

SIERRA DE LAS MINAS BIOSPHERE RESERVE  
MASTER PLAN  
1992-1997

Approved by the National Protected Areas Council  
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Natural Defense Foundation  
Guatemala

Original document is in Spanish. Translation was completed January 1993 by David Hernandez, Superior National Forest, and Paul Schmidtke, Hiawatha National Forest.

## PRESENTATION:

Five years ago, the 'Natural Defense Foundation' (FDN), a privately run conservation organization in Guatemala, began their effort to preserve Sierra de las Minas, which means " Mountain Range of Mines", one of Guatemala's most valuable natural treasures.

The first step in reaching their goal was achieved in October of 1990, when the Guatemalan Congress established La Reserva de la Biosfera Sierra de las Minas (RBSM), and granted the FDN the authority to administer and manage the Reserve. The second step toward preserving the area came a little over a year later, when this Master Plan was produced. We are confident that this Plan will be a valuable instrument to direct the administration and management of the Reserve in it's initial phase, so that the Reserve can become a true example of harmony between human development and natural resource conservation.

-The Planning Team-

## I. INTRODUCTION:

The document is structured as follows. First, it initially describes the purpose of the plan and objectives of the reserve, it's natural values and socio-economic importance, and threats to it's integrity. Next, it establishes policies to guide the actions of the Reserve administrators, public institutions, local governments, land owners, and communities having jurisdiction within the RBSM. Third, it defines the administrative structure, including the role of each institution and group involved with the Reserve. Finally, it details the programs and sub-programs for development of the Reserve.

The plan was developed using the following methodology:

1. Review of the laws governing all protected areas and specifically the law which established the Reserva.
2. Compiling information from library sources, experts in various fields of study, and personal experiences gained in developing conservation projects and development of the Reserve by FDN.
3. Rural visits and consultation with local residents.
4. Information gathered from the above methods was then analyzed.
5. The structure and content of the plan was then formulated
6. Consultations were held with various scientists, technicians and representatives of different institutions.
7. Revised and approved by the National Council on Protected Areas (CONAP)
8. Publication

## II. MASTER PLAN GOALS:

The following is a list of goals that this plan will attempt to achieve.

1. Provide to CONAP, the Reserve Administration, national and local governments, communities, and special interest groups the technical knowledge and regulation necessary for the administration and management of RBSM.
2. Fulfill the legal requirements required by the Decree 49-90 of Congress (Legal Declaration of the Biosphere Reserve Sierra de las Minas) as well as the Law of Protected Areas (Legislative Decree 4-89) and it's Regulation (Government Agreement 759-90).
3. Present the existing condition of the Reserve, it's biological and ecological values, and threats to the Reserve's integrity and its resources.

4. Define management policies to direct current use and future development with the Reserve.
5. Detail the Administrative structure necessary to accomplish Plan objectives, and the role each different organization plays in the management of the RBSM.
6. Identify priority management activities for RBSM and establish a timetable for their development.

### III. PRINCIPAL OBJECTIVES FOR THE RBSM

The protection of RBSM is priority in Guatemala. The RBSM is nationally and internationally recognized for the important benefits and services which it provides to Guatemala.

Quality management of the Reserve will be achieved by accomplishing the following objectives:

1. Maintain the diverse ecosystems, biodiversity, genetic resources and forests within the Reserve.
2. Protect natural water sources and watersheds for their socio-economic importance to the surrounding areas of the RBSM.
3. Promote sustainable natural resource use for benefitting local populations.
4. Achieve community participation in the management and protection of the Reserve.
5. Promote scientific study of the ecosystems and biological and genetic abundance of the Reserve, to gain scientific knowledge, which, when applied, can be a benefit to our country and all humanity.
6. Preserve the unique scenic values.

### IV. EXISTING CONDITION (Description and Analysis):

#### 1. Location-

The RBSM is located in northeast Guatemala, between the valleys of the Polochic and Motagua rivers. It is approximately 236,300 hectares or 583,661 acres in size (see map for detailed location).

#### 2. Soils and Geography

The RBSM is bordered, in the south and the north, by two great depressions that correspond with the Motagua and Polochic faults. The majority of the area is formed from paleozoic rock, which are the oldest rock formations of Central America. The mountain range itself is a large uplifted area of



bedrock with inclusions of amphibolites and marble. At the north end of this range, there is a well defined fault that experiences considerable displacement along it.

