEND (2 investigators/10 months)	<u>6000.00</u>
TOTAL	17040.00

A.I.U.
\$ 8,240

1991-1992

Approximately \$16,000.00 will be required for the 1991-1992 phase of work. Entry into the GIS data base framework will require the fulltime services of a computer data processor. At the end of 1992, it must be decided if further data entry

PERSONNEL:

Geog. Gerardo Garcia Gil, ECOSFERA, A.C.
Biol. Ignacio March, ECOSFERA A.C.

Attached are the curriculum vitae of the principal investigators.

LENGTH OF STUDY: Two years July 1990 - June 1992.

**PROPOSAL: MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE
BASELINE STUDIES OF THE RESERVE**

APPENDIX V PROPOSED ACTIVITIES 1.2 ~~BOTANICAL STUDIES~~

BACKGROUND:

The study of the flora of the Calakmul Biosphere Reserve, a project started by the Instituto Nacional de Investigaciones sobre Recursos Bióticos (INIREB), in collaboration with PRONATURA Yucatan, has been continued by the Facultad de Medicina Veterinaria y Zootecnia of the Universidad Autónoma de Yucatan (UADY). The floristic inventory of the area has been commenced and certain species have already been identified for their usefulness (see annex).

The botanists engaged in this project (M. en C. Jose Salvador Flores, M. en C. Juan Javier Ortiz, Tec. Edilberto Ucan and Maria Ortega Torres (Instituto de Ecologia), all experienced in the area, are willing to continue the major study over a three year period.

The floristic richness of the Reserve, noted in the preliminary collections (over 250 species) demonstrates the good state of conservation of the flora of the area and its vast extension. Based on these preliminary studies, it is estimated that there are approximately 600 to 700 species in the Reserve.

The main objective of the Biosphere Reserve is the rational use of the natural resources by man. Unfortunately the majority of the settlers in the area lack experience in the management of plants, having dedicated themselves almost exclusively to the exploitation of hard woods with great commercial value (mahogany and Spanish cedar, and more recently cattieranching.

The proposed inventory would focus on useful plants, as cited in the appendix. Many of these plants can be utilized for food, construction material, improvement of their health. Together with the program suggested under Environmental Education, the settlers would be introduced to these plants and stimulated to use and conserve them.

As part of the study, certain areas, typical of certain vegetal zones will be inventoried to serve as base line studies and for later comparative analysis on secondary growth patterns, recuperation patterns and primary growth relationships. The purpose of these studies will be directly linked to information provided on forestry influence on global warming developments.

As the Reserve contains unique ecosystems in the akalches and the aguadas, special attention will be given to them with emphasis on the epiphytes.

OBJECTIVES:

The principal objective of the proposal is to produce a complete floristic inventory; to group plants according to their current or potential use; their value as endemic, endangered or threatened species; and to produce recommendations for the settlers to manage these resources.

METHODS:

Over a three year period, the collection and study of the flora of the Reserve will be made, and will consist of 12 trips of 10 days. In this manner, collection will be made each month, so that all flowering species can be recorded. The collections will be intensive covering all of the vegetation zones of the Reserve. Various modes of transportation will be used to get to the most inaccessible areas. The processing of the material collected will take place in the herbarium of UADY where the main collection will reside. Visits to the national and US herbariums for identification purposes are contemplated. The material will be put into a data bank and will serve as part of the GIS system.

BUDGET:

	1990-1991	
SUPPLIES		2117.00
Office & botanical		
TRANSPORTATION COST		2933.00
CAMP EXPENSE		2800.00
STIPEND		17200.00
STUDY TRAVEL		<u>1000.00</u>
TOTAL		26050.00

1991-92, 1992-93

During this three year study the work will be divided up equally and expenses are expected to be approximately the same each year.

PERSONNEL:

M. en C. Jose Salvador Flores Guido, Director of Licenciatura de Biología, UADY

M. en C. Juan Javier Ortiz, Proyecto Flora Yucatanense, UADY.
Biol. Efraim Gutierrez, Biocenosis, A.C.

Tec. Edilberto Ucan, Proyecto Flora Yucatanense, UADY

Pas. Luz Maria Ortega Torres, Instituto de Ecología

Attached are the curriculum vitae of the principal investigators.

LENGTH OF STUDY: Three years starting in July 1990 - June 1993.

