Stewardship Plan

for

The National Parks of Haiti

by

Charles A. Woods

and

Lawrence Harris

STEWARDSHIP PLAN

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Charles A. Woods, PhD
Department of Natural Sciences
Florida State Museum
University of Florida

and

Lawrence Harris,PhD
Department of Wildlife and Range Sciences
School of Forest Resources and Conservation
University of Florida

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EXECUTIVE SUMMARY

1. Background

The concept of protecting the natural areas of Haiti goes back at least to the law of 17 August 1955. The official creation of "Parcs Nationaux Naturels" was a decree published on 23 June 1983, which set aside "Morne La Visite du Massif de la Selle" (2000 hectares) and "Morne Macaya du Massif de La Hotte" (2000 hectares) in addition to eight sites selected as "Parcs Nationaux" and "Sites Naturels" in the decret of 18 March 1968. These ten sites, but most especially Parc National La Visite and Parc National Pic Macaya represent the components of the national parks of Haiti. Since 1983 the Florida State Museum has worked on a contract with USAID to complete an inventory of Parc National La Visite and Parc National Pic Macaya, and to develop a management plan for each park, as well as for the national parks program. Since 1983 the parks have been under the joint administration of the Institut National Haitien de la Culture et des Arts (INAHCA) and the Ministere de l'Agriculture, des Ressources Naturelles et du Developpement Rural (MARNDR).

A. Location

The area now designated as Parc National La Visite is located 22 kilometers south of Port-au-Prince in the Massif

de la Selle in the area of latitude 18 20'30" N and longitude 72 20' W. The park is situated along the crest of the Massif de la Selle between Morne d'Enfer (1900 meters) and Morne Kadeneau (2155 meters). The highest spot in the park is Morne Cabaio (2282 meters) on which there is a benchmark. The boundaries of the park have not been officially designated. The official (by decree) size of the park is 2000 hectares. The natural boundaries of the plateau area of the park and the steep cliffs north of the La Selle Escarpment enclose an area of 4500 hectares. The region of Morne d'Enfer is a natural extension of the park that includes uninhabited areas to the west of Morne La Visite and the existing boundary of the park along the mountain road from Furcy. This area should be included in the park because it serves as [illegible] species and habitats that [illegible] eastern areas of the park. [illegible] 'Enfer to Morne Kadeneau is an area [illegible]

Access to Parc National La Visite is via the mountain highway from Port-au-Prince via Furcy and Ca Jacques. An alternative access route departs Port-au-Prince and follows the route to the south and the road to Jacmel. Beyond Jacmel the route passes through Marigot before ascending the southern slope of the Massif de la Selle to Marche Seguin which is near the southern boundary of the park. The route from Furcy passes through the park to join the route via

Jacmel at Marche Seguin. The route via Furcy is 55 km between Port-au-Prince and Parc National La Visite and normally takes four hours to drive while the route via Jacmel is 150 km and over six hours driving time. Both routes are rough and the unpaved mountain sections frequently are damaged by heavy rains. The grade on the route via Furcy is abnormally steep. Improvements will have to be made to both of these routes before safe and regular access to the parks by visitors will be possible.

The area now designated as Parc National Pic Macaya is located 36 km NW of Les Cayes and 195 km W of Port-au-Prince at latitude 18 21' N and 74 01' W. The park is situated around the two dominant mountains of the region, Pic Formon (2219 meters) and Pic Macaya (2347 meters) and includes the large and deep ravine between these two mountains that serves as the headwaters of the Riviere Ravine du Sud. The plain south of Pic Formon (Plaine de Formon and Plaine de Deron) are also included in the park as are the rocky (karst) hills along the southern boundaries of these plains.

The two high peaks tower above the surrounding plains (which are between 1000 and 1500 meters in elevation) and a series of mountain ridges and receive moist air blowing inland from the Golfe de la Gonave to the north (via the northeast trade winds) or the Caribbean to the south (via sea breezes). The result is an area of extremely high rainfall (in excess of 3000 mm/year). Parc National Pic

Macaya is the source of four major rivers of southern Haiti (Riviere de Port-au-Piment, Riviere des Roseaux, Riviere Ravine du Sud and Riviere l'Acul). Extreme deforestation in the area the stability of these rivers, and the rich agricultural lands below (Cohen, 1984; Lowenstein, 1984). Parc National Pic Macaya serves the dual role of conservation of the national patrimony in protecting numerous endemic species of plants and animals and protecting the watersheds of four of the most important rivers of Haiti that spread outwards from the park like the spokes of a wheel.

Access to Parc National La Visite is difficult. The journey is via the route to the south from Port-au-Prince passing through Les Cayes 196 kms west. Beyond Les Cayes the route is via a gravel road to Le Duc and then a rough dirt road to Le Pretre that crosses the Riviere l'Acul. Beyond Le Pretre the route ascends to the plateau of the Plaine de Formon by a series of sharp switchbacks to the town of Les Platons. The entire trip from Port-au-Prince is 129 kms, although the 33 kms from Les Cayes to Les Platons are the most difficult. Beyond Les Platons it is necessary to hike for 10 kms across the southern edge of the Plaine de Formon to the location of the park headquarters at 1428 meters elevation. A road is presently under construction by local residents from the Catholic church at Les Platons in the direction of Marche Sous Bois. As of November 1985 the

road was passable on a jeep for a distance of 1.5 kms. Because access to the park is so difficult and the location is so distant from Port-au-Prince we recommend that an area of the upper Plaine de Formon be leveled for a grass landing strip for small airplanes after the park is underway.

B. Purpose

The purpose of the national parks has never been clearly stated. The law of 17 August 1955 regulated cutting, transporting and selling wood, and the Rural Code of Francois Duvalier (28 May 1962) strickly controlled forest resources and activities in forest resrves. The decree of 23 June 1983 creating "Parcs Nationaux Naturels" lists eight park related responsabilities for MARNDR that can be summarized as: 1) protecting ecological conditions; 2) undertaking an inventory of plants and animals; 3) studying the characteristics of endemic species in relation to geology, soils, climate, etc.; 4) identifying areas having important ecological characters; 5) preserving national parks from physical deterioration; 6) supervising and working with the scientific community in studies in the parks and natural sites; 7) diffusing information concerning the parks and sites; 8) making the facilities of the parks available to visitors.

We have synthesized these statements, as well as our many conversations with personnel from the governmental and

private sectors into the following list which we believe represents the purpose of the Parcs Nationaux Naturels program in Haiti.

1. The protection of natural ecological conditions and processes. The two most important consequences of these actions are : 1) the preservation of watersheds, thereby improving the quality of life for all inhabitants of Haiti in areas adjacent to or under the influence of national parks; 2) the preservation of natural species diversity and therefore the national natural patrimony.

2. The promotion of the national natural patrimony. The two most important consequences of this activity are: 1) the education of the citizens of Haiti about the unique features of their country that make Haiti special; 2) the increased possibility that wise decisions of long range importance can be made concerning the utilization and development of the natural resources of Haiti.

3. The development of a recreation and tourism program that will take advantage of the unique physical location and beauty of the parks as well as the special features of the flora, fauna or geology. We believe that it is possible for the citizens of Haiti to benefit from the parks at both the local and national levels without damaging the quality of

the parks if a careful management plan is developed and implemented.

2. Resources

The geological and biological resources have been surveyed and are discussed in detail in the reports presented as companion volumes to the Stewardship Plan. These reports are: 1) Geological setting; 2) Floristic study; 3) Butterflies; 4) Malacology; 5) Herpetofauna; 6) Birds; 7) Recent and extinct mammals. In summary, these reports indicate that the national parks are of great importance because they have so many unique features. The geology of both parks reveals details about the past of Haiti when it was more than one island and when the tops of the mountains were shallow marine environments. The great ravine of the Riviere Ravine du Sud between Pic Formon and Pic Macaya is part of an enormous fault that cuts across the southern peninsula of Haiti from Tiburon to the Cul-de-Sac plain. The floristic features indicate that Parc Macaya has 69 vascular plants that are endemic species and Parc La Visite has 36 endemic vascular plants. The total vascular plant flora of Macaya includes 130 species that are endemic to Hispaniola, which is 28 percent of the flora of the park. Among flowering plants the degree of endemism of Parc Macaya is even greater with 124 species endemic to Hispaniola (34

percent of total) and 68 endemic to the park itself, which is 19 percent of the flowering plants of the park. In La Visite among the flowering plants 85 species are endemic to Hispaniola (34 percent of total) and 35 species are endemic to the park itself which is 14 percent of the flowering plants of the park. In terms of endemism Macaya is more important than La Visite. The importance of Macaya is even more dramatically pointed out when just orchids are analyzed (orchids are not included in the previous lists). Of the 133 species of orchids known to occur in Parc Macaya, 38 are endemic to the Massif de La Hotte itself. Only twelve species of orchids were collected in Parc La Visite.

There are 67 species of birds recorded from Parc La Visite. Seventeen of these are endemic to Haiti, so 81 percent of the endemic birds of the country are found in La Visite. There are 65 species of birds recorded from Parc Macaya. Four important endemic species are missing from Macaya, so Parc Macaya is more limited in importance in terms of the preservation of endemic species than is Parc La Visite. Both parks have significant populations of the Black-capped Petrel. The most endangered species in both parks is the White-winged Warbler, Xenoligea montana.

There has been a great loss of mammals in Parc La Visite. Of the 17 species of endemic terrestrial mammals known to occur in the parks within the last 3000 years, 16 (94%) have become extinct. The bats have fared almost as

poorly. Eight bat species are known to have occurred in Parc La Visite, but only four still occur within the boundaries of the park, a 50% loss. In Parc Macaya 17 species of endemic terrestrial mammals are known, but 15 have become extinct (88%). Nine bat species still occur in the park. Five species of bats of the Macaya fauna are vulnerable to extinction if caves are disturbed and habitat is destroyed (Morgan and Woods, 1986). The loss of endemic mammals in both parks is dramatic, but is not unique. The average loss of endemic species throughout the Caribbean during the past 3000 years has been 88% (Woods, et al., 1986). It is clear, however, that the loss in Parc La Visite is greater than the loss in Parc Macaya, and that La Visite is a very disturbed area. One species of mammal (a non-described and now extinct genus and species) is restricted to Parc Macaya. An intense effort to find additional new species of mammals in the Macaya and La Visite areas was unsuccessful, but it is likely that five species became extinct in the last 30 years (Woods, et al. 1986), which is the period of greatest habitat loss in the Macaya area (Cohen, 1984).

3. Management

We have presented a detailed outline of our recommendations for the management of each park (a

"Stewardship Plan"). We prefer the term stewardship rather than management since we believe the latter concept implies an active state of manipulation and alteration. Stewardship can be passive and allow the ecosystem to recover and maintain itself without extensive manipulation. Both parks are highly disturbed areas, however, and in the initial stages of creating the parks an active program will be necessary.

A. Zones.

The zones of each park fall into two categories, each of which is divided into three areas. One zone is associated with specific activities, and requires constant attention and an active role by national park personnel and visitors alike. This zone is called the "Designated Use Zone", and it is subdivided into the following areas. 1) "Recreation Areas" are where visitors can camp, hike, observe scenic vistas and enjoy special features of the parks. These areas are designated for each park on the maps and text of the "Stewardship Plan". 2) "Education Areas" are where national parks personnel have created a special enriched environment to educate visitors about the special features of the parks. These areas include nature trails, special signs at designated locations, the site exhibits and the public areas of the Park Headquarters. 3) Maintenance and Service Areas" are where national parks personnel work

and store equipment and supplies that are necessary to improve the quality of the park. These areas include the work areas near the Park Headquarters, the depots where equipment is stored, the security areas where guards work, the living quarters of the Park Headquarters, the stables and facilities for horses, mules and donkeys used in the functions of the park (tourism included), the garages and shops associated with the vehicles and machines.

The second zone of the parks is associated with restricted activities, and is called the "Limited Visitation Zone". The primary goal of activities in this zone is conservation of the soil, water, flora and fauna. The largest and most important region of this zone is the "Biological Preserve Area". No exploitation of any kind should be allowed in areas so designated. When areas are of potential importance to the conservation of specific organisms, soils or watersheds, but currently degraded, then an active role is required to restore the habitat to a condition where it can be regarded as a Biological Preserve Area. These areas, each of which will be designated as a "Restoration Area", are where active management is necessary with the long range goal of improving their quality so that future management will not be necessary. The last area of the Limited Visitation Zone is where research is permitted on a limited and carefully controlled basis. This area

should be distinct from Biological Preserve Areas, and is designated as a "Research Area".

All of these zones and areas are discussed in the text of the Stewardship Plan and identified on the maps of each park.

B. Construction Controls

The construction of all structures, trails and signs should be supervised by a central office of the national parks program where a record is kept of all construction activities. A central file in the Park Headquarters should contain work plans, information on costs and photographs of completed projects. A routine inspection of all projects in the parks should be completed by the Director at least once a year, and on a regular basis by each Park Supervisor.

Until a parks program is in place and trained personnel are able to take on this role a single person should be designated to assume this responsability. We recommend that Paul Paryski serve in this capacity on an interim basis, and continue to do so until MARNDR, INAHCA, and USAID agree that a suitable program has been implemented.

C. Roads

The existing roads to the parks are discussed in section 1A under access to the parks. Clearly, access to the parks is an important feature, and these roads must be maintained and improved before an active tourism program is

possible. In Macaya this will require continuing the construction of the rough road from Les Platons to Portal Formon via Sous Bois. Beyond Portal Formon the road can continue on to the Park Headquarters at "Bwa Pipirite". This road is designated on the map in the Stewardship Plan. Great care must be taken in the construction of this road, however, since it will open the region up and remove the last barrier to the exploitation of the interior of the Massif de La Hotte, its isolated location. We do not recommend the completion of this road until an active national parks program is in place with personnel committed to the supervision of all activities in Parc National Pic Macaya.

The existing road to and through Parc National La Visite is adequate for the present (but should eventually be improved). Additional roads are necessary to the camping facility and Park Headquarters. This road can follow an existing rough trail and old logging road. The old logging road should be upgraded to allow vehicles to pass to Tete Opaque. No roads should be constructed to Morne d"Enfer.

4. Administration

A. Suggested Annual Budget

The total budget for the national parks program over a five year program includes: 1) set up costs for the Central

Office in Port-au-Prince; 2) set up costs for each park; 3) signs; 4) exhibits; 5) publications; 6) training personnel; 7) research; 8) operating the Central Office in Port-au-Prince; 9) operating parks; 10) operating vehicles; 11) salaries in the Central Office; 12) salaries in parks. The total for these items over a fiver year period is $2,117,440. The annual budget for the first year ($519,350) is very high because of the expenses of purchasing equipment. The annual budget for each year after the first is approximately $400,000. The exact costs are outlined in the summary (Fig.5). The justification for all budget items are discussed in the Stewardship Plan. In summary, the four largest items are: 1) operating the Central Office (10% of total cost); 2) operating the parks (14% of total); 3) salaries for Director and other Central Office staff (27% of total); 4) salaries for Park Supervisor and personnel in parks (24% of total). These four items account for 75 percent of the total budget. The cost of setting up the parks and Central Office is six percent. The cost of training personnel is three percent. We believe that research is a very important component of the implementation of a national parks program. The cost of the research package proposed is $250,000 or ten percent of the total budget. We believe that personnel from the staff of the national parks program should work closely will all researchers, and that this should serve as an important part

of the training process for all national parks personnel during the first five years. The staff should also participate in the publication process of the results of the research. The results of the initial inventory should be published in 1986. The results of the five year research program would be published in 1990.

B. Routine Maintenance Schedule

A regular schedule should be established to insure communication between the parks and the central office in Port-au-Prince. The Park Supervisors should spend three weeks in the parks and one week in the central office. Within the parks a regular schedule should be established for the following components.

1. Access Roads - A work crew should be assigned to improving the quality of the access road to each park. After the roads are in suitable condition to allow safe and routine access to the parks, they should be "maintained" on a monthly basis to remove fallen rocks and insure proper drainage.

2. Trails - The trails through the areas of each park where vegetation is dense, and especially in Parc Macaya where trails become overgrown with cutting bamboo Arthrostylidium haitiense and sharp spined blackberrys Rubus spp., should be cleared every six months. In steep areas

care should be taken to landscape the trails at the same time to prevent erosion.

3. Park Headquarters - The Park Supervisor should develop a checklist for regular maintenance of the toilet, sinks, septic tank, cisterns, stove, refrigerator, propane gas and public quarters.

4. Central Office - The Director should develop a checklist for regular maintenance of all equipment, supplies and the building. The Director should delegate this authority to the Assistant Director for Administration.

5. Vehicles - The Director should develop a schedule where all vehicles are maintained on a regular basis. Each vehicle should receive a thorough inspection every three months. The Director should delegate this authority to the Assistant Director for Administration.

C. Infrastructure

The national parks "program" should be organized as a discrete unit with the ability to make decisions on policy, management and budget. All aspects of the park should be under the direct control of the Director.

The location of the national parks program within the structure of the GOH has never been clearly designated. We believe the best solution is to name the program Parcs Haiti and make no reference to a department, service or institute. Parcs Haiti should be a free standing unit of the GOH under

the supervision of a board of trustees designated as the National Park Authority. The organization of the program is diagramed below.

National Parks Authority

Director of INAHCA or ISPAN

Director of Direction des Ressources Naturelles, (MARNDR)

Director of Office of Tourism

Director Societe Audubon d'Haiti (SAHPE)

Prominent Private Citizen

International Representative

"Parcs Haiti"

Central Office

Component Parks and Natural Sites

The National Parks Authority would be responsible for meeting with the Director of Parcs Haiti on a regular basis, and assisting the Director to improve funding, develop long range goals and resolve points of conflict.

The actual administration of all aspects of national parks in Haiti should be the responsability of the Director of Parcs Haiti.

The organization of Parcs Haiti can be accomplished in any one of three ways. We recommend creating a new program

within Haiti. During the first year a Director and Assistant Director for Administration should be hired as well as a complete staff for each park (Park Supervisor, seven park guards, 15 park workers) and a complete office staff. The additional two positions (Assistant Director for Education and Recreation; Assistant Director for Conservation and Research) are important to the development of the parks and parks program, and require some technical abilities. If individuals with the interest and training for these positions do not exist in Haiti, then international personnel could be used to fill the positions on an interim basis (two to five years). The University of Florida, IUCN, Parks Canada, U.S. National Parks Service and World Wildlife Fund should be consulted for advice as to whom to hire. The University of Florida-Florida State Museum would be willing to coordinate this process.

The second possibility is to contract out the complete operation of Parcs Haiti to an international organization concerned with conservation and national parks. This concept has the advantage of being able to draw upon the experiences of the group in other countries and the high level of expertise of the group. It has the disadvantage of being new and inexperienced in Haiti (so there will be a significant loss of momentum) and being temporary and foreign. On the balance we feel that this is a good idea and should be implemented <u>if</u> our primary recommendation is

not possible. This organization should be under the supervision of the same National Parks Authority discussed above. The IUCN is a logical choice for this group. The University of Florida-Florida State Museum would also be willing to serve in this capacity.

The third possibility is to continue the existing program jointly supervised by MARNDR and INAHCA. If this method of administering the parks is selected then it is imperative that changes be made in the way the program is currently organized. We recommend the following changes.

1. Designate a single administrative head to the program.
2. Create a staff committed to the parks that is drawn from both INAHCA and MARNDR. Two individuals from each organization should be designated.
3. This group of five individuals would be responsible for the parks. The Director and two assistants would be assigned to the Central Office in Port-au-Prince. The other two individuals would be assigned to the parks (one in each park as a Park Supervisor).
4. This group of five would receive training in Haiti on parks techniques and natural science (see discussion below under "Training Programs").
5. This group should be given a new name. We recommend Parcs Haiti.