The soils are of the oldest kind in Central America; mostly of paleozoic rock (Campbell, 1982). Mostly of silty-clay to silt, the soils usually run 25 to 50 cm (10 & 20 in.) deep. Classified as highly erodible, they are not recommended for rangeland. According to the Natural Resources Master Plan (SEGEPLAN, 1975) these soils are recommended for activities related to forestry or the environment, with very small areas suitable for agriculture.

### 3. Climate

Like anywhere in the tropics, RBSM's climate is dictated by elevation and relative position of the highlands to the wind currents. The rain amount and duration varies greatly within short distances. Some areas in the highlands near the Polochic river receive more than 4,000 mm/yr (157 in./yr). At the same time, a mid-valley area in Motagua basin receives as little as 500mm/yr (20 in./yr.) (Campbell, 1982), due to the rain shadow effect that the high mountains to the east have on the area, making it one of the most arid locations in Central America.

### 4. Ecological and Biological Importance

The RBSM is one of the most spectacular areas of Central America. The geographic isolation and the great elevation difference form a large diversity of flora and fauna habitats. The majority of the undisturbed forests in RBSM are the 'Cloud Forests' which are located in the high elevations. Further down the slope, the RBSM contains a forest rich in species diversity. The terrain is very rugged, with slopes as much as 65% or more. Species are a mix of neotropical and neoarctic types, which leads to the large biodiversity in the area.

It is this bio- and genetic diversity which makes the Reserve so important. At a minimum, over 885 species of mammals, birds, and reptiles occur in the Reserve. This represents about 70% of all the mammalian, avian and reptilian species that occur in Guatemala and Belize combined. The Reserve contains over 600 kms<sup>2</sup> of Cloud Forest, the largest expanse of habitat for the Quetzal, the national bird, along with many other threatened or endangered species. Expert foresters consider RBSM to be the largest source of tropical conifer seed in the world. Seventeen species are registered, an invaluable fountain of germoplast for agro-forestry projects and the reforestation of Guatemala and the tropical world. This resources could ensure a stable forest products industry in Guatemala for many years to come.

## 5. Socio-economic Values

### Water

Sixty three watersheds are located in the RBSM. They provide fresh water, influence microclimates, and provide water supplies for industry, communities, farms/ranches, hydroelectric plants, etc.

### Forest Products

The majority of the people who live within and around RBSM use firewood for most of their domestic needs. Traditionally, the RSBM supplies conifers to sawmills in the valley of Motagua, as well as to the local population for building homes. Sub-products are vines which are used locally to manufacture rope, baskets, and ornaments. Finally, since time immemorial, people have gathered plants for medicines, food, and other needs.

## 6. Cultural Values

Various cultures have established themselves along and around the riversides of RBSM. Three archeological sites exist in the "buffer" zone on the north side of the RSBM. One of them, Zarquito River, is the only one that belongs to the classic period of the Maya and Chortí. The other two site, Tinajas and Pueblo Viejo, belong to the Maya and Q'eqchí, during the post classic period. Scattered throughout the Reserve are thirty other sites which are registered, including: the splendor of Quiriguá, Pataxté, Tampomá, Guaytán y San José Apantes. Currently, various ethnic groups occupy the area such as Q'eqchí in the north, and Poqomchí and Achí in the west. The major population in the south is of hispanic origin.

## 7. Problems and Threats

### Loss of Undisturbed Forest.

The major threat to the RBSM is the deforestation. Cleared land is put into grazing operations even though it is not suitable for these activities because of steep terrain, high erosion potential and adverse climatic conditions.

In the north, squatters of Q'eqchis decent have been attempting to establish settlements on private and public lands within the RSMB. These spontaneous colonizations have been occurring off and on for the last 12 years. The squatters practice migratory agriculture to grow annual food grains, by slashing and burning the forest and planting the crops. Crops are grown in furrows that often times run vertically up and down the slope, which only increases the erosion which results from this type of agriculture.

In other areas, like in the south, the uncontrolled deforestation for wood products (for the mills of Motagua) spells a major change for the land. Some of these lands remain deforested and range land is established. More

recently, many deforested areas have been put into production of ornamental plants.

#### Indiscriminate Exploitation of Wood and Degradation of Conifers

The commercial extraction of wood products from the northern area of the Reserve has surpassed the ability of the land to reforest the area. In the south, wood cutting for firewood and lumber has also caused great loss of forests. To make matters worse, the techniques used to harvest the timber often times result in degradation of the site, so that it cannot produce quality forest products. The present reforestation projects have not been enough for compensation. The high-grading techniques used have contributed to the degradation of the seed source of superior specimens of each species.