PROPOSAL FOR MULTI INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BASELINE STUDIES OF THE RESERVE

APPENDIX 1.3 ZOOLOGICAL STUDIES

1.3.1 Ornithological studies

BACKGROUND:

Tropical forest communities are frequently complex. Simple answers to complex problems are rare and baseline studies are essential to provide the context in which more specific studies can take place and be meaningful.

Due to the wide range of ecological niches exploited by birds, avian communities are excellent indicators of habitat quality and complexity. They are also extremely sensitive to changes in vegetation structure, especially those brought about by man.

OBJECTIVES:

The objective of this study is to determine the species composition and relative densities of avian communities in the major habitat types of the Calakmul Biosphere Reserve. It will help identify areas of high diversity. Those supporting their original fauna and those affected to varying degrees by man's activities. It may also help identify those practices that have least impact on the flora and fauna. In addition, therefore, it will provide baseline information on which management decisions, and also future studies, can be based.

Special attention will be given to certain indicator groups:

1. Raptors: this group is especially useful in determining habitat quality. Many require large territories in which to forage, and the presence of certain species, as well as their densities, are important indicators of large prey items, such as mammals or other large birds.

2. Understory species: since these species are usually the first to respond to changes in forest vegetation structure, they are extremely useful in determining habitat quality and may also be used as indicators of forest regeneration.

3. Migratory species: in view of the devastating effect of deforestation on their populations, a special effort will be made to determine the importance of Calakmul as a wintering ground for those species, and also their distribution within the reserve.

METHODS:

Field visits will be planned to take into account the seasonal variations in community composition. Census work will be carried out in the following major habitat types:

- a. undisturbed forest
- b. selectively logged forest

- c. seasonally flooded forest (akalché)
- d. aguadas (areas of permanent or semi-permanent standing water.)

The forest habitat within the Calakmul Reserve so far is far from homogeneous. Recently field surveys have shown that as many as 50 species occurring in one locality do not appear to occur in another some 60 kms. distant. This information indicates that a study of avian populations could have important implications in the zoning of the Reserve. In addition, the proposed study must of course take these differences into account. However, difficulty of access and the expenses involved in fielding expeditions impose certain restraints on the number of study sites that can be adequately covered. The present study, therefore, proposes to concentrate on two areas in the southern part of the Reserve where initial surveys have indicated that significant difference in species compositions occur, and one area in the north. The major habitat types within the reserve are all adequately represented in these three areas:

- a. undisturbed forest (sub-evergreen)
- b. selectively logged forest (sub-evergreen)
- c. seasonally flooded forest or akalché (sub-deciduous)
- d. aguadas (aquatic environments)
- e. cleared areas and secondary growth.

The three study sites include both the buffer and core zones.

It is proposed that the study be conducted over at least a three-year period. This in part is necessary to ensure the collection of sufficient data for the purpose of statistical analysis, but also to take into account annual fluctuations, particularly in rainfall, which can be severe.

A minimum of three visits would be made to each site per year so that transient, wintering and resident species can all be adequately censused. In addition, an attempt will be made to visit each of the areas at least once during the rainy season, both to monitor breeding activity among resident birds and to discover if local migrations or changes in distribution occur during this season.

A variety of census techniques will be employed to ensure maximum efficiency in the detection of species. Transects will be established in each of the study areas and these will be used to conduct visual, auditory censuses. As well as walking censuses, fixed points will also be established both at ground and canopy level. (Climbing equipment will be used to ascend to canopy level). The use of mist nets, and color bands for individual identification of birds caught, will be essential to supplement visual data and to estimate relative densities, especially for understory species. Where appropriate, playback techniques will also be used for more efficient detection of nocturnal species and certain raptor species.

BUDGET:

	1990-1991	
SUPPLIES		1500.00
Office & photo		
ORNITHOLOGICAL EQUIPMENT		2500.00
Nets, bird bands, recording equipment, etc.		
FIELD EXPENSES		6000.00
(12 trips)		
1 TRIP IN LIGHT AIRCRAFT		350.00
VEHICLE MAINTENANCE		1000.00
STIPENDS		<u>12000.00</u>
TOTAL		23350.00
	1991-1992	
SUPPLIES		1500.00
Office & photo		
FIELD EXPENSES		6000.00
(12 trips)		
STIPENDS		12000.00
VEHICLE MAINTENANCE		<u>1000.00</u>
TOTAL		20850.00

1992-1993

The budget for 1992-93 is expected to be the same as the previous year.

PERSONNEL:

Lic. Paul Wood, PRONATURA

Mauro Berlanga, PRONATURA

Authors of the 1989-90 avian inventory of the Calakmul Reserve, these two ornithologists know the birds of the area better than anyone else. Copies of their curriculum vitae are enclosed.