6. The single administrative head of Parcs Haiti should should be given complete control of the budget of the parks.

7. The group should have a separate office that is not a part of either MARNDR (at Damien) or INAHCA (at MUPANAH) so that it will have an identity of its own.

8. The group will still be supervised by the Directors of INAHCA and Ressources Naturelles in MARNDR. Since these two individuals are part of the proposed National Parks Authority we recommend the creation of this authority even if the third possibility for creating a program is selected.

Our primary recommendation for the creation of a national parks program in Haiti is the creation of a new Parcs Haiti authority, although we believe that either of the alternative possibilities would be able to accomplish the same goal of implementing a national parks program.

The decision on which program to follow should be made by March 1, 1986. The decision should be made by a majority vote of the seven individuals discussed as the National Parks Authority which can meet or a one time basis to make this decision or become a permanent group advising the national parks program (Parcs Haiti).

D. Personnel

The organization of Parcs Haiti is diagramed below.

PARCS HAITI

Director

Assistant Director for Administration

Assistant Director for Education and Recreation

Assistant Director for Conservation and Research

Central Office

Secretary

Librarian-Secretary

Chauffer

Commissar

Office Guardian

Parc National La Visite	Parc National Pic Macaya
Park Supervisor	Park Supervisor
Guardian Headquarters	Guardian Headquarters
Cook	Cook
Park Guards (7)	Park Guards (7)
Park Workers (15)	Park Workers (15)

E. Logistics

The Central Office in Port-au-Prince would coordinate all aspects of the program in national parks. All files, plans, publications, correspondence and budget information should be maintained there. The Director would interact upward with the National Parks Authority, laterally with other programs and supervise all activities of Parcs Haiti. The Assistant Directors will work with the Director and regularly tour the parks and make reports. The Park Supervisors will implement the directions from the Central Office and supervise the personnel in each park. The Park Supervisors should spend one week each month in Port-au-Prince working with the Central Office staff and planning. A radio communication network should exist between the Central Office and each park, and there should be regular discussions between the Park Supervisors and a designated person in the Central Office.

The Director of Parcs Haiti should meet with the National Parks Authority at least twice a year.

5. Interpretation and Research

The programs in interpretation and research are two of the most important elements of the national parks program. Interpretation is the reponsability of the Assistant Director for Education and Research. Research is the

responsability of the Assistant Director for Conservation and Research.

A. Interpretation

We recommend the following as part of a program in interpretation.

1. A series of temporary exhibits in Central Office (year one).

2. Informative signs at entrance to each park (year one).

3. A brochure on the parks that promotes the most important features, provides a species list of important organisms, discusses the rules of the park and the purpose and concepts of the parks (year one).

4. Four exhibits in the Park Headquarters at Morne La Visite (year two).

5. Two exhibits in the Park Headquarters at Macaya (year two).

6. Two permanent exhibits in the Central Office Park Headquarters (year two).

7. Nature trails with educational signs in each park as designated on the maps in the Stewardship Plan (year two).

8. Information signs at designated locations off the road beyond Furcy and along the road to Jacmel (year two).

9. Training the Park Supervisors to be interpretive naturalists (continual).

10. Developing a slide-tape presentation (French, Creole, and English versions) for use in informing the public of the national natural patrimony and the value of the parks (year one).

11. Designating national species, and promoting a better understanding of these species. We recommend the following.

a. Plagiodontia aedium - National Mammal

b. Phaenicophilus poliocephalus

(Grey-crowned Palm Tanager) - National Bird

c. Didymopanax tremulum - National Tree

d. Fuchia pringsheimii - National Flower

e. Karst topography - National Geological Feature

These features can be promoted in postage stamps, newspaper articles and posters. They can also be topics of discussion in schools.

12. There should be a regular weekly newspaper feature on the national parks written by the Director of Parcs Haiti or by special contributors. This feature should be in a prominent place in at least one newspaper, and should also be featured in the English language Haiti News.

13. Writing booklets on the special features of each park based on scientific results from inventories and ongoing research projects (year two and three).

B. Research

Research is one of the most important elements of the development process for the national parks program. An active research program will generate data on which management decisions must be based. The research program will also provide data on the national natural patrimony (endemic species, many of which will be new). A third and very important aspect of the research program is that by actively involving the staff of Parcs Haiti in the research activities (field work, analysis, publications) one of the most important and difficult aspects of the training program is completed (i.e. training in specific topics) at the same time that data and publications are being generated. Research personnel can also be required to lead training sessions while they are in Haiti. The most important research goals are outlined below. The costs of these programs are listed in the budget sheet and in the Stewardship Plan.

1. Publication of previous data from inventory (year one).
2. Research on the composition and requirements of the major plant communities. (five year study)
3. Research on the basic biology of the endemic mammals (endangered species). (five year study)
4. Biology of the Black-capped Petrel (three year study)
5. Regular inventories of avifauna (five year study)

6. Meteorological studies (five year study)
7. Invertebrate faunal studies (five year study)
8. Habitat requirements of herpetofauna (three year study)
9. Publication of the above data in 1990 (year five)

6. Park Headquarters and Stations

The facilities of the parks program are very important because they not only provide a working environment for Parcs Haiti personnel and colleagues, but also signal the existance of a viable parks program. This is especially important within the boundaries of Parc National Pic Macaya and Parc National La Visite where the Parc Headquarters buildings, depots and outposts demonstrate that the parks are official and that authority exists in the region. The parks facilities should be constructed at the earliest possible date (with existing funds, or in the first year of the new five year budget).

A. Location

1) Central Office This structure should be distinct from either MUPANAH or Damien. It can be located in Port-au-Prince or Petionville. We feel it would be desirable to build a facility for the parks at the designated National Botanical Garden. The existing plans for the Park Headquarters (see below) could be

modified as plans for the Central Office.

2) Park Headquarters at Parc National La Visite
This structure (see figure below) is to be located near the cascade in the central part of the park above the campground. This location is in an attractive wooded area (Bois Cascade) and is central to all activities in the park.

3) Depots and maintenance areas for Parc National La Visite will be in the existing buildings at the Scierie.

4) An existing caye can be rented or purchased at Tete Opaque as an outpost.

5) Park Headquarters at Parc National Pic Macaya
This structure is to be of the same plan as the La Visite facility and is to be built in "Bois Pipirite" at 1428 meters two kms north of Portal Formon (Madame Robert's house) and two kms SE of Pic Formon (year one).

6. Depots and maintenance facilities should be located near Portal Formon. The road will eventually be constructed to this area, and since the area is flat it is suitable for construction of a landing strip. An existing caye can be rented or purchased, such as the

caye of Madame Robert's that has been used by the inventory team (year one).

7. An inexpensive caye should be constructed at 1000 meters elevation in the ravine of the Riviere Ravine du Sud as an outpost. It should be modeled after Madame Robert's caye that the inventory team used (year two).

8. An inexpensive caye should be located on the north side of the park near 700 meters beside the Riviere La Guinaudee. An existing caye can be rented or purchased. This caye would serve as an outpost.

B. Type and construction

The plans for a Park Headquarters have been drawn and are available (submitted to INAHCA, MARNDR, and USAID on 17 December 1985). The plans call for a basic stone or cement block structure with a large front porch and central room for public meetings. There are four rooms around the central room to serve as office, laboratory, living and depot space. In the rear of the building are rooms for cooking, eating and a bathroom. The water supply for the headquarters is via two 300 gallon cisters that gather rainwater off of the rear roof of the building. This design is very flexible, and the function of rooms can change as the program grows. There is a loft for sleeping or storage.

The Park Headquarters would provide office space for the Park Supervisor, a work room, a sleeping room for the Park Supervisor, sleeping space for visiting scientists and technicians, and a guest room for visitors from the Central Office.

The building is to be constructed out of rock or cement. Wood is used for the interior supports. The roof is metal. All materials are available at the site or in Port-au-Prince. A materials list is provided with the plans.

7. Integration of the Parks with region

Parcs Haiti should make a special effort to improve the quality of life in the region around the parks in the Massif de la Selle and Massif de la Hotte. If the parks are going to be successful they must be viewed as being of local importance as well as in the national interest.

A. Jobs

The Personnel from the parks should be hired from the region. The available jobs associated with each park are listed below. Regular jobs = R; Occassional jobs = I.

	Number positions
1. Park Guards	7 (R)
2. Park Workers	15 (R)

3. Headquarters Cook	1	(R)
4. Headquarters Guardian	1	(R)
5. Other building guardians	3	(R)
6. Guides (estimate)	10	(I)
7. Special project workers (estimate)	10	(I)

Twenty seven jobs will be generated in each region by the permanent staff of the parks. Additional jobs will be available as the Park Headquarters is being constructed, and during phases of reforestation. Jobs will also be generated as recreation and tourism increases. Some of the jobs will be as guides, while others will be associated with renting horses and donkeys to visitors and selling supplies. The amount of money in the region will increase because of regular salaries being paid to Parcs Haiti personnel, and more money means an increased need for supplies. This will provide more jobs in the service sector of the region (store owners, farmers).

B. Watershed Management

One of the main goals of the park is to improve the quality of the environment and of the associated watersheds. This will have some impact on residents on the plains and along the rivers below the parks. More water will be available for human consumption and irrigation. The quality

of the water will improve. The rate of soil erosion will decrease. The danger of flooding to inhabitants living near rivers will decrease. All of these will be possible because major reforestation projects will be undertaken in each region.

C. Model Programs

The following model programs are proposed for the region of each park in association with Parcs Haiti.

1. Communal Firewood Forest Project.

2. Reforestation and Fruit Tree Propagation Program in cooperation with MARNDR and PVOS in region.

3. Technical Assistance Program coordinated by the Park Supervisors.

4. Local artisan, handicraft and recreation program coordinated by the Assistant Director for Education and Recreation.

8. Recommended Training Programs

Since there has not been a tradition of natural science, conservation or national parks in Haiti it is necessary and important to implement an active training program for all national parks personnel. After careful reflection we believe that the most cost effective and

appropriate training program is for seminars and workshops to be conducted in Haiti. Each workshop or training session should last about two weeks and be conducted by a carefully chosen international individual or group. There should be four training sessions per year (every three months). These training sessions should take place in the Central Office and within the parks. There could be more frequent training sessions during the first year of the program, and fewer as the program develops. A possible training program is outlined in Fig.6.

A. Individuals

Everybody associated with the parks should receive training of some kind. The nature and duration of the training are listed in the following table.

B. Location and Training

With the exception of the Director, who should be encouraged to participate in the international parks seminar, all training should be in Haiti. In this way specific training is possible and all staff of the Parcs Haiti program can receive some benefit from the instructors and training sessions. In addition, research biologists can be involved in the training sessions. This is good economy and encourages individuals to focus their training on the Parcs Haiti program rather than use the training as a stepping stone to a higher position in Haiti or to leave

Haiti. It is important to create as much long term stability in the Parcs Haiti program as possible.

C. Specific Courses and Topics

The need for specific topics will be identified with greater precision as the staff is hired and the background of the Parcs Haiti staff are known. At the initial stage we can identify the following topics which are of major concern.

National Parks Topics

1. History of National Parks and National Parks Policy
2. Biosphere Reserves
3. Administration of National Parks
4. Personnel Management and Decision Making
5. Financial Accounting and Data Management
6. Public Relations and Advertising
7. Museum Studies and Interpretation
8. Principles of Recreation and Tourism

Research and Conservation Topics

1. Biological and Geological History of Haiti

2. Collecting Techniques - Botanical

3. Collecting Techniques - Zoological

4. Ecological Methods

5. Cartography, Photo Interpretation and Remote Sensing

6. Major Features of Haiti - Botanical

7. Major Features of Haiti - Zoological

8. Major Features of Haiti - Geological, Hydrological, Meteorological

9. Analysis of Data, Statistical Techniques and Publication Techniques

Some of these 16 topics can be combined into one training session, while others (such as "major features of Haiti") represent more than one training session. The training sessions can be organized as distinct one to two week workshops and seminars. All research staff should be required to present training sessions as part of their research activities, and to include selected Parcs Haiti personnel in specific aspects of their research activities.

9. Concluding Comments on Parcs Haiti and Biosphere Preserves

The concept of a "Biosphere Reserve" has been approved by UNESCO under the Man and the Biosphere Program (MAB). Biosphere reserves are examples of the major landscapes of the world complete with characteristic landforms, flora and fauna as well as the various patterns of human use and adaptation of the region. The concept of a biosphere reserve is intended to promote a balanced relationship between people and the natural environment. The emphasis in biosphere reserves is demontrating the value and need for conservation and the link between wise land use policies and conservation and sustainable development. We believe that the concept of a biosphere reserve is very well suited to the nature of the national parks in Haiti, and we encourage Parcs Haiti to proceed with the implementation of a biosphere reserve program.

Biosphere reserves consist of core areas, which are lands already under some form of protection. In the case of Parcs Haiti, the core areas are Parc National Pic Macaya, Parc National La Visite (and the various sites listed in the decree of 23 June 1983). In biosphere reserves core areas are surrounded by zones of cooperation, in which a variety of resource uses may take place, such as forestry, ranching, farming or tourism. In these zones solutions to man-environment problems are sought by involving local people. This is often done by including selected local residents in the discussion process, often via a committee

made up of Parks personnel and local residents. The zone of cooperation is analogous to the "Buffer Zone".

The concept of a national park surrounded by a buffer zone, as discussed in the Stewardship Plan lends itself well to the principles of a biosphere reserve, especially considering the complicated land use practices in and around the national parks and the need to resolve the problems of land use and land tenure in the region. We also believe that the habitats of Parc National La Visite and Parc National Pic Macaya are unique and worthy of inclusion in the biosphere reserve program of the world's major landscapes. In 1985 there are 243 biosphere reserves in 65 countries. Parcs Haiti should begin from its conception to organize the national parks program and especially the two great national parks of Haiti as biosphere reserves.

Chapter I

The Concept of National Parks in Haiti

1. Introduction

Haiti is an island nation with a long history of human occupation and alteration of the diverse ecosystems of the western third of the island of Hispaniola. We know enough of the biological diversity of the country based on an analysis of fossil vertebrates from cave and sinkhole deposits and of fossil pollen in sediments to say with certainty that until the time humans arrived on the island between 5000 and 7000 years ago remarkably diverse floras and faunas were present in Haiti (Woods, et al. 1986). Historical accounts indicate that significant elements of that diverse flora and fauna were present until after the time of Columbus, and that many regions of the country were still forested and contained diverse natural ecosystems into the early part of this century (Wetmore and Swales, 1931; Wetmore and Lincoln, 1933; Wetmore, unpublished field notes; Ekman, 1926, 1928, unpublished catalog; Cohen, 1984; Lowenstein, 1984). Our objectives in this report are to present a synthesis of the biological survey initiated by the Unites Stated Agency for International Development (USAID) in association with the Ministere de l'Agriculture des Ressources

Naturelles et du Developpement Rural (MARNDR) and the Institut National Haitien de la Culture et des Arts (INAHCA) and to provide a series of recommendations on how to proceed with the stablishment of a program of natural resource conservation, preservation and management. The analyses and recommendations are focused on two regions of Haiti, one in the Massif de la Selle and the other in the Massif de la Hotte. These two mountainous areas are among the most important sources of water in the country, and contain the highes mountains of the Republic. Many endemic plants and animals are restricted to these regions of Haiti. In recognition of the importance of the regions to the natural patrimony of Haiti, as well as to their role in water conservation, a specific zone in each massif was set aside as part of the special domain of Haiti and placed under the protection of the government as soverign lands to be known as national parks. Legislation passed in 1983 created Parc National Pic Macaya in the Massif de La Hotte and Parc National La Visite in the Massif de la Selle (Map 1). These are the first national parks of significant size in Haiti, and therefore have special importance in the history of the Republic. Our objective is to provide data, analyses, historical comparisons, recommendations and a plan of operation that will be of use to the government of Haiti (GOH) in planning and implementing a national parks program in the most effective and timely manner possible. The recommendations in this report are based on our own personal analyses and reflect our experiences in Haiti as well where we

recommended the formation of national parks in mountainous areas of the Southern Peninsula nine years ago (Woods and Rosen, 1979), as in national parks in other countries of the Antilles, Africa and Costa Rica. Our park plan may not be the only viable solution to the question of how to create a functional program in national parks in Haiti. We are not sure what the best road to take is because of the many financial, administrative, social, historical and scientific questions that have weighed heavily on our minds as we have tried to formulate a national park program that is best suited for Haiti. With the assistance of the many important institutions and programs discussed in our document, Haiti will be able to create a long lasting program in the conservation of natural resources and the protection and promotion of its natural patrimony.

2. Terminology

Many organizations, individuals and terms are used in the course of this report. In order to provide a guide to the reader we are providing a list of the major terms used. When a name for an institution or organization is used for the first time in the text it is spelled out completely, but thereafter only the acronym is used.

Parcs Nationaux Naturels d'Haiti (Parcs Haiti)

Florida State Museum (FSM)

Government of Haiti (GOH)

Departement des Mines et des Ressources Energetiques (DMRE)

Institut National Haitien de la Culture et des Arts (INAHCA)

Institut de Sauvegarde du Patrimoine National (ISPAN)

International Union for the Conservation of Nature and Natural Resources (IUCN)

Ministere de l'Agriculture, des Ressources Naturelles et du Developpement Rural (MARNDR) [also known as DARNDR and sometimes as Damien].

Musee du Pantheon National d'Haiti (MUPANAH)

National Conservation Strategy (NCS)

National Parks Service of the United States (NPS)

Office National du Tourisme et des Relations Publiques (ONTRP)

Parks Canada (PC)

Societe Audubon d'Haiti pour la Protection de l'Environnement (SAHPE)

Unites States Agency for International Development (USAID)

United Nations Environment Program (UNEP)

United Nations Educational, Scientific and Cultural Organizations (UNESCO)

World Conservation Strategy (WCS)

World Wildlife Fund (WWF)

The following words are used in the text of this report without definition. We will provide a brief definition of each below.

Biotic diversity

The desired condition of having the greatest number of compatable species associations in natural area. The goal of our stewardship plan is the increase species diversity in the parks and not just to increase the numbers of a few selected species.

Conservation

The practices and/or customs of man that permit the perpetuation and sustained yield of renewable resources and the prevention of waste of non-renewable resources.

Edaphic factor

A condition or characteristics of the soil, (physical, chemical or biological) that influences organisms.

Endangered species

Species in danger of extinction and whose survival is unlikely if the causal factors continue operating.

Endemic species

A species confined to the island of Hispaniola or to a region of Hispaniola when so designated.

Migratory species

Species that regularly move beyond their regularly occupied geographic location, and in the sense of this study species that seasonally depart Hispaniola.

Preservation

The practice of totally protecting a species or habitat from any exploitation.

Rare Species

Species with small populations, usually localized within restricted geographical areas or habitats, that are at risk.

Resident Species

Species that do not migrate.

Restoration

The act of putting the ecosystems or a specific unit of the ecosystem (local habitat) back into prior (more natural) condition. The activity is one element of a stewardship plan.

Site Exhibit

An exhibit located within the boundaries of the national park or at a scenic location with a view of the park. The exhibit is capable of withstanding the effects of weather with only a shelter to protect it from direct rain.