#### Forest Sub-products Extraction

In the west the uncontrolled gathering of ferns, aborescents, and other ornamentals, such as orchids, have been detrimental to the populations of the species concerned.

#### Sedimentation and Erosion

The soils in RBSM are highly susceptible to erosion. The agricultural practices remove the vegetation needed for soil stability. Valuable top soil is lost. Current practices do not allow for the rehabilitation of these resources. The rivers become sedimented as a result. The water quality suffers from the sedimentation, which effects irrigation systems and hydro-electric plants.

#### Water-volume Loss

The deforestation of watersheds, especially in the slopes of Motagua, threatens the local economy. About 40% of the volume has been lost within the past 10 years, and the water levels have lowered considerably. The dependency of the water source for irrigation in the arid area warrants the protection of the higher altitude forests.

#### Hunting

In the past, hunting has been for sustenance. In the last few years an increase "sport hunting" has greatly taken it's toll due to lack of control (bag limits) and the irrational slaughter of wild animals. This originated, for the most part, with the increase of available firearms to the local population.

Fire (natural and man-made)

In the arid valley of Motagua natural fires occur occasionally. However, the majority of the fires are manmade for agricultural and rangeland construction. Some end up advancing on the higher forests destroying large tracts and reducing the capacity of the forest to regenerate itself.

#### Institutional Weaknesses

The entities (governmental and local authorities) responsible for different aspects of the land and natural resource management of RBSM do not communicate well with each other. Many times, they have conflicting policies and objectives with respect to the Reserve, and many of their employees do not even see the need to implement sustained yield practices. At the national level, most people do not realize the importance of the Reserve, especially with regard to watershed protection and do not appropriate sufficient funds to conserve and maintain sustained yield of the Reserve's natural resources.

#### V. MANAGEMENT DIRECTIVES:

##### 1. RBSM Administration

- A. According to the Congressional Decree 49-90, the Executive Secretary of the Reserve responsibility lies with FDN. The Board of Directors is made up of representatives from various organizations including CONAP, local development committees, indigenous peoples groups, and land owner organizations.
- B. Actions of the Board of Directors and of its individual members are found in the regulations of Decree 49-90, Government Agreement No. 93-92.

##### 2. Master Plan Application

- A. The Plan must be periodically revised to reflect the changes in the ecology, economy and socially within the RBSM.
- B. The Reserve Administration will implement management strategies that are consistent with the "Use Zones" in which the actions will be undertaken. These zones are based on ecological characteristics, natural resources within the RBSM, and carrying capacity of the land towards the proposed uses. The use zones within the RBSM are as follows: nucleus zone, sustainable or multiple-use zone, rehabilitation zone, and buffer zone. Within these zones can be sub-zones for more detailed management of lands, waters, and other resources.

- C. According to Article 4 of Decree 49-90 the eventual location of the nucleus zone will be presented to CONAP for approval, within two years of the approval of this document.
- D. The collaboration of all the authorities involved is needed for the successful application of the Plan in order to protect and manage the Reserve.

### 3. Biodiversity Conservation and Forests Protection

- A. Priority is given to the identification, evaluation, monitoring and protection of the area's different life zones, ecosystems, species, and threatened fragile natural characteristics and other areas unique to the Reserve. The administration of the Reserve is looking for support from law enforcement officials, and local land owners and business people, to carry out protective measures and established management directives.
- B. All local land owners, forest users and those dependent on the watershed resources are expected to guarantee the preservation of the cloud forests and headwaters of the rivers within the Reserve.
- C. The Reserve administration will identify, and pursue the restoration of lands needing rehabilitation. This will include promoting private sector activities and directing communities toward this objective.
- D. Due to the damage caused to the higher elevation life zones by naturally occurring and human caused fires local communities and land owners are expected to be trained and available to assist in prevention and suppression of such fires.

### 4. Water and Soil Conservation

- A. Priority is given for the protection of water sources, and the vegetation of the watersheds.
- B. In the nucleus zone, water sources and rivers will run freely without artificial obstructions to maintain the pure quality of the water resource (physically, biologically, and chemically).
- C. In the sustainable use zones, installations to capture water for domestic, agricultural and industrial use will be permitted, only after sufficient study of the impacts is conducted and such installations are approved by CONAP. The Reserve will develop a water regulatory mechanism in conjunction with national and local government agencies, local land owners and water resource consumers.
- D. Water pollution (surface and ground) of any kind is prohibited.
- E. The RBSM will manage soil uses to avoid the erosion and sedimentation caused by human activities.