EVALUATION:

This project will be assessed by Dr. Russell Greenberg of the Smithsonian Institute, Washington, D.C., a leading expert on migrant birds in the neotropics and Charles Turley and Peter Jenny of the Peregrine Fund, Inc. Boise, Idaho. Members of the Peregrine Fund provided training to the project workers during April-May 1990, including raptor census techniques, playback and use of climbing equipment. The Peregrine Fund has expressed interest in collaborating with this project, as has Dr. Greenberg.

LENGTH OF PROJECT:

The project is proposed to run for three 12 month periods. Climatic fluctuations, frequent and often severe, require that the project run for a minimum of three years in order to obtain reliable data.

PROPOSAL MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BASELINE STUDIES:

APPENDIX V PROPOSED ACTIVITIES 1.3 ZOOLOGICAL STUDIES

1.3.2 Identification of mammals in the Calakmul Biosphere Reserve and their association with different habitats

BACKGROUND:

The region of Calakmul is one of the most important regions for the conservation of tropical fauna. One of the major reasons for its significance is its continuance with the Peten forest of Guatemala. This vast forested zone aids in the survival of many species of mammals considered endangered or threatened with severe habitat loss in Mexico. These include: spider and howler monkeys, jaguar, puma, ocelot, tapir, white lipped peccary, collared peccary and temazate deer.

OBJECTIVES;

Determine the species of mammals inhabiting the Reserve with estimation of populations;

Determine their association with different habitats;

Establish initial studies to determine migratory patterns of selected mammals;

Identify species of importance for local human population.

METHODS:

Small and medium size mammals will be collected with nets and Sherman type traps. Larger species or those considered scarce in the area will be registered by direct or indirect observation (tracks and scat). Remains of hunted mammals will be retrieved for examination.

BUDGET:

	1990-1991	
OFFICE SUPPLIES	.	150.00
FIELD SUPPLIES (Traps, labels, nets, etc).		4250.00
FIELD EXPENSES		4150.00
STIPENDS		<u>9750.00</u>
TOTAL		18300.00

PERSONNEL:

Biol. Marcelo Aranda, Instituto de Ecologia, Jalapa, Veracruz
Dr. Lou Verner, Department of Biology, Illinois Wesleyan
University, Normal, Illinois.

Attached are copies of curriculum vitae of the principal
investigators.

LENGTH OF PERIOD:

The study will extend over a year's period.

**PROPOSAL: MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE
BASELINE STUDIES OF THE RESERVE**

APPENDIX V: 1.3. ZOOLOGICAL STUDIES

**1.3.3 Subsistence hunting in the Calakmul Reserve with
recommendations for the establishment of community regulation**

BACKGROUND:

Subsistence hunting is an activity practiced by most of the settlers in and around the Calakmul Reserve. Wildlife represents an important food source for these people. Through rational exploitation of wildlife, hunting could actually help conservation efforts. Because subsistence hunting, however, is illegal and official hunting regulations are usually disregarded, this activity is not regulated in a manner to guarantee the conservation of hunted species.

OBJECTIVES:

Make a thorough study of subsistence hunting in selected areas of the Reserve;

Estimate the effects of this activity on the faunal populations subject to hunting;

Learn the rationale, the methods and general concepts of the local population toward subsistence hunting and develop with them a proposal for community control.

The project will consist of several phases: evaluation; social consultation and finally a proposal for autoregulation. The project hopes to generate practical suggestions on the best way to manage wildlife taking into consideration the propensity of the local population to hunt. It will propose methods of regulation which these populations will be willing to accept because it is in their own self interest and not imposed.

METHOD:

Three localities will be selected which represent various settlements in the Reserve: for example: Central Chiclera Villahermosa, Ejido La Concepción, Bel-há). Through direct observation and interviews, subsistence hunting will be analyzed in these localities. As many interviews as possible will be made with settlers throughout the Reserve. The results and actions to be proposed will be included in a final document which will be submitted to the proper authorities in charge of the management of the Reserve and to the settlements which have participated in the study.

BUDGET:

	1990-1991	
OFFICE SUPPLIES		2400.00
VEHICLE MAINTENANCE		700.00
FIELD EXPENSES		2800.00
PARTIAL STIPENDS		<u>7200.00</u>
TOTAL		12900.00

PERSONNEL:

Biol. Ignacio March, who is also a member of the data base project.