Stewardship

The act of working with all aspects of a natural ecosystem so as to promote and protect its natural intergrety. The word has been chosen to contrast to term management, which we believe implies an active state of manipulation and "tinkering". Stewardship in its ideal sense can be passive and allow the ecosystem to recover and maintain itself without extensive

manipulation. Some restoration activities are part of the process of stewardship.

Threatened Species

Species likely to become endangered in the near future it the causal factors continue operating.

Names in Haitian Creole

Whenever possible the names for regions and conditions have been designated in Haitian Creole. The standard spelling and usage follows Valdman (1981). We have done our best to check the designations and authenticity of all Creole names with local authorities on a particular region or subject.

3. Conservation Strategy in Haiti

The national patrimony of Haiti consists of a blend of natural and cultural history. This "history" consists of physically tangible items such as endemic species and cultural artifacts as well as intangibles such as unrecorded folk music, culture and unique vistas and beautiful landscapes. No single item of natural or cultural history is any more important than another. All aspects of the national patrimony are to be cherished and conserved to the degree that national pride and identity dictate. The Conservation Strategy for Haiti should: 1) identify these items; 2) formally acknowledge their existence and worth; 3) follow a standard decision making process to

determine their disposition. All cutural and natural history items must or can be conserved, but the process of definition, deliberation and decision making should not be compromised. The Government of Haiti (GOH) should carefully design and designate the responsibilities of its departments and institutes so that all elements of the national patrimony are encompased by an administrative unit with a clear mandate for the evaluation and eventual disposition of a particular kind or class of patrimony. Several departments and institutes of the GOH are responsible for various aspects of national patrimony (see Figure 1). We stress, however, that while overlapping responsability for conservation may appear ideal on the surface, it is not ideal in practice. Disputes regarding authority and perceived responsability often can develop. We recommend that the GOH reduce the level of overlap between departments and institutions where possible and work each unit of the national organizational structure to clearly define their areas of responsability. When it is not clear which unit has responsability for all aspects a particular class of national patrimony, such as in the case of the national natural patrimony, then the GOH should consider establishing a new administrative unit.

Many of the cultural and natural history items alluded to above are not renewable and thus their conservation strategy should be distinct from that of renewable natural resources. A museum piece or scenic vista can be "used" in the sense that it

can be looked at, appreciated and studied, but actual physical use may quickly destroy it. Similarly, a forested watershed may be "used" to precipitate, obtain and moderate clean water supplies, but actual physical use of the same watershed may destroy it just as surely as the physical handling of a prized national artifact would destroy the artifact. For this reason we advise caution in adopting the philosophy that all natural resources are renewable and thus can be "developed" for sustained use. The definition of conservation presently proposed by the IUCN is as follows:

> The management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations.

Note that the emphasis is on management of the human use rather than on the management of the resource itself. By this definition conservation is positive and covers the spectrum of specific approaches. These include PRESERVATION of resources such as cultural artifacts and critically rare plants and animals; MAINTENANCE of resources such as viable populations of native plants and animals and unspoiled beaches and vistas; SUSTAINABLE UTILIZATION of resources such as rich alluvial plains, forests, and game birds; RESTORATION of resources such as deforested mountain slopes;and ENHANCEMENT of resources such as watersheds, forests and upland areas.

In Haiti the preservation of resources such as endemic species and the enhancement of resources such as watersheds and forests become a common concern. This is because in most regions of the country so much habitat for endemic species has been altered from its natural state that many species of plants and animals have become extinct or been severely reduced in numbers. The areas where habitats have been least disturbed are in remote montane regions. These are the same regions where the watersheds of some of the major river systems of Haiti are located. These areas, such as specific regions of the Massif de la Selle and Massif de la Hotte of southern Haiti are places where forest cover remains and endemic species are still present. The objective is to save important elements of the national natural patrimony by saving habitats. The habitats that are preserved, maintained, restored or enhanced improve the quality of the ecosystem and promote water and soil conservation. Therefore, in a country such as Haiti where land and resources are limited the effort to save important elements of the national natural patrimony is not a luxury that the country cannot afford, but rather a critical link in the preservation of its natural resources and especially its soil and water resources. Sites for national parks and conservation areas must be carefully selected with the aim of preservation of natural patrimony and conservation of water and soil.

4. Actions of the Government of Haiti in Conservation

The Government of Haiti (GOH) has taken an active role in the past to protect the environmental and natural patrimony of the Republic by passing laws and decrees. The law of 17 August 1955 (Moniteur number 87, 26 September 1955) regulated cutting, transporting and selling wood, protected the environment and created "Zones sous protection" and "Zones reservees." Law Number Eight (Des Forets) of the Rural Code of Francois Duvalier (Moniteur number 51, 28 May 1962) passed even stricter legislation concerning the protection of forest resources and controled activities in forest reserves. The decree of 31 March 1971 (Moniteur number 26, 1 April 1971) regulated hunting and protected nine categories of birds in accordance with the recommendations of the "Convention pour la Protection de la Nature et la Preservation de la Fauna Sauvage dans l'hemisphere occidentale," which Haiti ratified. In addition to the laws of 1955 and 1962 protecting the natural forests of the Republic and the law of 1971 regulating hunting and protecting certain bird species, the GOH has passed legislation concerning national parks. The decree of 1968 (Moniteur number 23, 18 March 1968) created "Parcs Nationaux" and "Sites Naturels" under the joint administration of MARNDR and the Office National du Tourisme. The sites that were selected for protection were "Sources Puantes", "Sources Chaudes," "Sources Cerisier et Plaisance," "Fort Mercredi," "Fort Jacques," "Fort Alexandre," "la Citadelle," and "lac de Peligre." The concept was expanded to include natural lands in the "Communique" of 5 May 1981 that

appeared in the Nouveau Monde which discussed establishing the first "Parc Naturel" in Haiti in the area between Morne La Visite and Morne Kadeneau in the Massif de la Selle.

The official creation of "Parcs Nationaux Naturels" was by decree published in Le Moniteur (number 41, 23 June 1983). The decree listed as existing laws: four articles of the Constitution; a 1921 law on public utilities; a 1926 law on "Forets Nationales Reservees"; a 1940 law concerning "monuments historiques"; a 1958 law organizing DARNDR; the decree of 1968 naming "Parcs Nationaux" and "Sites Naturels"; the decree of 1979 creating ISPAN; a 1982 law on regionalism; a 1982 law on uniform structures; and the decree of 1982 creating the Musee du Pantheon National d'Haiti (MUPANAH).

The decree of 23 June 1983 continued the protection of the eight sites discussed above by declaring them to be "Parcs Nationaux Naturels." In addition, "Parcs Nationaux Naturels" were created at "Morne La Visite du Massif de la Selle" (2000 hectares) which hereafter we will designate as Parc National La Visite and "Morne Macaya du Massif de la Hotte" (2000 hectares), which we will designate as Parc National Pic Macaya.

Article 2 of the decree directs that "l' administration generale, la protection et la mise en valeur des parcs et sites naturels terrestres et maritimes sont a la charge du

Departement." The "Departement" is not identified in Article 2 nor any place in Article 1.

The major responsibilities for the national parks program of Haiti are listed in Article 6 of the 1983 decree under additional responsibilities of MARNDR. Article 3 is quoted below:

> Artcicle 3. En plus des attributions courantes definies dans la Loi Organique du 7 avril 1958, le Departement de l'Agriculture, des Ressources Naturelles exerce les attributions suivantes ayant trait a la gestion des parcs et sites naturels;
>
> a) proteger les conditions ecologiques des parcs et sites naturels.
>
> b) entreprendre l'inventaire des especes animales et vegetales des parcs et sites naturels.
>
> c) etudier les caracteristiques des especes endemiques de haute valeur scientifique ainsi que celles des facteurs physiques: geologie, sols, climats et autres des parcs et sites naturels.
>
> d) identifier les aires naturelles terrestres ou maritimes du territoire national presentant des caracteristiques ecologiques uniques ou speciales et qui meritent d'etre declarees parcs ou sites naturels.
>
> e) preserver les parcs et sites naturels de toute

deterioration physique.

f) autoriser et superviser dans les aires des parcs et sites naturels tous travaux de recherche entrepris par la communaute scientifique.

g) diffuser toutes informations relatives aux parcs et sites naturels.

h) offrir les facilites d'acces et autres commodites aux visiteurs.

5. National Priorities and Conservation Goals in Haiti

Our interpretation of the primary conservation goals of the GOH are: 1) watershed management; 2) soil stabilization and conservation; 3) enhanced and sustained potable water supplies; 4) sustained yield forest products. We endorse a strong and unwaivering commitment to these goals, which can greatly facilitate the preservation of endemic species, the maintenance of natural biotic diversity, the development of a parks-related tourism industry, and the protection of natural ecological processes.

Within the 23 June 1983 GOH National Parks decree we note eight specific goals and responsabilities for the national parks program:

a. Protection of natural ecological conditions and processes.

b. Identification of sites possessing a significant

element of national patrimony.

c. Preservation of existing parks and potential park sites.

d. Inventory and describe natural plant and animal species.

e. Research and propose necessary management for endemic species.

f. Research and describe critical processes of the natural ecosystems.

g. Develop an interpretation and education program to inform the people of Haiti of their patrimony.

h. Develop a recreation and tourism program based on sites of national patrimony.

Our estimate of the priority rank and relative importance of each of these specific goals is as given above. The rationale for our ranking is simple: protection of the natural ecological processes and conditions goes furthrest to ensure achievement of all that follow. On the other hand, the identification and preservation of an endangered species or even an isolated physical site removed from the natural context (ecosystem) is a last ditch effort that is doomed to failure in most cases. Identification, research and interpretation of endemic or even presently unknown species species will be possible only if the natural sites on which they occur are secured now. To wait is to risk describing the past rather than the present.

We have synthesized these statements, as well as our many conversations with personnel from the governmental and private sectors into the following list which we believe represents the purpose of the Parcs Nationaux Naturels program in Haiti.

1. The protection of natural ecological conditions and processes. The two most important consequences of these actions are: 1) the preservation of watersheds, thereby improving the quality of life for all inhabitants of Haiti in areas adjacent to or under the influence of national parks; 2) the preservation of natural species diversity and therefore the national natural patrimony.

2. The promotion of the national natural patrimony. The two most important consequences of this activity are: 1) the education of the citizens of Haiti about the unique features of their country that make Haiti special; 2) the increased possibility that wise decisions of long range importance can be made concerning the utilization and development of the natural resources of Haiti.

3. The development of a recreation and tourism program that will take advantage of the unique physical location and beauty of the parks as well as special features of the flora, fauna or geology. We believe that it is possible for the citizens of Haiti to benefit from the parks at both the local and national

levels without damaging the quality of the parks if a careful management plan is developed and implemented.

CHAPTER II

Organizational Plan

Parcs Nationaux Naturels d'Haiti

Parcs Haiti

1. Objectives

The objective of this chapter is to recommend a plan to create a unified program to administrate all units of the National Parks of Haiti, and to implement sound programs in stewardship, conservation, education, recreation and public awareness.

2. Special Concern

The major concerns about the existing program in national parks in Haiti that have been expressed by various individuals we have interviewed during the course of our investigation are listed below.

1. There is a lack of a tradition of national parks in Haiti, and therefore the philosophy of "preservation" of the natural patrimony is a new concept that must be accepted.

2. There are few people in Haiti trained in ecology or natural resource planning.

3. There are many other priorities in the country, and human needs should take precedence over long range preservation and conservation goals.

4. There is no organization in Haiti that is clearly appropiate to manage the national parks. MARNDR is responsible for developing a sound program to improve the agricultural potential and "utilize" the natural resources of the country. INAHCA is responsible for preservation of the national patrimony with an emphasis on cultural and historical events. The Office of Tourism is responsible for promoting tourist activities are recreational facilities.

5. There was conflict between MARNDR and INAHCA in working together during the initial stages of implementing a program in national parks, and the program did not move ahead as rapidly as expected by international organizations.

6. There are not enough funds available to support a meaningful program on national parks.

3. Parcs Nationaux Naturels d'Haiti

A. Introduction

We propose that the most effective way to establish a viable program in national parks in Haiti is to create a new GOH organization responsible for the preservation of the national natural patrimony. This organization should be called the "Parcs Nationaux Naturels d'Haiti", and given the acronym "Parcs Haiti". We have chosen not to designate the program as a department, service or institution in order to

emphasize the independent status of the new program. The "Parcs Nationaux Naturels" as currently defined by law includes eight sites designated in the decree of 18 March 1968 and reiterated in the decree of 23 June 1983 as well as Parc National Pic Macaya and Parc National La Visite as described in Article 1 of the 1983 decree. The chief administrative officer of Parcs Haiti should be a "Director" who would be in charge of the supervision of "all" activities of the organization. The rationale for the creation of Parcs Haiti we believe lies in the wording of Article 2 of the decree of 23 June 1983 which states that "l'administration generale, la protection et la mise en valeur des parcs et sites naturels terrestres et maritimes sont a la charge du Departement." Since the "Departement" is not named or identified and since we recommend concentrating all activities under the direction of a "single" administrative unit we recommend interpreting the intent of the law to be the creation of a program which should be designated as Parcs Nationaux Naturels d'Haiti. In order to have a short attractive name for the program that is easy to remember and identify with we recommend using the name Parcs Haiti whenever possible.

Areas of the natural patrimony that should also be included in the domain of Parcs Haiti include marine areas of unique importance, recreational beaches, scenic areas, caves and sinkholes with unique elements of the past or

present flora and fauna, zoological parks, botanical gardens and natural biospheres of importance because of their unique features and influence on surrounding areas. A list of actual areas under the domain of Parcs Haiti is presented below. We have included all areas mentioned in the law of 1983.

Parcs Nationaux Naturels (current Law)

Sources Puantes	(10 ha)
Source Chaudes	(20 ha)
Source Cerisier et Plaisance	(10 ha)
Fort Mercredi	(5 ha)
Forts Jacques et Alexandre	(9 ha)
Lac de Peligre	
Parc National la Citadelle	(250 ha)
Parc National Pic Macaya	(2000 ha)
Parc National La Visite	(2000 ha)

Clearly, some aspects of the program in national parks as created by the decree of 23 June 1983 fall into areas of special concern to either ISPAN (which is currently part of INAHCA) or MARNDR. For example, at the present time ISPAN is responsible for national monuments, and Fort Mercredi, Fort Jacques, Fort Alexandre, and la Citadelle Laferriere even though they are part of "Parcs Nationaux Naturels" as legislated in the decree of 1983. In many aspects of both

Parc La Visite and Parc Macaya forestry, reforestation, soil conservation and other areas of concern fall into activities usually assigned to MARNDR.

The solution to these areas of overlap will require negotiations between the various branches of the GOH within the framework of the decree of 23 June 1983. We recommend as a solution to these overlapping responsibilities that all activities associated with the national natural patrimony be the domain of Parcs Haiti, that national historic sites and national historic parks remain the responsibility of ISPAN and that activities in the buffer zones surrounding the parks be administered by MARNDR. Parcs Haiti should work very closely with ISPAN, INAHCA and MARNDR and their should be many areas where the three programs will interact. These interactions become a natural association if certain regions, such as the area around Parc National La Visite and Parc National Pic Macaya are designated "Biosphere Reserves" (see discussion below). We recommend expanding the program at La Citadelle Laferriere to also become a Biosphere Reserve.

B. Organization of Parcs Haiti

The new Departement des Parcs Nationaux Naturels d'Haiti (hereafter called Parcs Haiti) should be an autonomous unit with direct responsibility for managing the

national parks and protecting the national natural patrimony. For a period of ten years Parcs Haiti should concentrate on establishing a sound program in the conservation of natural resources and in developing Parc National La Visite and Parc National Pic Macaya. Parcs Haiti can be created as an organization by one of three methods (see below), and should immediately begin to assume the responsibility for building a national parks program and implementing the recommendations outlined here. Three possible methods for creating Parcs Haiti are listed below:

1. Our recommended procedure is to form a new GOH organization called Parcs Nationaux Naturels d'Haiti (Parcs Haiti). This organization, as mentioned earlier, would not be designated as a department, service or institute and would not be a part of any existing program. It should be advised by a higher level authority made up of representatives from the GOH, private citizens and international organizations. This seven member board of trustees should be called the National Parks Authority. The recommended members of this authority are: 1) Director of INAHCA; 2) Director of the Direction des Ressources Naturelles of MARNDR; 3) Director of the Office of Tourism; 4) President of the Societe Audubon d'Haiti pour la protection de l'Environnement (SAHPE); 5) a prominent private citizen of Haiti interested in conservation; 6) a representative of an international organization.

The National Parks Authority would meet with the Director of Parcs Haiti several times a year and provide guidance.

The staff of Parcs Haiti would be hired as soon as possible following the guidelines on the following organizational scheme (next page and Figure 2). The budget for the salaries of Parcs Haiti personnel as well as for all equipment and operating costs for a five year period should come from a contract with USAID to be renegotiated at the end of the five year period. The Director of Parcs Haiti would be the responsible person in charge of the budget.

As many as possible of the six administrative personnel should be hired from existing individuals within the governmental or private sectors of Haiti. It is not possible to fill all administrative positions with qualified and interested Haitians, then it would be acceptable to designate one or two of the Assistant Directors from international organizations on a contract or subcontract basis for a period of time ranging from two to five years.

Parcs Nationaux Naturels d'Haiti

(Parcs Haiti)

Central Office

Director

Assistant Director for Administration

Assistant Director for Education and Recreation

Assistant Director for Conservation and Research

Secretary

Secretary-Librarian

Chauffer

Commissar

Office Guardian

Parc La Visite	Parc Macaya
Park Supervisor	Park Supervisor
Headquarters Guardian	Headquarters Guardian
Cook	Cook
Park Guards (7)	Park Guards (7)
Park Workers (15)	Park Workers (15)

2. A second method of forming Parcs Haiti would be by contracting with an international organization such as IUCN, Parks Canada or the University of Florida, and relying heavily on consultants. This contract organization would

function for a period of five years with the option to renew for another five years. Haitian staff would be hired where possible and the program would slowly train Haitian counterparts to assume full responsability at the end of the contract period.

3. A third method of forming Parcs Haiti would be by utilizing existing personnel in Haiti by designating a single Director and borrowing two staff members each from MARNDR, INAHCA. This group of five individuals would be totally responsible for the national parks program. The Director and two assistants would be assigned to the Central Office in Port-au-Prince. The other two individuals would be assigned to the national parks where one would be Park Supervisor for Parc National La Visite and the other Park Supervisor for Parc National Pic Macaya. The third Assistant Director should be an international person on a contract basis. This group should be called Parcs Haiti. The Director should have complete control of the budget. The Central Office should be apart from either Damien or MUPANAH so that it can establish an independent identity and work as a unit. The new program would still be part of INAHCA or MARNDR.

We recommend that Parcs Haiti be formed by 1 April 1986 by a method recommended by the National Parks Authority. The selection of a permanent staff or

appropriate international organization should be completed during the spring of 1986. Active discussions concerning the budget for Parcs Haiti should be initiated at the earliest possible date so that the scope of the Parcs Haiti program can be carefully planned. During the next decade Parcs Haiti should continue to function as an autonomous program with the support and advice of the National Parks Authority.