## 5. Sustainable Land and Cattle Ranches

- A. The administration of RBSM will make it a priority to work with local communities to guarantee sustained use of the resources, through use of agricultural practices that are consistent with the use zone where the activity is occurring.
- B. The RBSM will encourage the use of organic fertilizers and biological pest control agents, eliminating the use of pesticides and agro-chemicals.
- C. The RBSM will regulate the use of fire in site preparation for agriculture and other uses.
- D. The RBSM will promote permanent areas for cultivation in the agricultural areas of the Reserve.

## 6. Forest Products Management and Uses

- A. The natural forests within the sustained use and buffer zones will be managed as a renewable resource. There will be no total removal of the vegetation or permanent or irreversible impacts to the biodiversity, ecological processes, water sources or watersheds.
- B. In the aforementioned zones, the production of wood, and other non-timber forest products, will be managed under the principals of social and ecological sustained yield, especially pertaining to conifers.
- C. The promotion of establishment and development of agro-forest systems will take place for the communities and private owners of the area.
- D. Forest plantations will be established for local use as well as to supply the local forest products industry with raw materials, while also protecting the soils and watersheds of the Reserve.
- E. The use of native species will be encouraged for the plantations and agro-forestry systems.
- F. The RBSM will sponsor and strengthen activities directed towards collecting and producing seed and other genetic resources, preferred by the community groups, in accordance with authorized plans for these activities.
- G. Priority and support is given for local communities to develop management programs of natural forests.
- H. Removal of forest products from national or municipal lands, will be regulated by legislation in effect.
- I. All uses of natural resources need to comply with the existing legislation (in relation to procedures, technical requirements, and ecological sustainability).

## 7. Extraction of Non-renewable Resources

- A. No mineral extraction that causes or precipitates any type of contamination, erosion, or sedimentation, or that provokes any local ecological alterations will be allowed.
- B. All non-renewable resource extraction within the Reserve will be limited to the sustainable use and buffer zones. These activities will meet the requirements of the environment, mineral, and protected areas legislations (including impact evaluations, preventive and mitigation measures, like rehabilitation of affected areas). CONAP establishes the level of mitigation necessary, according to the legislation in place.
- C. Previous to authorizing the extraction of non-renewable resources (commercial and industrial) CONAP will contact the administration of the Reserve for their favorable opinion.
- D. Upon conclusion of the mineral development activity, the user will remove roadbeds and return them to the state in which they were found previous to the activity. This includes restoration of all access roads and any other affected areas.

## 8. Scientific Investigation and Monitoring

- A. Scientific study is encouraged for increasing the knowledge of biophysical characteristics, ecological processes, and human activity impacts within the Reserve.
- B. The administration of the Reserve will establish guidelines for scientific study, in all cases complying with the regulations of the existing legislation.
- C. The administration will define sites and subject of study.
- D. The data bases will include data on the state of the ecosystems and priority species in the Reserve, and their management requirements, as pertaining to land and resource uses.
- E. When possible, scientific study will be used to increase the knowledge of the local populations.
- F. The administration will encourage development of the scientific facilities within appropriate zones, for education and scientific investigation.

## 9. Environmental Education and Training

Education and training are essential for managing natural resources. The following is the administration's plan for carrying this out.

- A. Through educational methods (formal and informal) the administration will sponsor the education of permanent professionals involved in the activities of RBSM.
- B. With the inhabitants within the Reserve, the administration will develop an education program (formal and informal) involving the existing mechanisms and new facilities.
- C. Local residents will be instructed in sustained yield techniques so that their actions will rapidly become consistent with the objectives of the Reserve.
- D. A large scale public information plan will be implemented, that will be directed at local governments and other groups, who play a role in accomplishing Reserve objectives.