LENGTH OF STUDY: September 1990 - August 1991.

**PROPOSAL: MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE
BUFFER ZONE MANAGEMENT**

APPENDIX V PROPOSED ACTIVITIES 2.1 SOCIO-ECONOMIC STUDIES

BACKGROUND:

As a result of the first year's socioeconomic study, undertaken under the direction of Drs. Eckart Boege and Raul Murguia, the most important factors influencing the living conditions of the human population in and around the Reserve have been determined. Recognition of these factors, listed below, is critical for the development of an effective management plan for the Reserve.

a. The population which lives in the Reserve is heterogenous, having settled there during the 1960's and early 1970's. So far they have not had a serious impact on the Reserve as a whole.

b. During this period, a series of droughts followed by flooding has been so severe that many of the settlers have abandoned the area or moved to new locations. Abandonment of settlements and shifting of populations in recent years average every four years.

c. Water is the critical resource in the area. Wells present a costly and often impractical choice, as the water table is frequently at depths of 200 ms. and even when reached often contains such high levels of minerals as to be undrinkable. Water collection devises are insufficient and often badly constructed.

d. There exist no development plan for the communities and social services, such as potable water, latrines, schools and medical care, are minimal or non-existent.

e. Forestry exploitation has been up to the present extensive with little thought given to the careful management of this important resource. Reforestation programs on the part of the private lumber companies or the state have not been introduced.

f. The cultivation of chile and squash (chihua) has had a serious impact on the forest, as the areas preferred for its cultivation are those still in the forested area, and are destroyed to make way for chile and squash crops.

g. The economic crisis in the region has resulted in temporary migrations to urban centers (Cancun, Champoton, Escarcega) or temporary employment as lumbermen. During the past two years, temporary migration has affected 40% of the population.

OBJECTIVES:

In collaboration with the geographic team, a study will be made of the distribution patterns of human activities in and around the Reserve, identifying specifically their geographic location. This study will be done in collaboration with the Center for

Historical and Social Studies, University of the Southeast,
Campeche.

A strategy will be designed to resolve the problem of the low standard of living and make recommendations for the sustained use of resources in the buffer zone.

METHODS:

Each of the significant activities in the area will be identified and analyzed. In order to accomplish this, a series of meetings will take place with ejido groups to receive the settlers' views and proposals. A workshop of the investigators will be organized to process information and enhance relations with the settlers. A data bank will be established, as part of the one proposed in Appendix 1.1.

BUDGET:

	1990-1991	
SUPPLIES		700.00
FIELD EXPENSES, including travel		5000.00
STIPENDS		
2 Principal Investigators		2000.00
2 Research Assistants (6 months)		<u>3000.00</u>
TOTAL		10700.00

PERSONNEL:

Dr. Eckart Boege, Coordinator of Masters Program in Social Sciences
at CIESAS Golfo, Jalapa, Veracruz
Dr. Raul Murguía, CINVESTAV

LENGTH OF PERIOD:

One year.

PROPOSAL: MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BUFFER ZONE MANAGEMENT

APPENDIX IV 2.2 Community conservation/outreach:

2.2.1 Community outreach program in the buffer zone.

BACKGROUND:

Although archaeological evidence shows that the Calakmul Biosphere Reserve was heavily populated in precolumbian times, until recently when the Mexican Government encouraged the settlement of the region, the population was sparse, consisting mainly of chicleros, lumbermen and hunters. The precolumbian settlers had managed their limited water supplies by strict control and proper maintenance of the aguadas and cenotes, by the construction of canals and storage areas. It appears that intensive agriculture was also practiced through the use of raised fields. Following the collapse and abandonment of the area, these techniques were largely lost. When the new wave of settlers arrived with the construction of the transpeninsular road in the 1960's, few of them had the knowledge to cope with the difficult living conditions and most have been able to do little more than make out a bare subsistence standard of living. Among the migrant settlers are choles, tzeltes, tzotziles, either forced from their region by cattle ranchers or migrating after the Chichonal volcano disaster; others are Maya from the Peninsula; a portion come from other parts of Mexico, primarily Tabasco, Hidalgo, Guerrero, Michoacan and Veracruz. In addition, some refugees from Central America, especially Guatemala, reside in the area. Only one of the villages in the area which was studied (Antochie, 1985) still had its original settlers after 12 years. Some villages disappear altogether or move to another zone, their inhabitants hoping for more propitious conditions.