C. Responsibilities of Parcs Haiti

The reponsibilities of Parcs Haiti are discussed below in five major categories: 1) Implementation and development of the "stewardship plan"; 2) operation of Parcs Haiti; 3) public use of the parks; 4) environmental stewardship of the parks; 5) monitoring and evaluating the natural features of the parks and developing an educational program for the parks. The name of the administrator in charge of the duties outlined in each category is presented in parentheses. These suggestions are keyed to the organizational scheme presented earlier in this chapter. The final organization of Parcs Haiti may differ somewhat depending on how the staff is selected and which plan is followed. For example, it is possible that the GOH will choose to subcontract part or all of Parcs Haiti out to an international organization for the first five year period of

the development of the parks. If this is done then we recommend that the duties of the Director, who should be a Haitian national, remain as listed in section one of the following discussion. The international organization could assume responsibilities for the duties outlined in sections two through five. If the GOH decides to further divide the lines of responsibility, one international organization could be selected to operate the parks (sections two through four) under the direction of the Director, while another institution could undertake the duties outlined in section five to develop a method of monitoring the status of the most vulnerable features of the parks, conduct research and create an educational program. We have tried to write the "Plan for Organization of Parcs Haiti" in such a way that it can be adapted for any of the several ways of creating Parcs Haiti discussed in this chapter.

1. Implementation and Development - (Director)

The Director of Parcs Haiti will be responsible for the overall program in national parks, the supervision of each Assistant Director, the interactions with the other branches of the GOH and the implementation of the program. The major features of the duties of the Director in implementing and developing a program in national parks are listed below.

a. Review the "Stewardship Plan" for Parcs Haiti and work with the staff and other branches of the GOH to formulate a final plan.

b. Hire all staff of Parcs Haiti, and supervise and evaluate all personnel.

c. Coordinate all staff and projects into a unified program with a clearly understood mission and well defined goals.

d. Develop a schedule for the implementation of the "Stewardship Plan", and coordinate all phases of the work so that the schedule is maintained.

e. Develop a training program for the staff of Parcs Haiti.

f. Supervise all security forces of Parcs Haiti.

g. Meet regularly with the National Parks Authority and branches of the GOH, especially MARNDR and INAHCA to promote cooperation, productive interactions and the planning and implementation of specific projects.

h. Meet regularly with international organizations to develop programs of assistance in technical areas and in seeking additional funding for Parcs Haiti.

i. Coordinate the duties of "Interns" and volunteers from foreign institutions through the Assistant Director for Administration.

j. Supervise and manage the budget.

k. Present speaches, write articles and in all other ways promote the concept of Parcs Haiti. As soon as possible Parcs Haiti should create a tape and slide presentation of high quality to use in these presentations.

h. Carefully guide the growth of Parcs Haiti by evaluating all proposals for additional programs. The Director will have the responsability of deciding which features of the national natural patrimony are in need of being included in Parcs Haiti and coordinating the feasibility studies. The Director will work with the staff of Parcs Haiti and outside consultants in reaching a decision on any proposal based on the overall well being of Parcs Haiti, the natural feature under consideration and the overall interests of the GOH.

2. Operations (Assistant Director for Administration)

The day to day administration of the overall program of Parcs Haiti should be conducted by an individual or office that is responsible for administration and maintenance. This individual would meet regularly with the Director. The person would:

a. Assist the Director as requested.

b. Coordinate activities with Park Supervisors.

c. Coordinate activities with volunteer agencies.

d. Coordinate all activities of the staff of the Central Office of Parcs Haiti.

e. Supervise the use and maintenance of motor vehicles.

f. Supervise the use and maintenance of all equipment and supplies.

g. Maintain a Parcs Haiti library and research collection that would include a series of photographs of specific habitats, maps, reports, journal articles and books on the natural patrimony of Haiti and the national parks.

3. Public Use (Assistant Director for Education and Recreation)

All aspects of the use of the park by the public should be supervised by an individual or office that is responsible for education, recreation and tourism. This individual would report to the Director on a regular basis. The person would also work closely with the supervisors of each park and could be responsible for:

a. Designing and posting all signs.

b. Designing access routes and trails.

c. Designing scenic areas.

d. Designing special recreational features.

e. Public relations.

f. Develop educational exhibits for the parks.

g. Working with hotels, airlines and tourist organizations.

h. Writing a weekly column for newspaper and writing scripts for release to interested organizations.

4. Environmental Stewardship (Assistant Director for Conservation and Research)

All aspects of the programs concerned with the conservation of natural resources within Parcs Haiti and the stewardship of the resources within the parks themselves should be supervised by an individual or office responsible for conservation, preservation and stewardship. This person would meet regularly with the Director and with each Park Supervisor. They would be one of the major links between the Central Office of Parcs Haiti and the parks, and might spend significant periods of time in the field. The person would be responsible for:

a. Designating all Biological Reserve Zones.

b. Care for all special concern areas.

c. Representing Parcs Haiti in discussions concerning activities in the "Buffer Zone"

d. Implementing reforestation and reclamation projects.

e. Working with local land owners near the parks and organizations in Port-au-Prince to promote

land use practices that are appropiate for the areas of the parks.

f. Coordinating activities with MARNDR to develop a seedling nursery.

g. Fire control, and controlled burning of certain habitats to prevent damaging wild fires.

h. Representing Parcs Haiti in the implementation and coordination of the "Biosphere Reserves" in the areas of the national parks.

5. Monitoring and Evaluation (Assistant Director for Conservation and Research)

One of the most important aspects of the program in national parks is monitoring and evaluating the status of the ecosystems within the parks and the biosphere reserves. This important function will allow the Parcs Haiti to make decisions on land use, recreation and resource management. As special needs arise information on the status of the environment of the parks will allow Parcs Haiti to rapidly adjust policies to accomodate environmental emergencies, such as the continued decline of a particular endemic species or the sudden increase in the numbers of a pest or predator. The individual in charge of monitoring and evaluating the environment would work closely with the Director, other Assistant Directors, Park Supervisors and international research teams. Ongoing research projects are

an important component of the monitoring and evaluating process. The main reponsabilities of this person or office would be:

a. Periodic evaluation of the status of particular features of the parks (Black-capped Petrel colonies, etc.).
b. Coordinate the basic research project on the meteorological characteristics of the parks.
c. Coordinate with (international researchers) selected projects that are needed to complete a biogeophysical inventory.
d. Work with national and international researchers to coordinate their projects.
e. Review all research proposals to make sure there is a Haitian counterpart on each research project.
f. Review all applications for research or collecting to determine if there is a conflict with the principles and policies of the parks.
g. Develop a series of maps of each park.
h. Develop a series of air photographs of each park.
i. Be responsible for taking a series of photographs of specific locations of the parks at the same station over a number of years to document changes in plant communities.
j. Assist the Director in evaluating other areas that have been recommended as national parks.

D. Budget for Parcs Haiti

The budget for Parcs haiti has been developed for a five year period, and is presented in the table at the end of this section as well as in an abbreviated table in the Executive Summary. The major budget categories are: 1) cost of setting up the Central Office and Park Headquarters programs; 2) cost of information, boundary and entrance signs; 3) cost of constructing exhibits; 4) cost of publications advertizing and promoting the parks and for the publication of basic data (scientific results and new species descriptions); 5) cost of training programs for Parcs Haiti personnel; 6) cost of research programs; 7) operating expenses for Central Office; 8) operating expenses for parks and biosphere reserves; 9) operating and maintenance costs for vehicles; 10) salaries. The total proposed budget for Parcs Haiti (five years) is $2,117,440.

Budget justification

1. Set-up costs. The cost of setting up the Central Office and parks is $125,900, or six percent of the total budget. These costs include desks, chairs and basic office equipment as well as four vehicles (two for the Central Office, one for each park). A complete list of all recommended items is presented in the table at the end of this section.

2. Signs. It is important to place signs at the entrances to the parks as soon as possible to signal the official status of the parks and to welcome visitors. These signs should come out of the existing budget. Boundary and information signs should also be posted as well as signs for nature trails. The signs must be weatherproof, sturdy and attractive. The road signs, nature trail signs and supplemental signs will cost $3000.

3. Exhibits. As part of the educational program exhibits should be available at the Central Office and within each park. These educational exhibits will make the park experience more meaningful to visitors and educate park personnel and visitors alike as to the importance of the parks as component parts of the biosphere reserves. The exhibits will be designed in Haiti and constructed in the US as part of the Cooperative Agreement between INAHCA and the Florida State Museum. The cost for eight large exhibit signs is $8000, with information on both sides so that the messages can change to introduce variety.

4. Publications. We propose publishing a general purpose brochure on Parcs Haiti and the national parks at the earliest possible date (1986). This brochure will explain the purpose of Parcs Haiti, describe the major features of Parc Macaya and Parc La Visite including lists of major species, present maps of the parks and a message. It will also present information on how to make

contributions and support Parcs Haiti. The cost of the initial publication is $5000. We recommend additional more specific brochures and small booklets to be published the second and third year of the budget period at $5000 each year.

We believe that it is very important to make the results of the parks inventory available as quickly as possible. These "results" include descriptions of new species, analyses of major plant and animal associations and specific discussions of the major features of the parks. We recommend that these results be published as a single volume of the Bulletin of the Florida State Museum. Each page will have a complete abstract in French. All new species and important new data can then be made available to Haiti within one year, and be readily available to students and professionals in Haiti during the training sessions and development stage of a national parks program. The recommended budget for this publication is $20,000.

It is anticipated that a second scientific publication will be appropriate at the end of the five year budget period. This publication would include the results of research over the five year period and include Haitian counterparts as authors. We have budgeted $20,000 for this second scientific publication.

5. Training programs. We believe that the most economical way to run a training program is to make use of

seminars, workshops and training sessions in Haiti. Each two week session would be conducted by an international expert or team. We have budgeted $3000 for each session and recommended four sessions per year ($12,000). During the second year we recommend that the Director participate in the national parks seminar and visit several mayor institutions (such as the University of Florida) which have international conservation programs.

The research programs (see following item) can also be incorporated into the training programs.

6. Research. We believe that research is one of the most important components of a developing program in national parks. The data generated from selected research projects will be used in making management related decisions and in building the recreation and education programs. Parcs Haiti personnel should be included in all research projects and therein receive valuable training that will be specific to natural science in Haiti. We propose spending ten percent of the budget, or $205,000 on research for a five year period. The recommended research projects are listed below with their duration and total cost in parentheses.

1. Composition of major plant associations (5 years; $30,000).

2. Growth and regeneration of endemic plants (5 years; $30,000).

3. Habitat requirements of the endangered species of endemic mammals (5 years; 60,000).

4. Biology of the Black-capped Petrel (3 year; $30,000).

5. Regular inventories of park avifaunas (5 years; $10,000).

6. Baseline Meteorological studies (5 years; $5,000).

7. Distribution and habitat requirements of Invertebrates (5 years; $25,000).

8. Habitat requirements for endemic herpetofauna (3 years; $15,000).

7. Operating Central Office. The specific estimated costs of running the Central Office are listed at the end of this section. We believe that it is very important to have a well organized Central Office to tie together all aspects of the parks program. Since the parks program will also coordinate the activities of the biosphere reserves associated with each park, the Central Office will become a meeting place for many people and ideas. It will quickly become the crossroads of all conservation activities in Haiti and the clearinghouse for most information on the natural ecosystems of the country. The total estimated cost

of the office is $41,000 per year or $205,500 over a five year period (10% of total budget).

Our estimate is that it would cost $18,000 per year to rent a reasonable building for a Central Office. It would be cheaper in the long run to construct a new building. We recommend constructing a new Central Office on the site of the Botanical Garden following the plans for the Parks Headquarters (Figure 3).

8. Operating Parks. The estimated costs for the operation of the parks is $56,900 per year or $284,500 over a five year period. This is 14 percent of the total proposed budget for the parks (exclusive of salaries, vehicle costs and equipment). When salaries, vehicle costs and equipment are added the percent of the budget spent directly on the parks jumps to 40 percent of the total proposed budget. The individual items of operating the parks are listed at the end of this section.

9. Operating Vehicles. We propose purchasing four vehicles for use in the parks. Two vehicles are for use in the Central Office. One of which will function in the capital and the other will come and go to the parks. These will be station wagons. The other two vehicles will be pick-up trucks and will operate in the parks and transport the Park Supervisors back and forth between the parks and the Central Office. The estimated annual cost is $14,400 for a total cost of $72,000 or three percent of the total

estimated budget of Parcs Haiti. Individual items are listed below.

10. Salaries. The salaries of the four administrators and five support staff of the Central Office are $100,200 per year or $553,665 for five years (27% of total budget). The salaries for the two Park Supervisors, four support staff, 14 guards and 30 workers for the two national parks and biosphere reserves are 92,400 per year or $509,125 for five years (24% of total budget). Therefore, 51 percent of the proposed budget for Parcs Haiti is for salaries. The recommended annual salaries for all Parcs Haiti personnel are listed below.

Specific Budget Explanation

#	item	estimated cost
	Office set-up	
1	Office Typewriter	500
1	Portable Typewriter	350
1	Computer System	5,000
12	File Cabinets	2,500
10	Desks	3,500
10	Desk Chairs	1,000
1	Conference Table	800
20	Chairs	800
2	Storage Cabinets	800
10	Book cases	1,000
2	Map cases	400
1	Drafting Table	500
1	Drafting equipment	250
4	Air Conditioners	2,000
3	Audiovisual Equipment	1,500
1	Videocamera	3,000
3	Tape Recorders	750
1	Copy Machine	1,000
3	Cameras	750
1	Radiocommunications	12,000
2	Vehicles	32,000
-	Other Miscelaneous	2,000
	Total	$72,400

Park Set-up (each)

#	Item	Estimated cost
1	Woodstove	500
1	Storage Cabinet	400
1	Chainsaw	350
1	Generator	2,500
4	Guns (shotguns)	500
4	Altimeters + pocket transects	1,000
-	Field Furniture	500
-	Shovels, picks, etc.	1,000
1	Gas stove	500
1	Gas Refrigerator	500
1	Toilet	100
2	Sinks	200
-	Hardware	200
1	Vehicle (pick-up)	16,000
1	Motorcycle	1,500
-	Field Equipment	1,000
	Total	$26,750

Signs

2	4'x8' Entrance sign	$2000 *
60	Information signs	3000 *
2	4'x8' Roadside exhibits	2000
50	nature trail signs	1000
	Total (from 86-90)	$3000

Exhibits

4	Double side exhibit panels	8000

Publications

1 volume	Scientific Results I (Dec.1986 publication)	20,000
5000	Information Brochure (1986)	5,000
-	Park booklets (1987)	5,000
-	Park booklets (1988)	5,000
1 volume	Information Brochure (1990 publication)	20,000
	Total	$55,000

*we recommend that these be paid for with 1985 funds as soon as possible

Training programs

20	Two week training sessions (3,000 each) (five year period)	60,000
1	Special parks seminar + visits for Director	5,000
	Total	$65,000

Research

8 Research projects (see discussion in Budget Summary)

Operating Central Office

		per year	$205,500
-	Telephone	1,500	7,500
-	Lights + electricity	3,600	18,000
-	Office Rental*	18,000*	90,000*
-	Supplies	4,000	20,000
-	incidentals	5,000	25,000
-	Per diem pool	6,000	30,000
-	International travel pool	3,000	15,000
	Total	year	5 year
		$41,100	$205,500

*Note: It would be more economical to build a new Central Office building rather than rent a facility for over 3 years.

Operating each Park

		year	Total
-	Uniforms	$ 350	$1,750
-	Per diem (Park Supervisors)	3,600	18,000
-	Park Maintenance	24,000	120,000
-	Supplies	500	2,500
		$28,450	$142,250
	(X 2 for Combined Parks)	$56,900	$284,500

Operating four Vehicles

		year	Total
-	Maintenance and tires	$4,000	$20,000
	Gas	10,000	50,000
	License and insurance	400	2,000
	Total	$14,400	$72,000

Salaries

		per year	Total
1. Director	Salary	$20,000	*
	expenses	4,000	
2. Assistant Director #1	Salary	15,000	
	expenses	3,000	
3. Assistant Director #2	same		
4. Assistant Director #4	same		
5. Secretary		6,000	
6. Secretary-Librarian		5,500	
7. Chauffer		6,000	
8. Commissar		3,000	
9. Guardian		1,500	
10. Park Supervisor #1	Salary	10,000	
	expenses	1,000	
11. Park Supervisor #2	same		
12. Headquarters Guardian #1		1,000	
13. Headquarters Guardian #2		1,000	
14. Park Guardians			
1,800 each x 14		25,200	
15. Park Workers			
1,440 each x 30		43,200	
		$146,400	$1,062,790

*Note: We have added a 5% salary increase each year.

E. Parcs Haiti and the concept of "Biosphere Reserves"

Biosphere Reserves are a new concept in which a balanced relationship between people and natural ecosystems are encouraged in order to demonstrate the value and need for conservation in supporting sustainable development. Biosphere reserves are major landscapes complete with characteristic landforms, floras, faunas and various patterns of human use and adaptation. They consist of Core Areas and surrounding Zones of Cooperation. Core areas are lands under some form of protection, and zones of cooperation are multiple use buffer zones where a variety of uses of the available resources may take place. The managers of the Parcs Haiti program should do all they can to promote and protect the core areas, which will be Parc National Pic Macaya and Parc National La Visite. They should also work with the GOH organizations responsible for the management of the surrounding lands (MARNDR and ISPAN) to insure a coordinated approach in the cooperative research, restoration, supervision and monitoring. This could be under the general plan of cooperating together via the National Parks Authority as well as via specific committees and meetings. Committees of concerned citizens from the region of the national parks should be organized and have an opportunity to be heard and be a part of the decision making process.

The active biosphere reserve program will include the core area (Parcs Haiti), the zone of cooperation lands (MARNDR), the historic monuments in the region (ISPAN) and concerned citizens (a committee).

F. Organization of Parcs Haiti and other GOH units in biosphere reserve concept.

We propose that the parts of Parcs Nationaux Naturels are designated by the decree of 23 June 1983 be integrated into the biosphere reserve concept in the following manner. The chart lists all parts of the national patrimony that should be associated with each GOH unit, and also lists new items that might be added in the future (indicated with *).

Place	Size (ha.)	GOH unit
Parc National La		
Visite (Core)	6,300	Parcs Haiti
Buffer Zone La Visite	10,000	MARNDR
Parc National Pic		
Macaya (Core)	7,500	Parcs Haiti
Buffer Zone Pic Macaya	10,000	MARNDR
Citadelle Des Platons	250	ISPAN
*Parc National Naturel	5,000	Parcs Haiti
La Citadelle		

Project La Citadelle	250	ISPAN
Region Milot/Don Don	-	MARNDR
Fort Mercredi	5	ISPAN
Fort Jacques et Alexandre	9	ISPAN
Source Puantes	10	Parcs Haiti
Source Chaudes	20	Parcs Haiti
Source Cerisier et Plaisance	10	Parcs Haiti
*Lac de Peligre National Park	-	Parcs Haiti
*National Botanical Garden		Parcs Haiti
Parcs Nationaux Maritimes	-	Parcs Haiti
l.f.Les Arcaidine, Iroquois Islands		Parcs Haiti
Caves and Sinkholes	-	Parcs Haiti
Scenic Areas	-	Parcs Haiti

In this list there are two actual biosphere reserves (La Visite, Macaya) and one of great potential that we recommend be designated as a biosphere reserve (La Citadelle).

G. Ten Year Plan for Parcs Haiti

The plan for the next ten years should first and foremost include implementing the action plans for Parc National La Visite and Parc National Pic Macaya. These parks are discussed in detail in the following chapters and for each a ten year plan of action has been prepared. The following list is a series of recommendations in addition to the individual action plans for each park.

1. Implement ten year action plans for each national park.

2. Decide how Parcs Haiti is to be organized and staffed following the options outlined in this chapter.

3. Select a Director.

4. Select a staff for Parcs Haiti Central Office and national park sites.

5. Work with GOH, and international donor agencies and private foundations or NGOs to establish an expanded budget (see recommended budget).