#### 10. Squatter Settlements.

For the existing establishments in the nucleus zone the administration consider the following alternatives:

- A. Voluntary relocation outside this zone, with secured sustainability of land and cattle activities, tenancy, etc.
- B. The administration will promote and supervise programs and projects of technical assistance for land/cattle operations to guarantee the existing communities of the Reserve their success. These programs will attempt to eliminate community dependency on the program and steer them towards self-sufficiency

The communities need to secure the following as one of the priorities:

- a-Sustainable and organic agricultural techniques.
- b-Techniques for raising cattle that are consistent with cultural, ecological and climatic conditions.
- c-Aquiring knowledge of wild plants that have any type of commercial value or specific use to humans.
- d-Training to improve the commercial system of the area.
- e-Introduce and use new techniques and alternatives for commercial production
- C. The enlargement of or establishment of settlements is not permitted in the RBSM. For the existing ones the need is there to educate so that the community becomes compatible with the management of the Reserve.

#### 11. Tourism

- A. All tourism activities in the RBSM will be of low impact on the cultures and natural resources.
- B. The administration will prepare, with the participation of the Guatemalan Tourist Institute. (INGUAT) et. al., a development plan for tourism in the natural areas. Attractions will be identified, along



with architectural types and styles compatible with the area, sites for development, capacity of the different sites, etc. These plans will be revised periodically.

- C. All tourists developments within the RBSM will have a management plan, and evaluations of potential impacts to the environment, as outlined by the National Environmental Commission (CONAMA). A map will be included identifying affected sites, construction plans, factors of special considerations, etc.
- D. All construction will comply with regulations, limitations in effect within each zone, and also meet their objectives. The administration will supervise the compliance of such regulations and mitigation measures of environmental impacts.
- E. The tourism activities are expected to be economically beneficial to local communities, who will have the support for community initiatives directed to bring the tourists in the area.
- F. The administration will promote the opportunities of locals who show interest in establishing lodging, guiding services, or other businesses directed to touring visitors.
- G. The administration will promote the production of informative materials for visitors, such as maps, interpretive guides, etc.
- H. The administration will establish entrance fees and user fees where needed. The proceeds will go to the administration of RBSM.

## 12. Public Infrastructures and Services

- A. The administration will provide the basic necessary infrastructure for the protection and management of RBSM.
- B. The development of any infrastructure within the Reserve will be consistence with the direction and plans of this Plan, as well as with the regulations and legislation in effect. No developments will be constructed which compromise the objectives of conservation of the natural resources of RBSM.
- C. The administration will permit access to the Reserve for use by residents and visitors. Minimum impact (both visual and physical) will be strived for; no new roads will be built within the nucleus zone.
- D. Only necessary infrastructure will be permitted within the Reserve for the protection and management of same, and only in approved areas. Esthetic designs are to be used. Minimum impacts to the soil, water, etc. will be the norm.
- E. A uniformed sign system will be developed for the whole of RBSM.

### 13. Financial Resources for RBSM

- A. CONAP and the administration of the Reserve will establish financial sources to guarantee the operation of RBSM over the long term, including contributions from various sources, donations, entrance and users fees, etc.
- B. A percentage of no less than 20% of entrance fees, tariffs and other revenues of RBSM will be applied towards the support of long term conservation for RBSM. This fund will be managed by the administration, and can receive public and private donations from both national and international sources.
- C. Local governments will continue to establish excise taxes for the use of natural resources within their jurisdiction.

### VI. ADMINISTRATIVE STRUCTURE

#### A. The RBSM Administrative Division

Because of the size of the RBSM, divisions are needed within the administration of the Reserve into districts and sectors, using the following criteria:

1. Departmental jurisdiction of the 5 departments found in the Reserve.
2. Boundaries between watersheds.
3. The existing road systems.
4. Location of ethnic groups and settlements, and the opinion of different population groups within the Reserve

With the previous criteria met the, following districts were established:

1. Chilascó District
2. Motagua District
3. Polochic District

### VII. KEY INSTITUTIONS AND THEIR RESPONSIBILITIES

Various institutions exist with legal mandates related to the administration and management of lands and resources in RBSM. Their principle tasks are:

1. CONAP (National Protected Areas Council)
  - A. Preside over the Board of Directors of RBSM
  - B. Issue authorization for the use of natural resources within RBSM.
  - C. Support the Executive Secretary of the Reserve in its administration.
  - D. All other responsibilities granted by law
2. FDN (Natural Defense Foundation)