Currently an estimated 6,000 people live in or near the Reserve in about 40 communities, most of them settled on the recently constructed road running south from Xpuhil. These communities are found on the very limits of the Reserve's southern core zone. The need to integrate these settlements into the proper management of the Reserve is critical. It should be noted that the only large remaining high tropical forest left in the Calakmul Reserve is to be found in the southeastern corner, where population pressures are increasing. (March and Garcia, 1990)

The community outreach program presented below focuses on three aspects:

- A. dissemination of information about the Reserve directed at adults, with special emphasis on women's use of and need for the Reserve;
- B. environment education programs directed at the children;
- C. a modest animal health program established as an instrument to help the community outreach program receive acceptability, and at the same improve one aspect of their daily lives.

In order to carry out these objectives, the following programs have been designed. The first two will be initiated in 1990, the third in 1991.

A. program of environmental information and dissemination to be carried out in collaboration with SEDUE and Instituto Nacional Indigenista (INI).

OBJETIVES:

1. Establish a collaborative relationship with these two governmental agencies in order to work with the communities in the area, identifying the community problems most affecting the Reserve and attempt to reduce the impact through positive programs and effective presentations of the Reserve.

2. Inform the inhabitants of the Reserve and those in the border areas of the requirements for the proper management of the Reserve, the use they can make of the Reserve, the prohibitions and the need for their cooperation. Every attempt must be made to find alternative resources for those they currently exploit in the Reserve. Identify the most destructive human activities in the Reserve and attempt to alleviate these actions through cooperative efforts. Identify the utility of the Reserve to women, including its potential value.

3. Establish a base of communication between the inhabitants and the coordinated team of PRONATURA, SEDUE and INI, through town meetings, discussions with women in their homes and the dissemination of material about the Reserve.

METHODS:

1. Show by audiovisual means what the Biosphere Reserve represents: location, extension, characteristics, ecosystems, animal and plant life, as well as the relation of these elements to the community and the impact of human activities.

2. Promote the active participation of the inhabitants through meetings in order to understand their problems, anxieties, expectations and proposals they make about the management of the Reserve. Seek practical alternative economic sources of income.

3. Establish a center for Environment Education and Community Development at Xpuhil, where material can be displayed and stored and where personnel can stay and use as a Headquarters. This Center would be shared by personnel of INI and PRONATURA and others working on the program. The land has already been donated by the Xpuhil community for this purpose.

The program will be carried out with personnel of SEDUE, SEP, INI and PRONATURA, with the help of two recent university graduates completing their social service. In addition members of the PRONATURA team working in the Calakmul Reserve have all volunteered to help with the program.

B. Environmental education program directed at the children in and near the Reserve in collaboration with SEDUE, SEP and INI.

OBJECTIVES:

Produce with the youngsters of all ages a coloring book with images and texts on the animal and plant species in danger of extinction in the area and the ecosystems to which they belong.

Produce with the older children a simple catalog of activities which adults perform daily in the Reserve, identifying those which support the protection of the Reserve and those which are detrimental.

METHODS:

At the beginning of the school year, meet with the teachers to explain the program in collaboration with SEP. The programs would be introduced into the schools on an individual basis. A preliminary evaluation after the first school year would take place to study the impact, with a team of expert outsiders to judge the program and modify it accordingly. The material (coloring book, drawings, catalogs), would be exhibited in the Xpuhil headquarters as well in a center in the capital city of Campeche.

C. Animal Health program as an aid to establishing a cooperative relationship with the local inhabitants and increase their acceptance of the Reserve. The health of domestic animals is also directly linked with the use of the Reserve for hunting. The program will be coordinated with SEDUE, INI and the School of Veterinary Sciences, UNAM.

OBJECTIVES:

Improve the sanitary level of domestic animals in the communities and hence control and/or eradicate animal diseases that affect human beings and forest animals.

Increase animal production and thus relieve pressure on forest animals.

Establish communication and interexchange with communities and PRONATURA for the better management of the Reserve.

METHODS:

Establish office in the Xpuhil Center for veterinary medicine with 4 graduates in zootechnology and veterinary medicine who would do their social service in the area,

Make trips to the localities to implement programs of preventative medicine; perform simple veterinary practice with domestic animals and advise the communities on care and improvement of their animals. The veterinaries would travel in groups of two; one group remaining in Xpuhil while the other travels to the communities.

The communities would provide food and lodging; a symbolic charge would be made for consultations; some medicines would be sold at reduced prices if they were donated. The profit from the

- 4/6/8

medicines would be used to support the center and its expenses. No medicine would be sold if the animal has not been diagnosed in the clinic or by the veterinaries.