6. Work with the Societe Audubon d'Haiti pour la Protection de l'environnement (SAHPE) to establish a "friends of the parks" organization which can provide assistance (financial, volunteer, public relations).

7. Establish an international organization with a catchy name such as "International Fund for Conservation in Haiti". This program could be modeled after a similar

project for the Citadelle, and could raise funds in the U.S. and Europe for the national parks and publicize the program abroad.

8. Develop an "identity" for the parks and for endemic species of Haiti by a series of activities such as:

a. A set of postage stamps for the parks.

b. A set of postage stamps on special endemic. species.

c. Designate by a decree that the following endemic plants and animals be considered "National Species".

Grey-crowned Palm Tanager -National Bird.
This species, known as the "Kat Je" or "Quatre-Yeux" is the one bird found only in Haiti.

Plagiodontia aedium -National Mammal.
This species, known as the "Zagouti" is widely known in the countryside. It is one of only two species of endemic mammals left in Haiti.

Didymopanax tremulum -National Tree.
This large and beautiful tree is found in mountain areas of both Macaya and La Visite, and is endemic to the island. It is one of the most important forest trees in the parks, and

is known as "Bwa Tramble".

Fuchsia pringsheimii -National Flower. This beautiful, large red flower is endemic to the island and is found in both parks.

Karst topography - This special type of limestone is associated with cave formations, and some of the most important habitat formations in Haiti.

d. Create a "slide show" package on the national parks and the special areas of Haiti emphasizing what is unique and beautiful, and what the benefits of the park are to the present and future of Haiti (water conservation, tourism, national pride, etc.). The tape show should be professional and there should be three language versions (French, Creole, English) so that the program could be used in a variety of situations. The programed presentation (tape recorder with dialogue, music and slides) should run 30-40 minutes. FSM could coordinate the production of this program under the terms of our cooperative agreement with INAHCA. The slide show package should be created quickly since it is of value in many areas of the ten year plan for Parcs Haiti

in general as well as the plans for each park.

e. Create a series of post cards with attractive photographs of scenes from the national parks as well as some of the best features of the national patrimony (birds, plants). The cards could be for sale in areas in Port-au-Prince and elsewhere to create an association between Haiti, natural beauty and the natural patrimony.

9. Improve the information resource base of the parks by promoting the following:

a. A series of maps of the parks.

b. A pamphlet on the parks describing the concept most significant features, location, visiting conditions, guidelines for tourists and future goals (included in first year proposed budget).

10. Encourage the publication of the scientific results of the inventory study, so that all new data are available (including new species descriptions) for planning, training, and educational purposes.

11. Develop a research program to answer some of the important questions that exist on how to rehabilitate, restore, protect and safeguard natural ecological systems and processes. This would include:

a.Biology of Black-capped Petrels.

b. Biology of endemic mammals and efficient

eradication principles for introduced species.

c. Evaluating the necessity of fire in maintaining the natural environment.

d. Climatic profiles and local microclimatic features of parks.

e. Methods of regeneration of rare plant species of the "Rak Bwa" habitats.

f. Factors governing successional rates and patterns in disturbed communities.

g. Seed production, dispersal and germination of native forest species.

12. Encourage and support allied departments (MARNDR) to develop a nursery program for the parks specializing in the propagation of endemic plant species to be used in reforestation of "restoration areas" of the parks.

13. Work with the other agencies of the GOH, private individuals and international organizations to develop an acceptable combination of activities for the multiple use buffer zones, and to establish a "Biosphere Reserve" program.

14. Resolve all legal and public relations conflicts that threaten the parks such as the relocation of private citizens now living in the parks and claims of private ownership within the main core areas of the parks. We recommend that Parcs Haiti and the GOH support a Haitian

judicial scholar to review and analyze legal, cultural and moral land tenure questions in Haiti.

15. Work with international programs and agencies to assist in training a complete staff for Parcs Haiti that could be ready to assume full responsability for all aspects of the program at the end of ten years.

16. Keep the program small enough to be able to operate within the bounds of a modest budget so that there is a reasonable chance that Parcs Haiti can survive over a long term period within the financial capabilities of Haiti to meet all of its budgetary responsabilities. Do not allow more than 70% of the budget to be committed to personnel lest the personnel roster grow at the expense of operations in the parks.

17. Expand the program (with the limitations of #16 in view) to include additional areas of the national natural patrimony that can be better protected by Parcs Haiti than any other agency in Haiti and which can improve the identity of Parcs Haiti. We recommend that the first expansion of Parcs Haiti be the creation of a 5000 ha. national park around the core historical feature of the Citadelle Laferriere (to become a biosphere reserve). The reasons to do this are that the area is of biological and geological importance and will attract significant national and international attention because of the approaching anniversary of the arrival of Columbus in the New World.

18. Work with INAHCA to assist them in creating a series of exhibits at MUPANAH that will educate the public (nationals and tourists alike) on the unique value of the natural patrimony of Haiti, and in so doing illustrate the importance of the national parks.

19. Evaluate alternative economic enducements to insure a private sector commitment to the long term stability of the parks. The intent should be to insure that there is local interest and that there are local incentives for the maintenance of the parks which are of national origin and value.

CHAPTER III

Parc National La Visite

Section 1.- Location

The area now designated as Parc National La Visite is located on the Massif de La Selle in the area of latitude 18 20'30" N and longitude 72 20' W. All areas of the park that are located north of the La Selle Escarpment, the great cliffs along the north side of the Massif, are in the Departement de l'Ouest, while the larger proportion of the area of the park that lies south of the La Selle Escarpment is in the Departement de Sud Est. Characteristic features of the park are Morne La Visite, which is 2170 meters in elevation and commands a view of much of Southern Haiti, and Morne Cabaio (2282 meters), Morne Bellfontaine (2242 meters) and the twin heads of Morne Tete Opaque (2269 and 2250 meters). Morne La Visite is located 22 kilometers from the center of Port-au-Prince (the National Palace). We recommend expanding the park westward to Morne d'Enfer (1900 meters) and eastward to Morne Kadeneau (2155 meters).

Section 2.- Size and Natural Boundaries

The original "Communique" in the Nouveau Monde (5 May 1981) indicated that the first "parc naturel" was to be located between Morne La Visite and Morne Kadeneau on the Massif de La Selle. Depending upon the elevation at which

the northern and southern boundaries are set this park could vary in size from 500 to 1000 hectares. Subsequent discussions have interpreted the boundaries of the park to include the area along the ridge of the massif between where the main access road from Port-au-Prince and Furcy crosses the ridge (1880 meters elevation) and the eastern tete of Tete Opaque (2250 meters elevation). The boundaries to the north and south have never been officially established. The decree of 23 June 1983 creating the national park in the Massif de La Selle designated to size of the park to be 2000 hectares. The maps presented to the inventory team by INAHCA and MARNDR indicate that the north and south boundaries of the park have been set at 1600 meters elevation, and therefore to inclose a region of approximately 5000 hectares (see map 2). The boundaries have been adjusted in various areas to include such important features as the major cascade on the Riviere Blanche at 1650 meters elevation and to exclude areas of possible private property in the region of Morne Tete Opaque. However, since no official survey of the boundaries of the park has been initiated by MARNDR, it is not possible to discuss the official size or boundaries of the national park in the Morne La Visite area.

The natural boundaries of the park can be defined based on the results of the inventory.

Inventories of the most important geological, botanical, zoological and recreational features of the Morne La Visite region indicate that the core area (areas of complete protection inside the buffer zone) should include all of the following features.

Feature	Reason	Location
Morne La Visite	-water conservation	
	-soil conservation	2170 meters
	-scenic view	
	-nesting Black-capped Petrels	
Morne Cabaio	-water conservation	
	-scenic view	2282 meters
	-nesting Black-capped Petrels	
Morne Tete Opaque	-water conservation	
	-scenic view	2250 meters
	-nesting Black-capped Petrels (major colony)	
	-special botanical features	
Areas north of La Selle Escarpment	-water conservation	
	-mesic broad-leaved forest	
	-Nesting Black-capped Petrels	down to a minimum 1500 meters
	-*Plagiodontia* habitat	
	-special endemic birds	

	-orchids	
Morne Kadeneau	-special botanical features	2155 meters
	-habitat for nesting Black-capped Petrels	
	-"Rak Bwa" forest	
Areas south of La Selle Escarpment	-water conservation	
	-pine forest	1600 meters
	-watershed of R. Blanche	
Riviere Blanche including Grande Cascade	-water conservation	
	-mesic broad-leaved forest	down to 1400 elevation
	Plagiodontia habitat	
	-scenic and recreational features of Cascade	
Morne D'Enfer	-water conservation	
	-mesic broad-leaved forest	1400-1900 meters
	-reservoir of Biotic Diversity	

Each of the above regions will be discussed in detail in Section 4 (major features of the park). All of the features are part of a contiguous natural ecosystem and should be included into the same natural preserve. All activities in this preserve should be carefully supervised by national parks personnel. The shape of the preserve if all of the above features are included in the park would be: 1) a western plateau (Morne D'Enfer) and associated cliffs and ridges of 1100 hectares as proposed by Woods and Rosen

(1977); 2) a connecting corridor between Morne D'Enfer and Morne La Visite that includes Morne Fe Noir and Morne Nacel and occupies an area of 700 hectares; 3) a wide main area of the park that includes the ridge from near Ca Jacques (where the Furcy road crosses) eastward to Morne Tete Opaque, and beyond to one kilometer beyond Morne Kadeneau. Northward of the La Selle Escarpment to the base of the great cliffs of the Massif at 1500 meters, southward to the natural margin of the pine forest and ravines that form the upper watershed of the Riviere Blanche. This main unit occupies a minimum of 4500 hectares. The total park area is 6300 hectares (see Map 2).

In the Morne D'Enfer region the park would extend down to 1400 meters in the west and south and 1600 meters in the north. The corridor connecting Morne D'Enfer with the main body of the park would be limited by the 1600 meter contour on the north and 1400 meters on the south. The main body of the park would be limited by the 1500 meter contour to the north and more or less by the 1600 meter contour to the south. Along the southern margin of the park, however, there are many houses and the well developed area at Seguin. The southern boundary will have to be adjusted to take into consideration these problems keeping in mind that, except for the Ravine of the Riviere Blanche, this is the least important biological zone of the park.

Section 3.- Access to Parc La Visite

The access to the park from Port-au-Prince is via either of two highways (Map 2). The northern access is via the route through Petionville, Kenskoff and on to near the Teleco. The road to this point is either paved (to beyond Kenskoff) or semi-paved (to near the crest of the ridge). From the crest of the ridge at 1800 meters elevation a spectacular view exists of the Massif de La Selle with particularly fine vistas of Morne La Visite, Morne Cabaio and the main steep cliffs of the massif that we have designated as the place of the clouds, or "Nan Nway" in Creole. Farther along the highway there are equally splendid views of Morne D'Enfer and of Pic La Selle, the highest peak in all Haiti. These locations make excellent locations for rest stops and scenic areas. At two locations along this highway (one near the first ridge so that it has easy access from Port-au-Prince and a second at a picturesque location ten kilometers by road from the first and five kilometers (11 km by road) from Morne La Visite where the most impressive view of the park is available) local site exhibits should be located that portray the limits of the national park on an enlarged protograph of the massif, and discuss a few of the major features of the park that can be seen from the spot.

The highway from the ridge above Furcy to the crest of the Massif de La Selle near Ca Jacques is 22 kilometers in

length and takes two hours to drive depending on local road conditions. The road is very steep in locations and can be dangerous (or even impossible) during the rainy season when parts of it are washed away or closed by landslides, and other areas are slippery because of mud and running water. Over the crest of the massif near Ca Jacques the road traverses the pine covered plateau and is very pleasant and safe to drive on. Several side branches are possible, and some areas are rough and in need of repair and maintenance, especially as the road crosses tributaries of the Riviere Blanche.

The road passes 1.5 km SW of Morne La Visite in the area of Ca Jacques, which is about a half hour hike from the road to the summit of Morne La Visite. The trail is not well marked, but if properly maintained it is a pleasant and not difficult hike where a splendid view is possible from the interior of the park where it reaches the edge of the abandoned sawmill (La Scierie) where several old buildings have been reconstructed. From this location all areas of the park can be reached by trail either on foot or horseback. The road continues on to Marche Seguin where it joins the route from the south and another route from the east that leads out onto the Plain of the massif in the direction of Pic La Selle.

The route via the south departs Port-au-Prince and follows the excellent highway across the mountains to the city of Jacmel. This part of the highway passes through picturesque countryside and is 100 kilometers long. There are a few spots along the road where views of Morne D'Enfer are possible, but the mountain is far away and often covered with clouds. Even so, because the road between Port-au-Prince and Jacmel is a major tourist route we recommend that a site exhibit be established at the most appropriate view of Morne D'Enfer that points out the significance of the national parks for water conservation and the preservation of the natural patrimony of Haiti.

The southerly access to the park leaves Jacmel as a non-paved route and passes along the coast through the towns of Cayes Jacmel and Marigot. There are hotels in Jacmel and at Civadier Beach eight km east of the city. The route, after passing through the towns of Marigot and Ti Feuille 2 km beyond, crosses the Grande Riviere or Riviere des Plantils (formed by the Riviere Blanche flowing from Parc National La Visite) and ascends into the mountains. During the rainy season the river crossing can be dangerous and impossible in a passenger vehicle. The route from Marigot to Marche Seguin is 20 km. long and is not nearly as steep or dangerous as the road from Furcy to Ca Jacques.

The total driving time from Port-au-Prince to the park headquarters on Parc National La Visite is six hours (150

kilometers) depending on traffic in the Carrefour section and the condition of the road beyond Marigot. The Jacmel to the park headquarters section is three to four hours (49 kilometers). The northerly route from Port-au-Prince to the park via Furcy is four hours driving (55 kilometers) depending on the condition of the road after crossing the ridge near Furcy. From the scenic vista on this ridge to the park headquarters is a three hour drive (22 kilometers) under normal conditions.

Section 4.- Major Features of Parc La Visite

The major features of each park are discussed in elaborate detail in each of the eight supplemental reports that accompany this document. The reader should refer to each of these documents for complete species lists and discussions of how the species or features fit into the overall history of the region. The individual reports are: 1) Geological setting of Macaya and La Visite National Parks, Southern Peninsula of Haiti by Bruce MacFadden; 2) Floristic study of La Visite and Macaya National Parks, Haiti by Walter Judd; 3) The Orchids of La Visite and Macaya National Parks, Haiti by Donald D. Dod (included as part of the previous report); 4) The Butterflies (Lepidoptera: Rhopalocera) of Morne La Visite and Pic Macaya, Haiti by Frank Gali and Albert Schwartz; 5) The

Malacology of La Visite and Macaya National Parks, Haiti by Fred Thompson; 6) The Herpetofauna of the National Parks in Southern Haiti by Richard Franz and Daniel Cordier; 7) The Recent and Extinct Mammals of La Visite and Pic Macaya National Parks, Haiti by Charles A. Woods; 8) The birds of La Visite and Pic Macaya, National Parks, Haiti by Charles A. Woods and Jose A. Ottenwalder.

These reports provide a basis for understanding the geological setting and ecosystem of each park and are the basis of the analysis for the "stewardship plan". They are, however, not a complete documentation of the natural features in the region. Detailed analyses of climate, hydrology, soils, and entomology other than Lepidoptera were not completed by the inventory team nor was a socioeconomic analysis done of the region.

The major features of each report are summarized in the following pages.

A. The Geology of Parc National La Visite

The geology of the region of La Visite reflects the history of the island (MacFadden, 1986). The central feature is a massive block of Eocene limestone that dips southward. This limestone cap is exposed along the La Selle Escarpment to the north at about 2100 meters and along the southern boundary of the park at 1600 meters. This block

provides the park with most of its characteristics. Within the limestone substrate extensive blocks of karst have been exposed. These karst related geological features include many dolines, sinkholes, ravines and verticle-walled pipes. A complex system of underground caverns has been developed by water working along cracks in the hard limestone. Some of the exposures of hard limestone have weathered as jagged blocks, standing like monuments on the surface. These areas are called "casse dent" and have given rise to a region of the park by that name. The superficial limestone outcrops eventually weather to form small rounded residual rocks where joints and cracks exist. Water from precipitation goes directly into the ground and does not flow on the surface. However, because much of the limestone forming the surface of the park is unfractured, the headwaters and tributaries of the Riviere Blanche contain significant amounts of flowing surface water.

The limestone block of Parc National La Visite is called the Neiba Foundation. It was formed 40-42 million years ago as an area of shallow water and an exposed external platform. Some areas are made up of tiny foraminifera. Near the northern boundary of the formation at about 2000 meters elevation a rich shelly marine fauna is exposed that is composed of corals, pelecypods and gastropods. The shells of these organisms can be found in rocks near cliffs of La Visite and Cabaio, and in caves.

The northern boundary of the Massif de La Selle is a steep cliff (La Selle Encarpment) that was formed by a major fault, the La Selle fault. North of this fault the limestone broke apart exposing the much softer rocks below to rapid erosion, creating the great cliffs of the massif. The rocks that are exposed on the surface of the cliff, and which can be seen by hiking about in the basin between Morne La Visite and Morne Cabaio, are very different than the limestone encountered on the plateau and ravines. The rocks one encounters are pillow lavas (basalts) that weather to a rotten, iron-stained outcrop. These rocks date at 85 million years old. Other rocks in the zone are olivine tholeiite basaltic rocks as well as deep water limestones and some clastic (sedementary) deposits including turbidites. This group of rocks is called the Demisseau Formation, and was formed deep under the sea in the late Cretaceous. This formation represents the late Cretaceous sea floor which was subsequently uplifted.

This area of Hispaniola emerged in the early Eocene as a series of low lying islands separate from the areas of Hispaniola north of the Cul-de-Sac. Some paleogeographic reconstructions place the southern Peninsula, and therefore the island forming what is know the almost flat surface of Parc National La Visite, far to the west of its present position and far removed from central highlands of Hispaniola.

B. Floristic Features of La Visite

The floras of both parks are very diverse and extremely rich in endemic species (Judd, 1986). Species of seed plants endemic to Hispaniola that were collected in the national parks are listed in Table 3. Note that several species are undescribed. In fact, more endemic genera are restricted to the Massif de la Hotte than any other region of Hispaniola. From a study of published accounts of the flora of the localities now contained in Parc National La Visite and Parc national Pic Macaya, and of E. Ekman's personal field notes, it appears that most plant species present in the 1920's still occur within (or adjacent to) the two national parks. Thus it is likely that the establishment of the national parks in the Massif de La Selle and Massif de la Hotte will lead to the preservation of an important component of the flora of Haiti.

The plant formations of Parc National La Visite, in the Massif de La Selle, form a complex mixture of pine and cloud forests. Hardwoods occur along the steep,moist, more or less north facing slopes from Morne Tete Opaque west to Morne La Visite and continuing onto the plateau of Morne D'Enfer. Pinelands occupy the central plateau of the La Selle range. The vegetation of the larger ravines, especially the Riviere Blanche, around sinkholes and caves in the pine covered plateau is composed of elements of the

hardwood community. Localized areas of the park are very disturbed due to cutting, burning, and agricultural operations. With the destruction of the natural vegetation of the montane areas of Hispaniola (and especially Haiti) occurring at a rapid rate, the forested tracts preserved in these parks are of increasing scientific value.