- A. Serve as Executive Secretary of the Board of Directors of RBSM.
  - B. See to the conservation and protection of the natural resources of the Reserve, with the support of local governments and law enforcement agencies.
  - C. Coordinate and execute the plans and management programs by which the Reserve is managed.
3. INTA (National Institute of Agricultural Change)
- A. Support to the administration of the Reserve, the protection and management of national lands, and the natural resources, according to existing laws and approved plans.
  - B. Assign to CONAP, national lands within the Reserve for suitable management by the administration of the Reserve.
4. DIGEBOS (National Forest Service)
- A. To carry out the supervision of licenses for authorized use in the Reserve.
  - B. Assist the administration of the Reserve, the private sector, and area communities in establishing plantations and the management thereof.
5. Rural and Urban Development Boards
- A. Participate as voting members on the Board of Directors
  - B. Support the Executive Secretary by complying with all laws and coordinating action of departments within their agency.
6. Local Governments
- A. Support the administration in the protection and management of RBSM lands within their jurisdiction.
7. Law Enforcement Agencies
- A. Support and assist RBSM personnel in protection of the natural resources
  - B. Assist civil and judicial authorities in upholding all current laws pertaining to the RBSM
8. Communications Ministry
- A. Maintain roads and other public works within the RBSM
  - B. Assist the administration in transportation and communications planning.
9. INGUAT
- A. Assist in Formulating a general tourism plan for the Reserve and the area around it.

- B. Help local communities and business develop low impact tourist activities which will benefit the community and help raise the standard of living in the area.
- C. Help the administration set up a trust fund for long term financing of the Reserve.

#### 10. Local Communities

- A. Participate as Voting members on the Board of Directors.
- B. Participate in the design of programs targeted at helping local communities.
- C. Participate in sustained yield management activities within the Reserve.

#### 11. Non-governmental Organizations

- A. Assist, support, and compliment administration programs including training, scientific investigation, environmental education, agricultural extension, natural tourism, and other sustained yield activities.
- B. Help to raise public consciousness as to the importance of the Reserve.
- C. Assist in developing financial source to guarantee long term operation of the Reserve.

#### 12. Private Sector Businesses and Individuals

- A. Appoint representatives who would participate as voting members on the Board of Directors.
- B. Use sustained yield techniques in their activities within the Reserve
- C. Cooperate economically with the Reserve and contribute money to the Reserve trust fund.

### VIII. MANAGEMENT CATEGORIES, LIMITS AND ZONES

The RBSM is divided into 4 zones: nucleus, multiple and sustained use, recovery, buffer zones. The limits of the Reserve and its zones of use is established in the Decree 49-90, with modifications in Article 4 of the same law.

#### 1. Nucleus Zone

According to Decree 49-90, the main objectives of this zone are: protect the natural environment, conserve the biodiversity and protect watershed. Ecological tourism will be allowed in certain areas only if such activities do not create negative impacts to the ecosystems in the area. Conservation education will be a priority.

##### Other Objectives:

- A. Protect the natural heritage of RBSM.
- B. Succeed in protecting endangered species, species unique to the area, the ecosystems, and genetic resources in the Reserve.

- C. Protect natural resources from illegal activities, i.e. slash and burn agriculture, hunting, forest fires, new settlements, etc.
- D. Achieve the compatibility of scientific or ecotourist visits with the maintenance of the natural resources.
- E. Discover all the natural resources of RBSM through scientific study.
- F. Monitor environmental changes.
- G. Protect the watershed of the 63 rivers which start in RBSM.
- H. Maintain and rehabilitate the vegetation cover to conserve the soils, water and wildlife resources.

## 2. Multiple Use, Buffer, and Recovery Zones

These zones are primarily buffer zones for the nucleus zone.

Other Objectives:

### Multiple Use and Sustainable Zone

For the most part, this area is forested and due to topography etc. is only suited for forest management. Resources are managed under the principals of sustained yield and directives of the present plan are still in effect.

### Buffer Zone

Achieve sustained yield of the forest resources with the goal of increasing the standard of living for the inhabitants.

Achieve environmental participation and education in the communities for the maintenance and improvement of conditions within the Reserve and its resources.

These objectives will be developed according to this Plan.

### Recovery Zone

Achieve the rehabilitation of the vegetative cover of the damaged areas (due to detrimental practices of the past), protect and rehabilitate the soils, water sources, and wildlife habitat rehabilitation, to allow for sustainable yield.

## IX. MANAGEMENT PROGRAMS

### 1. PROTECTION AND MANAGEMENT OF WILD AREAS

#### A. Protection Sub-program

#### Objectives

- 1. Establish the infrastructure for the protection and management of RBSM.
- 2. Protect the natural and cultural heritage.
- 3. Establish visitation limits to minimize the impact to the resources (natural and cultural).
- 4. Control illegal activities previously mentioned.