BUDGET:

	1990-1991	
DIDACTIC SUPPLIES & EQUIPMENT		3000.00
Projector, slides, mobile generator.		
Didactic material, posters, collar pencils, cardboard paper, etc.		
PURCHASE		
second hand 4x4 pickup, including insurance policy, taxes and title costs		6000.00
VEHICLE MAINTENANCE		1000.00
CONSTRUCTION OF CENTER		5000.00
FIELD EXPENSES		4000.00
STIPENDS;		
Coordinator 12 months		7600.00
4 Helpers (students completing their social service) 6 months		4800.00
		<u>4800.00</u>
TOTAL		31400.00

	1991-1992	
DIDACTIC MATERIAL		1000.00
VEHICLE MAINTENANCE		1500.00
MAINTENANCE OF THE CENTER		1000.00
BASIC VETERINARY MATERIAL		2000.00
FIELD EXPENSES		4000.00
STIPENDS		
Coordinator 12 months		7600.00
4 helpers (students completing their social service) 6 months		4800.00
		<u>4800.00</u>
TOTAL		21900.00

	1992-1993	
DIDACTIC MATERIAL		1000.00
VEHICLE MAINTENANCE		1500.00
MAINTENANCE OF THE CENTER		1000.00
FIELD EXPENSES		4000.00
STIPENDS		
Coordinator 12 months		7600.00
4 helpers (students completing their social service) 6 months		<u>4800.00</u>
TOTAL		19900.00

PERSONNEL:

Licda Catarina Gallego will lend overall supervision to the project. Written agreements must be reached with School of Veterinary Medicine, Autonomous University of Yucatan (UADY) and UNAM, as well as with INI and SEP. These programs orally have already been enthusiastically received by Dr. Leopoldo Pasch, director of the School of Veterinary Sciences, UNAM; Salvador Flores, Director of Zoologia, UADY; by Dr. Gonzalo Solis, director of INI Yucatan Peninsula, Director for Rural programs, SEP-Campeche, as well as SEDUE-Campeche. Fernando Lara of SEDUE-Campeche helped design the above described project. Several pharmaceutical companies have indicated willingness to help supply the necessary supplies.

PROPOSAL FOR MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BUFFER ZONE MANAGEMENT: 2.2

APPENDIX 2.2.2 Management of Forestry Resources in the Reserve

BACKGROUND:

The vast expanse of tropical forest extant in the Calakmul Biosphere Reserve when considered as part of the "Greater Peten" represents a major Mesoamerican resource to mitigate global warming. To date there is no overall forestry plan to protect this important resource or to exploit it in a rational sustainable manner. Urgently needed are: an assessment of the forest resources in the Reserve and the surrounding area, including the possibility of rehabilitating damaged areas (mainly abandoned cattleranges); the possibilities of introducing a forest management plan aimed at sustained production; the seriousness of clandestine importation of lumber from the Peten, Guatemala; the feasibility of starting a forest management pilot program.

METHODS:

-through contacts with the Secretaria de Agricultura y Recursos Hidráulicas (SAHR), local lumber cooperatives (ejidal), independent lumber company representatives, establish overall appraisal of lumber resource, current and potential. Identify other forestry resources in the Reserve;

-assess the damaged areas; their recuperative capacity; the value in potential marketable wood of secondary forest growth;

-identify independent lumbermen and ejidos interested in designing a agroforestry plan aimed at managing forest resources at a sustainable level;

-if feasible, prepare a pilot project within or bordering the Reserve for evaluation and support the second and subsequent years.

BUDGET:

1990-1991

STIPENDS:

Forestry expert 4 months 2000.00

FIELD EXPENSES 200.00

TOTAL 2200.00

1991-1992

Future investment in forestry programs for Calakmul Reserve will depend on the results of the investigations of the agroforestry expert. If the conditions looks favorable, a forestry pilot program will be stablsh in the Reserve.

PERSONNEL:

Dr. Michael Keyes H., current
Network of Integral Manag
Quintana Roo.