The species composition of the pine forest in the Massif de La Selle is described by Holdridge (1947: 40-68) and Judd (1986:11-12) who also described the composition of the hardwood forest in great detail (Holdridge, 1947:68-85; Judd, 1986:12-13). Both authors note how one forest community grades into the other, and that while clear examples of each exist it is more common to find forest stands with characteristics of each. Holdridge classified both "the hardwood forest" and "the pine forest" in his "subtropical moist forest formation" when they occur below the frost line. He noted that above 2100 meters elevation, especially in poorly drained regions or in areas with little evaporative water loss, that the forest takes on the characteristics of a "tropical lower montane wet forest formation". This type of forest is characteristic of a region with an annual precipitation between 2000-4000 mm. per year. In Holdridge's ecological map, constructed for the Organization of American States (Sedwitz and Canet, 1972) he classified most of the plain of the Massif de La Selle as "Foret tres humide de Montagne de basse altitude",

or tropical lower montane wet forest formation. The areas above 2100 meters elevation he classified as "foret tres humide de Montagne" or tropical mountain wet forest formation. These designations are somewhat misleading because they are not precise enough to differentiate between the specific local regions in the park, many of which are dramatically different from one another but fall into the "tropical lower montane wet forest formation".

In order to be precise in our use of habitat description in the park we have subdivided the forest types in Parc National La Visite into the following habitat types.

1) Mature pine forest (Creole name "Bwapen")

Forest stands dominated by mature Pinus occidentalis. The complete species composition of this forest formation is described by Judd (1986:10-12).

2) Successional pine forest (Creole name "Bwapen Raje")

Forest stands of young Pinus occidentalis, often of even age and rarely over six meters tall.

3) Mature hardwood forest (Creole name "Rak Bwa")

This forest type, sometimes called cloud forest on limestone or mesic broad-leaved forest, is often dominated by large Didymopanax tremulum trees and a variety of shrubs including the wild avocado Persea anomala, which is an important food source (fruits, bark, twigs) for a variety of species of birds and mammals. The species composition of this forest formation is described by Judd (1986:12-13).

4) Fragmented hardwood forest (Creole name "Bwa Raje")

This forest type represents small patches of "Rak Bwa", often growing around sinkholes or at the mouths of caves, or extensive areas of Rak Bwa that have been altered by cutting, burning or severe wind damage.

The species diversity is considerably reduced from that of a typical "Rak Bwa" as described by Judd (1986) or Holdridge (1947).

5) Abandoned gardens or areas in early succession (Creole name "Raje")

Open areas dominated by grasses, braken ferns and blackberries (Rubus spp.).

6) Garden (Creole name "Jadin")

Active garden plots or extensive agricultural areas where corn is planted during the summer months.

The vascular flora of Parc National La Visite is documented by collections representing 308 species (including 249 flowering plants, 3 conifers, and 56 ferns and fern allies). The largest families are Asteraceae (25 species), Poaceae (14), Urticaceae (13), Rubiaceae (13), Melastomataceae (11), Dryopteridaceae (10), Solanaceae (10), Polypodiaceae (9), Araliaceae s. lat. (8), Piperaceae (8), Aspleniaceae (7), and Lamiaceae (7). The total vascular flora (excluding orchids) includes 90 species endemic to Hispaniola (29% of the flora), and, of these, 36 are endemic to the Massif de La Selle (about 11%). As in Parc National Macaya, endemism is most pronounced among the flowering plants, with 85 species found in the park being endemic to Hispaniola (34% of the flora of the park). Of these, 35

species (about 14%) are endemic to the Massif de La Selle. Families with many endemic species include Asteraceae (10), Urticaceae (8), Melastomataceae (7), Rubiaceae (6), Solanaceae (5), Ericaceae (4), Myrtaceae (4), and Lamiaceae (4). A total of 57 species of mosses and 16 species of liverworts were collected in the region; very few of these are endemic.

The species of special concern (endangered species) would include all endemics with ranges restricted to the Massif de La Selle (see Table 3). Species that are especially susceptible to disturbance are listed below.

Juniperus ekmanii. This is the woody species most in danger of extinction. It now occurs only in the Tete Opaque region of the park. It does not sprout vegetatively after fire or cutting.

Hypericum millefolium

Miconia rigidissima

Gesneria hypoclada

Siphocampylus caudatus

Rondeletia domatiata (from Morne D'Enfer)

The Orchids of Parc National La Visite

The depth of the analysis of the orchids of La Visite is considerably less than the investigation of the orchids of Parc National Pic Macaya. Forty species are reported from the region of Morne La Visite. However, not all of

these would be expected to occur in the park since most were found in the 900-1500 meter elevation range. All of the significant areas of broad-leaved forest in the park occur above this elevation, and only a few areas of the park extend down to 1400 meters. Except for the "Nan Nway" habitat on the north face of the massif, which has been severely altered by fires and deforestation in the past and is once again being systematically destroyed, and the pockets of broad-leaved forest in ravines and around sinkholes and karst exposures, little mesic broad-leaved forest remains in the park to support orchids. The region of Morne D'Enfer is an exception, and is one of the reasons this wet plateau with extensive areas of broad-leaved forest must be included in the park, and connected to it via a corridor of protected habitat.

Twelve species of orchids were collected in Parc National La Visite. These species were in eight genera. The most abundant orchids were in the genus Lepanthes. Four species of this genus were collected. Most orchids were collected on the north face of the massif between Morne La Visite and Morne Cabaio. This habitat extends from the ridge of the massif at an elevation above 2100 meters to below 1500 meters. The forest below 1500 meters is very disturbed by peasants burning and cutting to create gardens, and by fires that often escape to burn upwards along shoulders and drier rock faces of the steep cliffs. Only

the wet basins are protected from the effects of wild fires escaping from below. These basins, especially, in the area below the ridge connecting Morne La Visite with Morne Cabaio, are the most important habitats for orchids in the park. Special efforts must be made to prevent these mesic basins from becoming converted to gardens. Many have, with disastrous results to the orchid flora of the park.

The lack of a long list of orchid species for the park is partially the result of too little collecting, and too little habitat at low to intermediate elevations. However, it is also clearly the result to overexploitation of the Rak Bwa (mesic broad-leaved forest).

C. Parc National La Visite and its butterflies

Twenty species of butterflies are known from Parc La Visite, which is almost twice as many as the eleven species known to occur in Parc Macaya (Gali and Schwartz, 1986). The two parks have six species in common. One species, Calisto archebates, is restricted to the Massif de la Selle. It is not apparent why so many more butterflies occur in Parc La Visite than in Parc Macaya, of the butterflies studied ten species are lowland forms and eleven species clearly prefer upland areas. Of the eleven upland forms, nine occure in Parc La Visite while only six occur in Parc Macaya Of the ten lowland forms, eight occur in Parc La

Visite while only two occur in Parc Macaya. This is a peculiar ratio since so much more of Parc La Visite is upland, but still La Visite has many more lowland forms occuring there than in Parc Macaya. We believe that this might be the result of the highly disturbed nature of the vegetation in Parc La Visite which is allowing lowland-like successional vegetation to invade the park boundaries. The species occuring in each park are listed in Table 4.

D. Parc National La Visite and its Land Mollusks

Fewer species of land snails are found in Parc La Visite than in Parc Macaya (Thompson, 1986). Forty-five species were collected in or near La Visite. Of these 27 were new species, but none were of new genera. At least three new species are endemic to the Morne d'Enfer - Morne Nacel area west of the main body of the park. The most important habitat for land snails within the boundaries of the park is associated with thick forest cover on limestone (karst) domes. These areas are "Rak Bwa" or "Bwa Raje" habitats. Table 5 lists all of the taxa of land snails known to occur in Parc La Visite.

E. Parc National La Visite and its herpetofauna

Twelve species of amphibians and reptiles are reported to occur within the proposed boundaries of Parc National La

Visite (Franz and Cordier, 1986). Four species (Eleutherodactylus armstrongi, Eleutherodactylus furcyensis, Eleutherodactylus leoncei, Wetmorena haetiana) are restricted to the Massif de La Selle and adjoining ranges in the south-central mountains of southern Haiti and adjacent Dominican Republic. Five other species are more generally distributed forms, including Anolis armouri which we also found in Parc National Pic Macaya.

During the course of conducting field work in Parc La Visite several frogs were found which appeared to be undescribed. These species are currently under study. The possible new frogs plus those taxa already established suggest that the creation of Parc National La Visite is warranted in order to conserve the quickly disappearing montane herpetofauna associated with high elevations in the Massif de La Selle. Most of these species occur in specialized environments. It is essential that the native Rak Bwa areas remain intact if these species are to continue to survive in the La Visite area.

Expansion of the proposed boundaries to include Morne D'Enfer and several isolated tracts southwest of Seguin is recommended. This would add many of the taxa on the Annotated List not presently included in the park. The lower elevation sites southwest of Seguin are remnants of wet forest on limestone (Rak Bwa) which is a forest type that has nearly disappeared from the Massif de La Selle.

Much of that which remains occurs on isolated limestone ridges that extend south of the road between Seguin and Marigot. Only limited agriculture is possible on these rugged limestone outcrops. With their addition to the park concept, the over-all species richness of the park would be greatly enhanced. We recommend that an inventory of the herpetofauna of these ridges be undertaken in order to understand which of the areas is most important to preserve in association with the areas already set aside as Parc National La Visite. Table 6 lists the reptiles and amphibians of Parc La Visite.

F. The Birds of La Visite

A complete list of all bird species of Parc National La Visite is included with this report at Table 8. A basic group of 41 resident species has been recorded from the park (Woods and Ottenwalder, 1986). These birds occur within the boundaries of the park throughout the year. An additional 21 bird species spend the winter months in the park. The total list for birds at all seasons in the park is 67 species. Of this list of birds inhabiting Parc National La Visite 17 are present that are part of the 21 species of endemic birds found in Haiti. Therefore 81% of the endemic birds of the country are found in Parc National La Visite, which is one measure of the importance of the park.

The most important habitat in the park for species of special concern is the steep north face of the massif between Morne La Visite and Morne Kadeneau. This area receives little direct sunlight and is frequently covered with clouds rising from the lowlands below. Our designation of the area is "Nan Nway" or place of the clouds in Creole. Mesic broad-leaved forest covers the steep north slope of the massif. This habitat is suitable for the threatened Chat Tanager and the rare and endangered White-winged Warbler. It is also the place where Black-capped Petrels nest during the winter months (November-March). This habitat is being rapidly altered as peasants cut and burn the natural vegetation on the mountainside to construct gardens. The population of breeding Black-capped Petrel is reduced from the last known survey in 1963 (Woods and Ottenwalder, 1986). Dogs and cats are known to feed on petrels. Dogs dig petrels from their burrows and disrupt their breeding. Dogs and cats should be removed from all sections of the park.

There has been a decrease in the numbers of ground nesting birds in the last five years. The decrease may be associated with predation from dogs and cats, but also could be associated with predation by the mongoose, which is becoming quite common in the park.

The second most important habitat is represented as patches of mesic broad-leaved forest ("Bwa Raje") surrounded

by open pinelands ("Bwapen"). This combination of habitat supports the endemic Ground Warbler, Antillean Siskin, La Selle Thrush, Rufous-throated Solitaire and Hispaniolan Trogon. The habitat is most often associated with outcrops of karst, ravines, the mouths of caves and the openings of sinkholes. The forest in this habitat is very similar to the "Rak Bwa" forest in the "Nan Nway" on the north face of the massif except that it is much less heterogeneous.

The area surrounding Morne D'Enfer eight km west of Morne La Visite is covered with a rich, diverse broad-leaved forest (Rak Bwa). It has been much less altered than the Nan Nway region between Morne La Visite and Morne Tete Opaque and the "Bwa Raje" pockets of broad-leaved forest found throughout the park. This habitat is especially rich in endemic bird species, and should be allowed to serve as a reservoir of species diversity that will allow the populations of birds to withstand the temporary loss of habitat in the main body of the park covered by the deforestation of the pinelands in the 1970's and the recent exploitation of the mesic broad-leaved forest.

The caves of the park are important nesting sites of the Collared Swift, and should be protected from exploitation.

The pinelands are important to the nesting and feeding behavior of the very special White-winged Crossbill. This species feeds on cones produced by mature pines. It is

found nowhere else in the Antilles, but also occurs in northern regions of temperate North America.

The bird species that are known to occur in Parc National La Visite but not in Parc National Pic Macaya are: 1) La Selle Thrush; 2) Palm Crow; 3) Hispaniolan Parakeet; 4) Ground Warbler; 5) Black-crowned Palm Tanager. It was previously believed that the White-winged Crossbill and the Antillean Siskin were also confined to La Visite, but our recent work confirms that these species also occur in Macaya (Woods and Ottenwalder).

G. The Mammals of La Visite

There were once many endemic mammals living in the region of what is now Parc National La Visite (Woods, 1986). Our records indicate that several species survived in this area and in the area of the Plain of Formon of Parc National Pic Macaya into historic times even though they became extinct in other regions of Haiti more than 1000 years ago (Woods, et al., 1986). The list of original terrestrial mammals of La Visite (Table 11) includes three species of zagouti (rodents of the genus Plagiodontia), two species of hutia (another large rodent), one species of giant hutia, one species of small hutia-like animal, one species of monkey, four species of tenrec-like insectivores and at least two and maybe as many as five species of large ground

sloths. Of these 17 land mammals, only one species is known to still survive in the region of the park (and only two in Haiti). The lone survivor is the "zagouti", Plagiodontia aedium.

The "zagouti" was until the last three years more common in the park than it was in any other known region of Haiti. This is because there are many areas of its preferred habitat in the "Nan Nway" region and in the ravine of the Riviere Blanche. In 1982 we estimate that 50 zagouti were found in the Nan Nway area between Morne La Visite and Morne Cabaio (Woods, 1986). In 1985 that number had been reduced to two. The specific reasons for the loss of so many zagouties in the park in the last three years are: 1) destruction of the Rak Bwa forest covering the limestone blocks in the "Nan Nway" region; 2) predation by dogs which now regularly hunt at night in gardens where zagouti found refuge in Rak Bwa covered karst areas in 1982; 3) the killing of animals by peasants in the early morning hours as they work in their newly cleared gardens and encounter zagouties feeding on their crops.

The zagouti is now almost eliminated from the "Nan Nway" region. It still survives in the upper ravine of the Riviere Blanche. If the current trend continues almost all zagouties will be gone from Parc National La Visite by 1990. If the gardens are removed from the "Nan Nway" habitat and the "Rak Bwa" allowed to regenerate, as it does readily by

sprouting from stumps in early stages of habitat destruction, then we believe that the zagouti can increase in numbers in the park again.

The reasons why 16 of the 17 species of land mammals that are known to occur in Parc National La Visite became extinct in the last few thousand years are not clear, but surely relate to: 1) habitat destruction; 2) hunting; predation; 3) competition; 4) disease. Plagiodontia aedium is a survivor and has managed to persist in this region of Haiti in spite of many of the same problems that eliminated the other 94% of the land mammals known to occur in the region (Woods et al., 1986). If the habitat can be protected and if dogs and cats can be removed from the park, we believe that Plagiodontia aedium has a good chance of surviving within the boundaries of Parc National La Visite as drawn to include all 6300 hectares.

The other kinds of mammals known to occur naturally in Parc National La Visite are bats. Eighteen species of bats are known to occur in Haiti. Eight of these are recorded in caves and/or sinkhole deposits within the boundaries of Parc National La Visite (Woods, 1986). Carbon^{14} dates for these samples indicate that they were present in the last 10,000 years. Work on the recent species of bats indicate that only four species of bats are known to still occur in Parc National La Visite (Table 12). Since bats are not easy to see or capture, some of the 50% reduction in bat species

might be associated with sampling error. However, the reduction in the number of species of bats below the number that is known to have occurred there before the habitat was altered is further evidence of the negative impact deforestation has had on the mammalian component of the ecosystem of Parc National La Visite. Ninety four percent of the land mammals and 50% of the bats of the region have become extinct. Something must be done to alter the rate of habitat destruction or the loss of endemic mammals could be complete.

The mammalian fauna of Parc National La Visite now includes four introduced species (Table 13). These are the Black rat, Norway rat, House mouse and Mongoose. In addition dogs, cats, goats, sheep, cows, and live in or near the park in a feral state. The current mammal fauna of Parc National La Visite can therefore, be summarized as seven species of land mammals (one endemic and six introduced) and four species of bats. It is indeed a sad commentary on the influence of human activities on the mammals of a region. A complete list of the species of mammals known to survive in La Visite is presented in Tables 11, 12, 13. The list of the extinct species of land mammals is available in the final report on mammals (Woods, 1986).

SECTION 5.- Critical Regions and Topics of Special Concern

Parc National La Visite

The previous discussion of the "Major Features" of Parc National La Visite as well as a close review of all the characteristics of the region indicates that several areas are more important than others. The regions that are in greatest need of protection are listed below.

Critical Areas

Region	Reason
1) The north face of the Massif called by several authors the "Nan Nway" because of the frequent cloud cover.	Critical habitat for nesting Black-capped Petrels. Also important habitat for six species of endemic birds, the endemic mammal Plagiodontia aedium and several endemic orchids.
2) The karst country SW of Morne Tete Opaque.	The area is where most remaining Juniperus ekmanii trees still occur habitat is one of the few regions on the plateau capable of

	supporting a large area of broad-leaved forest. It is one of the more populated regions of the park, and is being rapidly degraded.
3) The plateau on Morne D'Enfer	This is the only extensive area of broad-leaved forest left in the La Visite region, and it is essential to protect the habitat from further exploitation and to connect it to the park via a corridor that will allow plants and animals to recolonize the central areas of the park.
4) The entire ravine of the Riviere Blanche to below the great cascade at the SW boundary of the main region of the park.	This area is the only location where Plagiodontia aedium continues to survive in any numbers. It is also favored habitat for plants and animals that require wet forest cover. The

cascade is one of the most picturesque locations in the park.

Special Concerns

1) Protecting the Black-capped Petrels along the north face of the escarpment between Morne La Visite and Tete Opaque.

2) Protecting the few remaining "zagouti" (Plagiodontia aedium) in the park by preventing all exploitation of the north face of the escarpment and the ravine of the Riviere Blanche.

3) Removing all dogs and cats from within the park boundaries to protect the ground nesting birds and endemic mammals.

4) Removing all domestic animals from within the park boundaries, such as goats, sheep, cows and horses.

5) Preventing any further cutting of the patches of broad-leaved forest ("Bwa Raje") that occur in isolated patches around sinkholes, ravines, caves or karst exposures.

6) Establishing a program of guardians to patrol the park and protect the flora and fauna.

7) Completing an official boundary survey of the park and to clearly mark all of the perimeter of the park.

8) Producing a series of information signs that will:

a. Welcome visitors to the park at major byways.

b. Inform visitors of the rules of the park.

c. Warn visitors about vulnerable habitats or activities that damage the ecosystem.

d. Educate visitors about the special features of the park.

9) Establishing a park headquarters and associated parks staff that is capable of keeping access to the park open and undertaking projects in regions of special concern (preventing erosion, destroying old gardens or ajupas, planting trees, maintaining a seedling nursery of endemic trees and shrubs, clearing trails, building camping or recreational facilities, fighting fires, serving as guardians, signaling the presence of government authority with the park).

10) Determining a logo and appropriate uniform for all personnel associated with the park.

11) Undertaking an educational program in the Capital that will encourage understanding of an appreciation for the park. Exhibits should be set up at MUPANAH to educate the public.

12) Creating a local "site museum" at the park headquarters to demonstrate the major features of the park and make it possible for visitors to appreciate what is unique and valuable about the park.