5. Acquire lands that are valuable biologically (according to regulations of the Law of Protected Areas).

#### Main Activities

1. Set and mark boundaries of each zone and maintain them.
2. Permanently patrol and guard the natural and cultural resources.
3. Establish refuges, guards stations and trails in strategic areas. Protection of the existing infrastructure.
4. Assist and orient the environmental education and scientific study activities.
5. Bio-physical observation and monitoring in the Reserve.
6. Disseminate information to the public as to what is and is not permitted within the zone.
7. Organize local groups for the protection of the Reserve and its resources.

#### B. Conservation Management Sub-program

##### Objectives

1. Observation and monitoring biophysical characteristics of the area.
2. Adequate management of threatened and endangered species, their habitats, and other vulnerable resources, by means of protecting, and in special cases, manipulating the environment and the species.
3. Minimize introduction of exotics.
4. Guarantee water quality and quantity by protecting the headwaters of the rivers and watersheds.

##### Activities

1. Manage representative ecosystems for scientific study and to meet objectives of the Reserve.
2. Design alternatives for controlling the extinction of flora and fauna.
3. Maintain and monitor the economically, medicinally, and nutritionally important species and communities.
4. Execute the engineering and management of areas for rehabilitation.
5. Take measures to decontaminate contaminated lands/environment.
6. Take measures against insects and diseases.
7. Evaluate environmental impacts.
8. Study the repopulation of native species or threatened or endangered species unique to the area.

#### C. Scientific Research Sub-program

##### Objectives

1. Increase the knowledge, through scientific study, of the representative ecosystems, the species, and genetic resources of the Reserve. Coordinate and execute research activities to establish a large pool of knowledge about the resources and natural processes.
2. Establish directives which will determine the scientific investigation activities within the Reserve.

3. Guarantee the transfer and application of knowledge of the flora and fauna of the Reserve, to improve areas that need improvement.
4. Monitor significant resources to determine natural water soil and biological processes within the Reserve and human impacts to them.

#### Activities

1. Monitor environmental impacts of use of the Reserve's resources.
2. Monitor the agricultural advances.
3. Establish weather stations.
4. Identify species and or highly diverse, fragile ecosystems and give them immediate ecological evaluation.
5. Develop direction and standards of investigation and integrate with regional, national, and international institutions.
6. Identify permanent locations for observation of the changes of flora, fauna, and the ecosystems.
7. Establish a library in the Reserve which will include studies, maps and technical information.
8. Inventories and census of threatened species.
9. Monitor the carrying capacity of the Reserve for public use.
10. Monitor the hydrology
11. Initiate studies to determine the socio-economic benefits of the Reserve to local populations.

## 2. SUSTAINED DEVELOPMENT PROGRAM

### A. Environmental Education Sub-program

#### Objectives

1. Make the populations aware of the role the Reserve plays in wise use of natural resources.
2. Achieve the support of regional authorities, local governments and rural organizations concerning the importance of managing and conserving the resources.
3. Add to formal educational programs on all levels information about the function of natural systems and importance of conservation.
4. Develop a user education program for all visitors of the Reserve.
5. Instill a new attitude in all Reserve users concerning appropriate and inappropriate actions when managing forests, water, and soils.

#### Activities

1. Develop a public information program through various mediums of communication.
2. Develop an environmental education plan at the formal and informal levels.
3. Coordinate with the education system in the introduction of environmental education in its programs.
4. Develop seminars and programs directed towards the regional authorities, local governments and communities.
5. Form and organize support committees for the resources and environment.

6. Produce educational materials.

## B. Natural Tourism Sub-program

### Objectives

1. Develop an organized nature tourism industry consistent with existing laws and policies.
2. Guarantee the tourism will be economically beneficial to the Reserve and area communities.
3. Train Reserve's personnel and interested local residents on the proper use of environmental education materials.
4. Identify the special attractions.
5. Construct minimal facilities enough to receive visitors to the Reserve.
6. Ensure in the appropriate behavior of the visitors throughout the Reserve.

### Main Activities

1. Secure the participation of local organizations, especially rural ones, in managing tourists services and other economical ventures.
2. Develop the tourism plan.
3. Promote community assistance in the development and management of tourists activities.
4. Prepare informational brochures to orient visitors to the Reserve's attractions.
5. Establish public use regulations to protect visitors and the natural resources.
6. Register all visitors.
7. Build facilities and interpretive centers for visitors.
8. Design and implement a permanent training program for the Reserve personnel and local residents in management of natural tourism business.