Juan Peon Molina, comm
willingness to assist in
members of newly created
are also interested in dev
in southeastern Mexico. W

Botanists, working under
trees and plants of current
have also indicated their

In addition, The World Wil
to send a forestry expert
the proper management of

LENGTH OF PERIOD:

The immediate project will

gional e
tural Re

who has
is in c
section
groforest
hout rem

ared to f
presentat
in this

ated its
rest comp
s in the

PROPOSAL MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BUFFER ZONE MANAGEMENT

APPENDIX 2.2.3.1 Microenterprise development-Honey production

BACKGROUND:

Even though the flora of the Calakmul Reserve has a high percentage of nectar-bearing flowers, production of honey has been drastically cut in the past few years because of the introduction of the African bee and a severe drought which has affected the area. Research in the area already indicates that honey production could be greatly increased as well as diversified, if two separate programs could be introduced:

a. reestablishment of honey production in the area with training on how to cope with the invasion of the African bee and its effect on the domestic bee (Apis mellifera).

b. commercialization of honey production of the native stingless bee .

The Peninsula long has been one of the major producers of honey in the world. Local experts have expressed willingness to help assess the potential of honey production in the Reserve and marketing of the product. In addition, representatives of INI also wish to encourage honey production in the area as a means of providing additional income for the settlers in this area and have expressed their desire to collaborate on this project.

The second part of this project represents a distinctly different approach to increased honey production in the Reserve by introducing Meliponiculture in the Reserve. The native, stingless bee (Meliphona beechii), known in Maya as xunan kaab and paisil kaab, has been exploited by the Maya for centuries. Recorded in the famous ancient books of the Maya, the Chilam Balam of Chumayel, Tekax, Kaua and Man, it is still gathered by the Maya when found in the forest. Because it is a different species, it is not threatened with Africanization. The collection of nectar, pollen and honey is possible; their value as very nutritious and flavorsome products is well known. This species is known to exist in the Calakmul Reserve and to be collected in the wild. The Faculty of Veterinary Medicine and Zootechnology of UADY as well as the INI center at Maxcanu Yucatan have developed new techniques for production. This technology consists of using, instead of a hollow tree trunk or hobón, a wooden box similar to that used by the domestic honeybees. Recent studies at UADY show that the new technology results in higher production and more sanitary conditions.

OBJECTIVES:

-encourage through contacts with local experts and governmental authorities the reestablishment of domestic honey production in the Calakmul Reserve buffer zone.

-study the potential market for producing honey "from flowers from the Calakmul Biosphere Reserve" for an elite market, with an attractively packaged bottle of honey for sale to conservation oriented companies and to the international tourist market. at Cancun.

-introduce meliponicultura in the buffer zone of the Calakmul Reserve with the inhabitants of the ejidos, by demonstrating the new technology for the production of melipona honey.

-provide in this way additional income for the communities in this zone.

METHODS:

In order to carry out this project, technicians in both types of honey production will investigate the opportunities for honey production and will give workshops introducing the new technologies. An already existing program in Mexico on how to cope with the introduction of the African bee needs to be activated in the buffer areas around Calakmul Reserve. A careful assessment of the impact of the African bee needs to be made before any large scale operation is introduced. Many of the settlers in this area are terrorized by the African bee and have abandoned their hives. In early July 1990, a first human fatality was recorded on the Yucatan Peninsula of a prominent citizen in Quintana Roo. Fatal attacks on animals have been reported throughout the Peninsula.

For the introduction of meliponiculture into the buffer zone, financial support is needed to bring interested settlers from the ejidos in the buffer zones to workshops held under the auspices of UADY, Maya Sostenibilidad and observe the operations at the INI station at Maxcanu, Yucatan.

Both traditional designs, (jobones or hollow logs) as well as modern techniques will be demonstrated. The beehives will be then constructed in the communities selected. At the end of a year, an estimated 80 producing hives for each community would be established. Each producer would be obliged to deliver a beehive for each of the hives established in his colony in exchange for the services he received from the program. He would also be expected to pay partially for the assistance he receives during the first two years of operation. Effective marketing would be effected in collaboration with the communities.

BUDGET:

1990-1991

STIPENDS

1 apiculture investigator 4 months	5500.00
1 scholarship for student doing social service	2400.00
1 bee collector	1080.00

MATERIALS

For beehives construction	2000.00
---------------------------	---------

FIELD EXPENSES

For participation workshop	<u>3000.00</u>
----------------------------	----------------

TOTAL

13900.00

1991-1992

STIPENDS

1 apiculture investigator 4 months	5500.00
1 scholarship for student doing social service	2400.00

MATERIALS

For beehives construction	2000.00
---------------------------	---------

FIELD EXPENSES

	<u>3000.00</u>
--	----------------

TOTAL

12900.00

PERSONNEL:

Consorteam of intersted investigators including Sustenibility Maya/University of California Riverside, UADY, INI with PRONATURA.