Section 6.- Zones and Areas of Parc National La Visite

The areas of the national parks fall into several categories as listed in Figure four. The park is surrounded by a wide area of land that is privately owned (Private sector, Free-use Zone). Inside this overall region should be a Buffer Zone where various kinds of land use are possible but in which Parcs Haiti will work closely with MARNDR and the private sector to establish guidelines for the kinds of activities that will be allowed under the concept of a biosphere reserve. Both of these zones fall out of the area of direct jurisdiction of Parcs Haiti. The park itself is under the jurisdiction of Parcs Haiti and is composed of two main zones. In the "Designated Use Zone" are areas where general activities are allowed under designated conditions. This is the zone in which the areas generally used by visitors are located. The other zone of the park is the "Limited Visitation Zone". In this zone are areas where visitors are not allowed and where conservation and research are emphasized.

This arrangement is summarized in the list below. All of the following units are part of the local biosphere reserve (Map 3).

Outside the Park (Supervised by MARNDR, INAHCA and local committees)

A. Free Use Zone

B. Buffer Zone

Inside the Park (Supervised by Parcs Haiti)

C. Designated Use Zone

1. Recreation Areas
2. Education Areas
3. Maintenance and Service Areas

D. Limited Visitation Zone

1. Biological Preserve Areas
2. Restoration Areas
3. Research Areas

A. Recreation Area

Inside Parc La Visite are areas (within the Designated Use Zone) where the features are suitable for general public use and appreciation. The environment in these areas will need to be enriched and modified in order to make it more suitable for general use. The eight most important modifications that relate to the ten year plan for the park are listed below.

1) Park Headquarters should be constructed in Bois Cascade near the waterfall and above the camping meadow.

2) The camping meadow near the park headquarters should be modified so that tents can be set-up. Some lean-to shelters should be constructed, and the long range (beyond five years) goal should include the construction of some small cottages that could be rented for weekends and brief periods.

3) A latrine should be constructed near the Park Headquarters with a clean and easily maintained bathroom and shower complex and sinks for washing.

4) A PVC pipe should be extended from the nearby spring to the camping meadow to provide water for washing dishes and to supply the latrine.

5) A trail to Morne La Visite across the upper cascade and past the spring in the meadow below Morne La Visite should be planned and built.

6) Morne La Visite scenic vista area should be planned and built.

7) A trail to the lower cascade should be planned and built.

8) The "basin" below the lower cascade should be improved so that swimming and a scenic vista are possible. The trail down the steep bank will need to be improved, and stairs will need to be constructed.

B. Biological Preserve Area

An important rationale for the establishment of a national parks program in Haiti is conservation. By conservation we lump together the goals of water and soil conservation with the need to protect the ecosystem for the protection of endemic species of plants and animals. Large regions of the park should be set aside as areas where no exploitation of any kind should be allowed. The guiding principle in these conservation areas is wise stewardship to increase the biotic diversity of the entire ecosystem. We have chosen to designate these areas within the Limited Visitation Zone of the park as "Biological Preserve Areas". The most significant regions of Parc La Visite that are large enough to support significant levels of biotic diversity and are in need of immediate protection are listed below.

1) The north face of the escarpment between Morne La Visite and Morne Kadeneau.

2) All of Morne D'Enfer.

3) The area around Morne Tete Opaque where Juniperus ekmanii grows. This region is called Bois Codine.

4) The entire ravine of the Riviere Blanche.

C. Restoration Area

There are a number of areas within Parc La Visite that are of importance to specific organisms or are so badly disturbed that active management is required as part of the stewardship plan in order to restore their biological potential. Active management implies enriching the environment (placing nest boxes out to encourage cavity nesting species or reforestation with trees and shrubs that provide food and shelter) or manipulating the environment (trapping mongoose or rats from areas where they threaten birds, killing dogs and cats that prey upon endemic vertebrates). Additional research is required before activities can be recommended that might improve the chances of survival of certain species (i.e. extermination of rats and mongoose in areas where Black-capped Petrels nest) or improve biotic diversity (management by fire). The four areas of Parc La Visite that qualify for immediate restoration under the goals of the ten year stewardship plan are listed below.

1) Small regions in the Tete Opaque area where specific Juniperus ekmanii need to be protected and some reforestation will be necessary. There are many gardens and houses that will need to be removed if Parcs Haiti is to assume control of the region.

2) The basin between Morne La Visite and Morne Cabaio on the north face of the escarpment. This is critical habitat for Plagiodontia aedium, La Selle Thrushes and several other endemic species. In the last three years, massive deforestation has occurred in the region. All dogs and cats must be immediately removed. Persea anomala should be replanted in various areas.

3) The Bellfontaine area has been severely deforested and is wasteland. It should be reforested in Pinus occidentalis.

4) The Morne Cabaio area has been severely deforested. Dry areas should be replanted with Pinus occidentalis, mesic basins and areas of karst should be planted in Persea anomala and Juniperus ekmanii.

Note: Given the difficulty of managing a nursery we recommend initial reforestation by planting bare root seedlings collected underneath parent trees, and transplanting small specimen trees of specific species such as Persea and Juniperus.

D. Maintenance and Service Areas

Some of the most important activities in the park relate to providing services for personnel, equipment, visitors and technical advisors associated with Parc La Visite. The most important of these activities center around the Park Headquarters and the access routes to the park. These areas are in the Designated Use Zone. The ten year plan calls for the designation of the following regions in and around the park as "Maintenance and Service Areas".

1) The Park Headquarters.
2) The road from Ca Jacques to Seguin.
3) A supplemental Park Headquarters (outpost) in the Bois Codine-Tete Opaque area where guardians can be stationed and teams working in the interior of the park can find shelter.
4) A road (or rough trail) between the Park Headquarters and Tete Opaque.
5) The entire road from Furcy to Parc National La Visite.

E. Security and Information Areas

The park is an imperfect place in the sense that problems already exist and future patterns of unwise use or inappropriate activities could further damage the fragile ecosystem. Security guards are necessary to prevent the active exploitation of Parc La Visite by people living in or near the park. Security stations are necessary to provide

shelter and work stations for guards, and to serve as symbols of authority and a warning to potential exploiters. Information signs are needed to inform visitors to the park of the proper use of facilities of Parc La Visite and to guide them to areas of special recreational potential and away from areas of special conservation significance. Five areas that fit the recommendations outlined in the ten year plan are listed below.

1) Placement of a sign at the entrance to park near Ca Jacques.

2) Placement of a sign at entrance to park near Seguin.

3) Construction of a guard station at Ca Jacques.

4) Incorporation of a guard station into the area of the Service Depot near La Scierie.

5) Incorporation of a guard station into the supplemental park Headquarters at Bois Codine.

F. Education Area

Parc National La Visite is ideally situated within driving distance of Port-au-Prince and Jacmel (see our description of access routes to La Visite), and should attract a large number of visitors if the park is properly developed and promoted. One of the highest goals of the ten

year plan for the park is to develop a viable program in recreation and tourism. For visitors to make use of the park there must be unique and attractive activities centered in and around Parc La Visite. These features can have multiple significance (tourism, education, scientific development), and should be carefully designed in close association with MUPANAH. The seven regions and activities that related directly to the ten year plan are listed below.

1) Placement of a Site Museum (exhibits) in the central public room at the Park Headquarters.

2) A 1x2 meter educational panel should be placed on the top of Morne La Visite outlining the geological history of the area and highlighting specific regions of importance and where conservation activities are underway.

3) A scenic vista area with a 1x2 meter educational panel with information about the park should be placed near the crest of the road above Furcy. The educational panel should also provide information on the significant features of the La Selle Escarpment. We believe it could become a pleasant outing for people to drive from Port-au-Prince to the scenic vista, and so a small picnic area should be constructed there.

4) A scenic vista site (of Morne D'Enfer) should be constructed along the road between Port-au-Prince and Jacmel and should be enriched with a sign explaining pertinent facts about the park and region, and identifying features that can be observed.

5) A nature trail should be constructed passing up the ravine north and east of the camping meadow. Signs should be placed along this trail that identify trees, rocks, habitats and special phenomena.

6) Parcs Haiti should work with the Office of Tourism and private foundations and corporations (including hotels) to consider the construction of an attractive lodging facility on the outer boundary of the park or at a carefully considered location within the park. This area would be designated as part of the "Recreation Area" and carefully supervised.

G. Research

A major component of the national parks program in Haiti should be the conservation of the national patrimony and the protection and promotion of the unique natural features of the Republic for the benefit of all Haitians (tourism and education). Active research in the park, which is a form of exploitation, is not warranted except under exceptional circumstances. These circumstances are: 1) when

the knowledge gained will aid in the wise stewardship of the component parts of the ecosystem; 2) when the knowledge and experiences associated with the research activity will help train Haitian personnel; 3) the scientific value of the proposed is of a unique character and can only be done within the boundaries of the park. Research on eight topics during the initial five year period is recommended because we believe that the activities will provide important new information and will be a component in the training of the park personnel. These research topics are listed below.

1) An analysis of the composition (quantitative) of each major plant association within the park.

2) An analysis of the microhabitat requirements of each endemic plant species as well as the details of growth and regeneration (carried out in park and adjacent to it).

3) A detailed analysis of the habitat requirements of Plagiodontia aedium and Solenodon paradoxus as well as a search for the effects of dogs, cats, mongoose, Black Rats and Norway Rats on the reproduction and life history of these two rare and endangered endemic species (carried out in park and at areas adjacent to park as well as in other regions).

4) A detailed analysis of the habitat requirements of the Black-capped Petrel, and the effects of dogs, cats,

mongocse, Black Rats and Norway Rats on breeding (carried out in park and along the La Selle Escarpment).

5) The specific habitat associations of each species of bird utilizing the park (carried out in park).

6) The distribution and specific habitat requirements for numerous species of invertebrates (including a search for additional new species).

7) The distribution and specific habitat requirements for each species of frog and reptile.

8) Baseline studies on the climate of each microhabitat in the park.

Section 7.- Plan for Parc National La Visite

The stewardship plan for the park will be divided into nine topics: 1) Administration and the park site; 2) Maintenance; 3) Security; 4) Recreation and Tourism; 5) Education and Interpretation; 6) Public Relations; 7) Research; 8) Conservation; 9) Ten Year Plan.

A. Administration:

There should be a full time "Park Supervisor" assigned to Parc National La Visite who has lodging and an office at the newly constructed Park headquarters. This supervisor

would be responsible for coordinating all activities within the park. The person would supervise the guardians, the maintenance workers and temporary help. The Park Supervisor would also meet with visitors, run the education center and be the general spokesperson for the park in the region. The person would report to the Director of Parcs Haiti and to each Assistant Director by regular written reports and monthly meetings. The Park Supervisor should spend three weeks of each month in the park, and one week at the Central Office in Port-au-Prince.

Volunteers or students from educational institutions in Haiti or other countries who are associated with the park should work under the direction of the Park Supervisor.

B. Maintenance

There should be a full time team of maintenance workers who work on the road, clear trails, construct facilities, etc. The crew would be under the supervision of the Park Supervisor, but there should be a crew chief. They should be workers recruited from the area of Parc National La Visite. Whenever possible the workers should sleep in quarters outside the boundaries of the park. We should not construct a village inside the park to house, feed and supply the large number of workers who will be associated with Parc National La Visite.

The maintenance crew should be responsible for all areas within the park, as well as maintaining the road between Furcy and the park.

C. Security

There should be a team of full time guardians for Parc La Visite under the direction of a "Chief of Guards". Guards should not be stationed within the park so that there is no chance of a problem developing where guards are exposed to the possibility of maintaining their own gardens or having domestic animals of any kind within the park boundaries. Guards should regularly patrol the park via horse back. The patrols could cover different regions of the park on different days, but be regular enough to insure the impression of a strong and visible presence of authority within the park. All guards should wear uniforms, have a means of security, and have a sense of pride and belief in what they are doing. The latter comes from being carefully selected, well supervised, properly trained and regularly educated. The guards would be trained by the Park Supervisor and be part of the training sessions that take place in the park.

A security headquarters should be incorporated into the modified old park headquarters at the Scierie so that it is clear that the security force has authority within the park but is under the administrative control of the Park

Supervisor. The security force can also make use of the Agricultural station NW of Seguin. This site is 2 km by road from the Park Headquarters, 4 km from Morne La Visite and 3 km from Tete Opaque.

The number of guards should be large enough to insure the safety of the guards under difficult circumstances and to adequately staff the security post. We propose the following arrangement.

A. Chief of Guards	1
B. Guard post on road to Furcy	2 guards
C. Patrols on horseback in Park	2 guards
D. Day duty at park Headquarters	1 guard
E. Reserve guard for rotational duty	1 guard
	7 guards

How the administration of the guards in the district should be organized is an inter-institutional matter that should be determined by the GOH. It should be noted that a potential conflict could arise as to who has the responsability for "security" in the region. There are a number of VSN personnel in the area, and there is a post of the FADH in Seguin. The security team of the park should be able to draw from either of these security forces for assistance, and could be formed entirely from one or the

other. It must be clearly understood, however, that they must enforce the rules and regulations of the park and that they must acknowledge the authority of the Park Supervisor and the Director of Parcs Haiti. The formation and development of the administrative structure of the security force should be completed as soon as possible by a formal written agreement between Parcs Haiti and GOH.

D. Recreation and Tourism

The first phase of the development of a program in recreation and tourism is to develop all of the eight points previously mentioned as being part of the "Recreation Area" (Section 6-A). These recommendations when completed will give visitors something to do in the park. The second phase would be to integrate the recreation program with the education program (Section 6-F). These two programs have many areas of over lap, and coordinating activities between the two would make the parks even more interesting places to visit and spend time in.

When the above goals have been met, there will be: 1) trails leading to interesting places in the park (Morne La Visite and the Grande Cascade); 2) scenic vistas (Morne La Visite as well as the sites along the road leading to the park); 3) recreational sites (campground, swimming at the Grande Cascade and the upper cascade, relaxation at the "Sous La Visite" site along the trail to Morne La Visite;

4) educational facilities (the local site museum at the Park Headquarters, the nature trail with instructional signs).

After a good facility is in place at La Visite, Parcs Haiti should work with private enterprise (hotels, travel bureaus, airlines, tour guides, etc.) to create a tourist package where visitors could be brought to the park on a regular basis. A reasonable, rustic hotel or lodge could be constructed near or in the park at that time. The facility could be constructed with private money, and could include an expanded museum facility. Since the park is so close to Port-au-Prince, is so scenic, has such a pleasant climate and great recreational potential, it is reasonable to conclude that recreation and tourism could be a major feature of the park. We believe that this would be possible without compromising the quality of the park or destroying the conservation features of Parc National La Visite.

We recommend that the local inhabitants of the region be included into the tourism package. The effort should be designed and coordinated by the Park Supervisor and the Assistant Director for Education and Recreation. The program should include local guides as well as a place to rent horses. Food and soft drinks could be sold at local stands.

E. Education and Interpretation

The major features of an educational program are listed in the section describing Educational Areas (Section 6-F). The six features and programs listed should be undertaken at an early stage in the development of the park. The exhibit panels can be designed in Haiti and constructed at the Florida State Museum under the auspices of the cooperative accord. They should be all-weather panels of an adequate size (1x3 meters) and have a reasonable amount of information in an attractive format. The panels should be incorporated into a public room at the Park Headquarters. There should be four panels at the beginning each with an exhibit on both sides. The eight exhibits should be: 1) Geological features; 2) Climatic features; 3) Major forest communities; 4) Interesting flowers and shrubs; 5) Birds; 6) Mammals of the park; 7) Other animals of the park; 8) Water cycle and cave biology.

The nature trail should be constructed along the ravine NE of the Scierie. The trail should pass up the ravine and return via the upper cascade near the Park Headquarters. There should be signs on trees, and near flowers and rocks identifying the natural features of the park. The nature trail should be keyed to information on the exhibit panels in the Park Headquarters.

F. Public Relations

The park should be promoted in the media in Port-au-Prince after adequate facilities exist in the park site to insure that visitors will be impressed with the park. The park should be featured in a series of educational exhibits at MUPANAH. A regular weekly feature on some special aspect of the park should be written for the newspaper in Port-au-Prince.

The Park Supervisor should be well trained in explaining the importance of conservation and the specific goals and plans of the park to individuals living in the park and in areas adjacent to the park. One of the most important aspects of the job of the Supervisor of the park should be to keep peace in the region and to promote an understanding and appreciation for the parks at the local level.

G. Research

There are a number of things that are not adequately understood. Before long range conservation and management plans can be made answers must be found to these questions. We recommend that a five year program of research be initiated. The research should be coordinated through a foreign university or institution. For each research project a co-investigator from Haiti should be assigned to

actively participate. This co-investigator should be a co-author of all reports and publications.

The major research questions are listed in Section 6-G.

H. Conservation Goals

The major conservation goals for Parc La Visite for the next ten years are listed below.

1) Preservation of Juniperus ekmanii and reforestation of all appropriate areas of the park with this important endemic plant.

2) Re-establishment of the rich and diverse mesic broad-leaved forest in appropriate areas of the park.

3) Preservation of the breeding colonies of Black-capped Petrels between Morne La Visite and Morne Kadeneau.

4) Preservation of the White-winged Warblers in the mesic broad-leaved forest.

5) Re-introduction of breeding Hispaniolan Parrots into the forest of La Visite. Nest boxes should be placed in appropriate areas within the park.

6) Preservation of the Zagouti, Plagiodontia aedium on the northern escarpment of the La Visite park and in the ravine of the Riviere Blanche.

7) Re-introduction of Solenodon paradoxus into the park.

8) Conservation of the endemic birds closely associated with the mesic broad-leaved forest (Hispaniolan Trogon, Ground Warbler, Chat Tanager).

I. Ten Year Plan for Parc La Visite

All of the major features of the plan for Parc National La Visite are discussed and outlined in sections A-H and should be able to be accomplished in the next ten years. In summary, these are:

1) Select a full time Park Supervisor and support staff for the park (Highest Priority).

2) Initiate an on site training program (High Priority).

3) Construct a Park Headquarters at Bois Cascade based on the plans provided (High Priority).

4) Clearly established the boundaries of the park (High Priority).

5) Establish Biological Preserve areas to protect the endemic flora and fauna (High Priority).

6) Establish signs and information exhibits (High Priority).

7) Reforest areas that are seriously degraded with appropriate vegetation.

8) Eliminate all domestic animals from within the park boundaries.

9) Resolve all issues of private holding in the park, and remove all residents with houses or permanent structures.

10) Complete a series of research projects to provide basic information on the natural resources of the park, and help train Haitian biologists who can assume a major role in the National Parks Program.

11) Establish a site museum at the park headquarters and educational facilities including a nature trail.

12) Establish a recreational program with a clearly marked series of trails and appropriate facilities.

13) Improve access to the park.

14) Eliminate all feral dogs and cats.

15) Establish an internship program to insure that in time Haitian citizens will be in a position to assume all positions with the park as well as the National Parks Program.

16) Create a Recreation and Tourism package that will encourage regular visitors to come to the park.

CHAPTER IV

Parc National Pic Macaya

Section 1.- Location

The area designated as Parc National Pic Macaya is located on the Massif de la Hotte at the crest of the mountains where several major rivers originate (Map 1). The park lies at latitude 18 21' N and 74 01'W. The crest of the mountains divides the Departement du Sud (Arrondissement des Coteaux) in the south from the Departement de la Grande Anse (Arrondissement de Jeremie) in the north. The most characteristic feature of the park is Pic Macaya with an elevation of 2347 meters. Pic Macaya is located 36 kilometers northwest of the city of Les Cayes and 195 kilometers west of Port-au-Prince.