## C. Forest Resource Sub-program

### Objectives

1. Inventory the existing forest resources in the area.
2. Achieve sustained uses of the natural resources of the area.
3. Increase the level of participation of the local communities in the management and protection of the forest and other forest resources.
4. Conserve genetic banks.
5. Look for alternatives uses of forest resources for the communities and landowners.
6. Proper administration of the uses of the natural resources.

### Main Activities

1. Complete an inventory of forest resources that have sustained yield potential or practical value.
2. Design a small scale programs on the sustainable uses of the resources for the local communities.



3. Promote the establishment of plantations of native species and put emphasis on seed nurseries.
4. Create and put into motion a functional system of forest fires prevention and control.
5. Design a forest management program for the landowners and communities.
6. Manage the technical and financial cooperation for reforestation and management.
7. Design and implement an interagency coordination system to help manage the natural resources.
8. Establish a management program for seed nursery to produce selected tree species.
9. Support projects which demonstrate proper sustained yield practice to local residents.
10. Establish integrated watershed and soil protection plans.

#### D. Agriculture and Rangeland Sustainability Sub-program

##### Objectives

1. Understand the traditional management practices of agro-forestry and land/cattle operations.
2. Develop, demonstrate and spread sustainable practices for agroforestry and land-cattle operations.
3. Try to establish private ownership of lands in the communities.

##### Main Activities

1. Develop a diagnostics of agriculture, land-cattle, agroforestry study to meet the socio-economic needs of the community.
2. Implement the proper techniques for the benefit of the economy in the short, middle and long term.
3. Facilitate organized groups in agroforestry systems.
4. Look for institutional support for the implementation of agroforestry systems.
5. Prepare financial proposals for the development and implementation of agroforestry practices.
6. Develop information exchanges between communities using sustained yield agriculture and agro-forestry techniques.
7. Establish one or more demonstration parcels.
8. Promote private ownership of the communities' lands.

#### E. Rural Community Extension Sub-program

##### Objectives

1. Establish basic services to the populations within and around the Reserve.
2. Improve living conditions and economic levels for the rural populations.

##### Main Activities

1. Get an inventory of human necessities of the communities within the area, including health conditions, nutritional information, infant mortality, educational level and available potable water.
2. Implement extension and assistance programs.
3. Develop programs which would inform farmers and other inhabitants on the application of alternative technologies.
4. Promote the formation of organized groups for the improvement of living conditions.

### 3. ADMINISTRATION PROGRAM

#### A. Organization and Finance sub-programs

##### Objectives

1. Achieve an efficient administration, one that's coherent with the objectives of the Reserve.
2. Secure finances necessary to implement the plans, programs and required projects.
3. Achieve the cooperation and coordination of the authorities and institutions involved with the management of the Reserve.
4. Secure necessary funding for the function of the Reserve, through the direction of the State, private parties, and cooperatives.

##### Main Activities

1. Structure the administration organization according to the requirements of this Plan.
2. Establish methods, guides, and organizational procedures.
3. Hire adequate personnel.
4. Administer the financial resources and personnel.
5. Prepare budget and financial information.

#### B. Qualifications sub-program

##### Objectives

1. Gradually bring personnel involved in the management and development of the Reserve up to speed.
2. Qualify personnel involved with rural areas in the planning, management, and development of wild areas or protected areas, and other related subject.

##### Main Activities

1. Support the participation of personnel in these aforementioned programs.
2. Organize personnel training activities

#### C. Maintenance sub-programs

##### Objectives

1. Equip the areas with basic infrastructure necessary for the development and functionality of the programs.
2. Adequately maintain the infrastructure, equipment and vehicles, for better use and development of activities of the management plan.

#### Main Activities

1. Construct necessary installations and infrastructure for the management and development of the Reserve.
2. Regular maintenance of equipment and the infrastructure of the Reserve.
3. Rent facilities and equipment as needed.

#### D. Planning Sub-program

##### Objectives

1. Prepare annual operation plans and update Master Plan.
2. Identify sources of financial support and other cooperation.

##### Main Activities

1. Develop annual operation plans.
2. Prepare projects and financial support proposals, and solicit funds from various sources.
3. Master Plan revision.
4. Develop projects for the programs and sub-programs.