LENGTH OF PERIOD:

Two years.

6
13

PROPOSAL FOR MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

BUFFER ZONE MANAGEMENT: 2.2

APPENDIX 2.2.3.2 ECOTOURISM IN BUFFER ZONE OF CALAKMUL RESERVE

BACKGROUND:

One of the richest archaeological areas in the entire Maya zone lies within or near the Calakmul Biosphere Reserve. Moreover, some of these impressive sites, like Becan, Chicanna, and Xpuhil, are located a few minutes from the major highway crossing the Peninsula from Escarcega to Xpuhil. Others like Hormiguero and Rio Bec require advanced planning and a local guide to visit; others like Calakmul, require an adventuresome spirit and a tolerance for the unexpected. All of these sites need careful planning so that in the future the natural resources are protected and conserve the tropical forest atmosphere which makes them distinct from their sister cities to the north, like Uxmal and Chichen Itza.

Flagrantly absent from this concentration of ruins are any hotels or attractive restaurants or detailed information about the sites.. There are no hotels between Chetumal and Escarcega, even though there are at least major five sites worthy of visit. The Mexican Government's Ministry of Tourism has recently expressed interest in promoting the Maya zone through its project "El Mundo Maya". For its initial phase it wishes to concentrate on drawing on the Cancun tourist trade to the already well known sites of northern Yucatan with their adequate infrastructure.

Unless a group of entrepreneurs interested in conserving the natural resources of the buffer zones of the Calakmul Reserve determined that the establishment of a hotel-parador in the Xpuhil area was feasible, there is faint chance that the area will in the near future enjoy hotel facilities.

The establishment of a modest hotel would provide some jobs for local inhabitants, and would stimulate spin off activities, like the production of food for the hotel, and the provision of guide and chauffeur services.

OBJECTIVES:

- stimulate interest in the establishment of a small hotel in the Xpuhil area with the active participation of the local community and the advisory capacity of INI.
- provide a feasibility study on ecotourism trade in the area; current and potential activity; requirements, services available and lacking, impact, positive and negative on the area;
- recommendations for the establishment of ecotourism infrastructure in the region.

METHODS:

A study group, headed by an expert in ecotourism and assisted by an international known consultant, would study all aspects of the project and prepare a project. Interest in the idea would be

stimulated by the study group as well as PRONATURA.

BUDGET:

1990-1991

STIPENDS

1 expert in ecotourism

3500.00

FIELD EXPENSES

500.00

TOTAL

4000.00

PERSONNEL:

Dr. Ray Ashton, Gainesville, Florida (if available).

María de Jesús Ordoñez, of the Center of Ecology, UNAM.

LENGTH OF TIME:

The feasibility study would require 6 months. The study will be undertaken to give us a better idea of the possibility of developing ecotourism in that area.

57

PROPOSAL: MULTI-INSTITUTIONAL SUPPORT CALAKMUL BIOSPHERE RESERVE

ADMINISTRATION OF THE PROJECT

APENDIX V PROPOSED ACTIVITIES 3.0

More than a dozen institutions will be directly involved in this project. In order to coordinate their activities and to stimulate additional international interest, a person cognizant of the challenges that the Reserve offers and the benefits that can be secured by its proper management will be named by PRONATURA.

He will be assisted by Biol. Eduardo Galicia of PRONATURA, who is already working with others on the team to design a management plan.

In order to keep in touch with other members of team and interested participants, Eduardo Galicia will circulate a modest newsletter for those working in the Reserve.

Administrative costs will include communication efforts.

BUDGET:

	1990-1991	
OPERATION OFFICE		
Supplies & equipment		2335.
COMMUNICATION		2000.
Telephone, Fax & Printing Bulletin		
STIPENDS		
1 Coordinator (12 months)		16000.
1 Assistant to coordinator (12 months)		6000.
FIELD EXPENSES & TRAVEL		8000.
VEHICLE MAINTAINANCE		<u>1000.</u>
TOTAL		35335.

1991-1992, 1992-1993

OPERATION OFFICE	1000.
Supplies & equipment	
COMMUNICATION	1000.
Telephone, Fax & Printing bulletin	
STIPENDS	
1 Coordinator (12 months)	16000.
1 Assistant to coordinator (12 months)	6000.
FIELD EXPENSES & TRAVEL	3500.
VEHICLE MAINTAINANCE	<u>500.</u>
TOTAL	28000.