Section 2.- Size and Natural Boundaries

The "communique" in the Nouveau Monde (5 May 1981) mentioned the creation of "parcs naturels" in the Massif de la Selle and Massif de la Hotte but did not mention the specific location or boundaries of the park in the La Hotte region. The decret of 23 June 1983 creating the national park in the Massif de la Hotte designated the size of the park at Macaya to be 2000 hectares. The communique signed by Dr. Roger Lafontant and Frantz Flambert on 15 January 1985 declared the Macaya area as a "zone protegee" but did

not set the specific boundaries of the preserve. The size of the park was described as 2000 ha with a 10,000 ha buffer zone in an internal document between MARNDR and USAID entitled "Fiche de Projet en Cours". Our original recommendation for the size of a national park around Pic Macaya was 3000 hectares (Woods and Rosen, 1977). In correspondence between the Florida State Museum and USAID a preliminary boundary for Parc National Pic Macaya was recommended as comprising 5500 ha. This proposal was accepted by INAHCA and MARNDR, and is being used by MARNDR in conjuction with the recommendations of Florence Sergile, Parks Coordinator in the Direction des Ressources Naturelles (MARNDR), to determine the boundaries of the park by the boundary survey team from MARNDR. We believe that the size of the park should be expanded to 7500 ha. The specific areas to be included and the justifications for doing so are discussed below (Map 4).

The natural boundaries of Parc National Pic Macaya can be defined based on the results of the various inventory teams and the final reports of these investigations. Analyses of the inventories of the most significant geological, botanical, zoological and recreational features of the Pic Macaya region indicate that all of the following features should be included within the territorial limits of the park.

Feature	Reason	Location
Pic Macaya	-water conservation	
	-unique broad-leaved and pine forest community	2347 m
	-nesting Black-capped Petrels	
	-soil conservation	
	-Recreation (wilderness setting)	
Pic Formon and Pic Le Ciel	-unique broad-leaved and pine forest community	2219 m 2170 m
	-possible Black-capped Petrel nesting area	
	-water conservation	
	-soil conservation	
"Bwa Formon" (karst hills between Morne Cavalier and Sous Bois)	-Endemic orchids	1570 m below Morne Cavalier and along rim of Plain of Formon (karst hills) to 1000 m
	-Plagiodontia habitat	
	-Especially rich avifauna	
	-Numerous endemic species	

"Gran Ravin" of the Riviere Ravine du Sud	-Numerous endemic species -Water conservation -Soil conservation	1919 m in saddle between Pic Macaya and Pic Formon eastward in Gran Ravine down to 500 m
Ridge of Macaya	-Unique broad-leaved forest -Water conservation -Nesting Black-capped Petrels -Numerous endemic species	2 km. W and 6 km E. of Pic Macaya
Ridge of Formon	-Unique broad-leaved forest -Water conservation -Possible nesting Petrels	2 km W. and 6 km E. of Pic Formon

Plain of Mare Cochon	-Only habitat with *Solenodon* -Rich broad-leaved forest -Exceptional number of endemic species -Soil conservation	1200-1400 m elevation NE of Macaya

Each of the above features will be discussed in greater detail in the section on the "major features" of the park, and has been described in elaborate detail in each specific report accompaning this document. All of the features are part of a natural ecosystem that ranges in elevation from 900 to 2347 meters. If Parc Macaya were to include all of these areas it would be a 5000 ha "block" of terrain that would contain Pic Formon and Pic Macaya at their watersheds. Parc Macaya would also include a 500 ha. peninsula of land that streaches southward from Pic Le Ciel and includes the forested karst hills around the western and southwestern boundaries of the plains of Formon and Deron that are rich in important sinkholes and have several small ponds. The park should also include 2000 hectares NE of the ridge of Pic Macaya in the areas of Diquillon and Mare Cochon. All of this park of 7500 hectares should be protected from environmental degradation of all kinds including all agriculture and deforestation. The flora and fauna of Parc

Macaya contain more endemic species than any other known area of Hispaniola.

Section 3.- Access to Parc Macaya

Access to Parc National Pic Macaya is difficult. There are several ways to enter the park, but only one is practicable (Map 4). That route is via the city of Les Cayes where there are several hotels that would be suitable for tourist accomodations. Les Cayes is 196 kilometers by road west of Port-au-Prince and the journey takes less than four hours to drive on a paved all-weather highway. From Les Cayes the route is a gravel road to the town of Le Duc. Beyond Le Duc the road becomes rough and crosses the Riviere l'Acul three times before passing through the town of Le Pretre. Beyond Le Pretre the road is very rough and climbs the escarpment by a series of switch backs from the valley of the Riviere l'Acul up to the southwestern margin of the Plain of Formon at Les Platons. This is a picturesque area where there is a fortification (Citadelle Des Platons) and splendid views of the eastern Massif de la Hotte (ridges of Pic Formon). The trip from Les Cayes to Les Platons in 33 kilometers and takes about two hours to drive. From Les Platons the local residents are building a road towards Sous Bois (the site of an important local market). The route is not completed, however, and in November 1985 it was possible

to drive on it for only 1.5 km beyond the Catholic church at Les Platons. Therefore, it is necessary to hike from Les Platons (elevation 650 meters) northwest across the Plain of Formon. The route passes through Marche Sous Bois, and then the extensive karst hills that are still forest covered and which are known locally as "Bwa Formon". The boundary marker for the southern edge of the park is located beside the trail in Bwa Formon 100 meters before the trail finally passes out onto the flat, fertile Plain of Formon at "Portal Formon", a collection of houses and large fields in a region designated on the map (Edition 2-AMS, Sheet 5370-1, 1:50,000) as Nan Seille. Nobody in the region currently recognizes the name Nan Seille, and all use the name Formon or Portal Formon. The route from Les Platon takes three hours to walk and is 10 kilometers long. At "Portal Formon" the visitor looks northward to see Morne Cavalier and Pic Le Ciel to the west of the ridge of Formon orientated in an east-west direction. From "Portal Formon" two trails can be used to pass through the park.

The first trail passes directly northward and ascends the ridge of Formon via a series of gardens known as "Kay Ogile" until it passes over the top of the massif at 1850 meters elevation. The trail then descends into the "Gran Ravin" to a settlement of gardens known as "De Glace". The area at "De Glace" is 1030 meters in elevation, and is

located beside the Riviere Ravine du Sud in the bottom of the "Gran Ravin".

The second trail passes northeast across the upper Plain of Formon and through a karst zone to the Plain of Deron. On the Plain of Deron is a region of sinkholes, ponds and streams. The karst hills south of the Plain of Deron are known as "Bwa Deron". All of this area should be in the park. The trail then ascends a ridge east of Morne Cavalier to the crest of the mountain at 2000 meters elevation. At this point three routes are possible: a) a newly cut trail that follows the ridge to the east to intersect the first trail at 1800 meters elevation; b) the old trail which passes northward and descends into the upper "Gran Ravin" where it eventually joins the dry streambed of the Riviere Ravine du Sud at 1550 meters elevation; c) a newly cut trail that cuts off to the west of the trail and ascends the ridge of Formon. The trail to the west passes across one peak (called by local woodsmen "Le Ciel"). The top of Pic Le Ciel is somewhat cleared, and a magnificent view of Pic Macaya is possible from there by climbing a low pine tree in the clearing. This area serves as an excellent camp site. The trail continues on from this 2170 meter peak across a narrow ridge to 2219 meter Pic Formon which is covered with broad-leaved forest capped with a few towering pines. The trail then descends northward along the ridge that connects Pic Formon with Pic Macaya. This connecting

ridge is known locally as "Pa l'en cont". After passing over a small well forested peak at 1919 meters in the center of the ridge which we designate as "Tete Ravine" the trail steeply ascends the south ridge (shoulder) of Pic Macaya. This trail passes near rocky ledges in places and is quite dangerous and steep. The trail eventually levels off at the shoulder (2200 meters) below the summit before steeply climbing to the summit. A camp has been cleared near the summit of Macaya at 2335 meters. The summit is 50 meters west of the camp site at 2347 meters, and is marked by chunks of cement (probably part of the old benchmark) wedged into the stump of a fallen pine.

This is the only practical route to take into the park, although it is possible to hike into the park from the east via the towns of Duchity or Beaumont. However, the route crosses steep ravines and the trail to the summit of Pic Macaya has not been cleared. It is currently possible to travel only as far as "Zapoti", a clearing at 1216 meters two km north of Pic Macaya. The northern route, therefore, is not suitable as the primary access to the national park even though this is the historical route of access to Macaya that was followed by Wetmore and Darlington. Now that the trail has been cleared across Pic Formon from the south, the route from Les Platons should be considered the primary access to Parc National Pic Macaya. If the road between Les Platons, Sous Bois and eventually Portal Formon

is completed this will provide access to Parc National Pic Macaya that would be suitable for tourists. However the route would require major supervision to prevent habitat exploitation. The route from Les Platons provides many picturesque vistas of Parc National as it traverses the broad plain and crosses the karst hills.

Section 4.- Major features of Parc Macaya

The following section summarizes all of the reports of the biogeophysical inventory. An attempt has been made to review the most important features of Parc Macaya, and to provide a synthesis of the information that is necessary for planning as well as understanding the significance of Parc Macaya. Each original report stands on its own and should be consulted for detailed information concerning Parc Macaya.

A. The Geology of Parc National Pic Macaya

The interpretation of the structural geology of Parc Macaya is complicated by the extensive weathering of the outcrops and the dense vegetation cover of most sections of the park. There are numerous faults, some trending east-west along the Grande Ravine du Sud and others north-south in the Macaya Formation.

One of the most significant geological features of Parc Macaya is the extensive karst topography that occurs along the areas of low relief east and south of Morne Cavalier. Karst is also exposed along the ridges between 1800-2000 meters east of Pic Formon and along the ridge between Pic Formon and Pic Macaya. Most exposures of karst in the park are associated with the "karst hills" that cover the edge of

the Plain of Formon, which are really cones of karst. Low areas are frequently doline collapses or sinkholes. Steep-sided solution pipes and sinkholes are often encountered on the Plain of Formon and Plain of Deron. Even though the area receives abundant rainfall, most water quickly enters the subsurface hydrologic cycle via the extensive joint system and larger scale solution features (flowing into caves).

The main body of the park is composed of two tall peaks, Pic Formon and Pic Macaya. They are separated by an active east-west trending fault system that forms the "Gran Ravin" and the Riviere Ravine du Sud east of the ridge connecting Pic Formon and Pic Macaya indicate active vertical uplift in the region. The upper surfaces of both mountains are covered with deep rich soils that support a dense forest. These soils are highly oxidized, reddish laterites. There is a thick layer of humus formed by decomposing vegetation.

The long fault that originated in the Miocene passes through much of the Southern Peninsula and crosses Parc Macaya via the "Gran Ravin". The evidence of active vertical tectonics in the region is found in the steep slopes of the ravine, the numerous talus deposits that flow out onto the bottom of the ravine and flat areas on the slopes above, and the frequent occurrence of massive landslides.

The rocks of the park are from two formations. Most rocks are limestones of the Macaya Formation. These massive limestones are characterized by numerous veins of calcite. Most rocks are fine-grained and light grey in color. Occasional rocks that are greyish-brown or even darker in color are encountered. This rock formation is very old, probably originating in the late Cretaceous 70 to 80 million years ago. During this time the western portion of what is now the Southern Peninsula, and the Parc National Pic Macaya was a back-arc basin that may have been detached from northern Haiti and located hundreds of kilometers to the west of its present position.

The second formation that is found in the park is the "Demisseau Formation". This is the same formation that is found in Parc National La Visite north of the La Selle Escarpment. It is a deep-water deposit consisting of basaltic volcanics (lava flowing under the ocean surface), turbidites, limestones, cherts and siliceous sandstones. Rocks derived from this formation are exposed at 1150 meters in the stream basin of the Grande Ravine du Sud. Other outcrops of basalt can be observed at 1400-1600 meters elevation along the southern slope of the ridge of Formon. Most workers believe that the Demisseau Formation underlies the Macaya Formation, and is therefore older.

Both the Macaya and Demisseau formations were formed in the deep ocean in the ancient Caribbean Sea. This sea

became shallow in the area of what is now the peninsula of Haiti in the early Tertiary. During the middle Tertiary (Miocene) a major tectonic left-lateral fault developed. Since this time there have been continued lateral and vertical tectonic events that have shaped the land as we see it today. The late Tertiary and Quaternary (last 9 million years) has been characterized by the formation of karst landforms and lateritic soils. If Hispaniola was separated into two islands as some geologists believe, then the Southern Peninsula would have joined the rest of Haiti about 9 million years ago.

The forces that shaped Haiti are still at work in Parc National Pic Macaya. One of the best places in all Hispaniola to stand and appreciate the forces of geological events in action is in the upper Grande Ravine du Sud at 1600 meters elevation.

B. Floristic Features of Pic Macaya

The vegetation of Parc National Pic Macaya in the Massif de la Hotte consists of an extremely diverse moist broad-leaved forest growing on and around areas of exposed limestone at the lower elevations of the park and extending upward to about 1250 meters elevation (Table 3). Above 1250 meters a complex mosaic of habitats exist ranging from moist, dense cloud forest to occassional open, savanna-like

pine forest (best developed above 1600 m). Human-caused disturbance is extensive below 1600 meters.

Judd (1986:7-10) describes the vegetation in the Macaya region into two major types. The first is an extremely diverse wet forest on limestone. This is equivalent to Holdridge's (Sedwitz and Canet, 1972) "foret tres humide de Montagne de basse altitude" and ranges upward to about 1250 meters elevation. The second forest type described by Judd is a complex mosaic of pine and cloud forest formations. Local edaphic factors such as soil, exposure, local precipitation amounts, wind patterns as well as part of the history of the region (i.e. fire, cutting, hurricanes) influence what type of forest will grow in a particular locality. Because it is difficult to speak of the park in specific terms within the general forest types mentioned above, we have subdivided the forest types with several subunits.

The lower "wet forest on limestone" is subdivided into four types of habitat.

1) Mature broad-leaved forest (Creole name "Rak Bwa Woch").

This is a typical forest of the karst hills on the edge of the Plain of Formon. The species composition is described by Judd (1986:9-10).

2) Fragmented broad-leaved forest (Creole name "Bwa Raje Woch).

This is a small patch of the preceeding forest type or one that has been dramatically altered by selective cutting.

3) Abandoned gardens or areas of early succession (Creole name "Raje").

Grassy areas on the Plain of Formon or in the foothills below 1300 meters.

4) Gardens (Creole name "Jadin").

Garden planted in cleared areas within the "Rak Bwa Woch" or on the Plain of Formon.

The complex of forest types above 1300 meters elevation have been subdivided into the following units.

1) Pine forest (Creole name "Bwapen").

This forest type is described by Judd (1986:7). It is similar to the pine forest in La Visite except it is much moister and has many more broad-leaved plants in the understory.

2) Successional pine forest (Creole name "Bwapen Raje").

Young stands of Pinus occidentalis with blackberries (Rubus spp.) and braken ferns.

3) Mature hardwood forest or "cloud forest" (Creole name "Rak Bwa").

This forest has few or no overstory pines, and usually has large and conspicuous individual Didymopanax tremulum trees (called "Bwa Tramble"). The understory is a diverse array of small trees and shrubs such as Garrya fadyenii, Myrsine coriacea, Brunellia comocladiifolia and the important wild avocado Persea anomala. The climbing bamboo Arthrostylidium haitiense ("liane a scie") grows up in sunny spots and makes many areas of this habitat almost impenetrable.

4) Fragmented hardwood forest (Creole name "Bwa Raje").

Small patches of "Rak Bwa", or hillsides where the typical "Rak Bwa" has been modified by fire or wind damage so that only a few species are present. In these disturbed zones the climbing bamboo often grows up and over all of the fallen vegetation.

5) Abandoned gardens or areas of early succession (Creole name "Raje").

6) Gardens (Creole name "Jadin").

The above designations in conjuction with the discussion and species lists available in Judd (1986) allow us to understand the fine grain distribution of vegetation types and associated flora found in various regions of the

park. A further indication of the importance of Parc Macaya is demonstrated by examining the ecological map of Haiti prepared by L.R. Holdridge for the Organization of America-States (Sedwitz and Canet, 1972). The map shows five vegetation formations occuring within the boundaries of the park and associated buffer zone. These formations are determined on the basis of elevation, precipitation, evaporation, and climate. The five formations are described below. The French name for the formation is given as presented on the map by Holdridge (Sedwitz and Canet, 1972). The English name is taken from Holdridge (1947:138) in the work on the pine forests of Haiti in which he developed his now famous system for classifying vegetation types. The presence of five vegetation formations in one small region is an indication of the ecological importance of Parc National Pic Macaya. Some of these formations are associated with abundant rainfall, further pointing out the significance of the park in water conservation (see plate 6 in Atlas d'Haiti, Lasserre et al., 1985).

1) Foret tres humide de Montagne de basse altitude (Fth-M6) Tropical lower montane wet forest formation.

-Precipitation 2000-4000 mm.

-Plain of Formon, foot hills of massif and karst hills.

2) Foret tres humide de la zone Sous-Tropicale (Fth-S)
Subtropical wet forest formation.

-Precipitation 2000-4000 mm.

-Valley of Riviere des Roseaux and north face of Pic Macaya.

3) Foret tres humide de Montagne (Fth-M)
Tropical Montane wet forest formation.

-Precipitation 1000-2000 mm.

-Upper ridge and peak of Formon and Macaya.

4) Foret pluvieuse de Montagne de basse altitude (Fp-M6)
Tropical lower montane rain forest formation.

-Precipitation over 4000 mm.

-Upper "Gran Ravin" and Riviere Ravine du Sud and the plain east of Macaya towards Catiche and Duchity (Mare Cochon).

5) Foret pluvieuse de la zone Sous-Tropicale
Subtropical rain forest formation.

-Precipitation over 4000 mm.

-Lower area of Ravine of Riviere Ravine du Sud and along the edge of the plateau of Mare Cochon towards Catiche where the road from Cayes to Jeremie crosses over to the top of the plateau.

A total of 463 species of vascular plants (including 359 flowering plants, 1 conifer, 102 ferns and fern allies) were collected in Macaya National Park. These belong to 263 genera in 109 families. The largest families (excluding the Orchidaceae) include the Melastomataceae (34 species), Asteraceae (30), Polypodiaceae s. str. (22), Piperaceae (19), Rubiaceae (19), Urticaceae s. lat. (19), Dryopteridaceae (17), Poaceae (15), Solanaceae (13), Bromeliaceae (12), and Myrtaceae (12). The total vascular flora includes 130 species endemic to Hispaniola (28% of the flora of the park). Of these, 69 are endemic to the Massif de la Hotte (15% of park flora). The degree of endemism among the flowering plants was slightly greater with 124 endemic species (34%). Of these, 68 (about 19%) are endemic to the Massif de la Hotte. Only six percent of the fern and fern allies of Macaya are endemic. Families with large numbers of endemic species include Melastomataceae (26), Urticaceae (12), Asteraceae (15), Solanaceae (7), and Myrtaceae (6). A total of 99 species of mosses and over 50 species of liverworts were collected in Parc Macaya. Very few of these are endemic.

The species of special concern (endangered species) in Parc National Pic Macaya as determined by Dr. Walter Judd of the University of Florida include a number of endemics with ranges restricted to the Massif de la Hotte (see Table 3).

Species that are especially susceptible to disturbance are listed below.

Myrsine magnoliifolia

Meliosoma abbreviata

Calycogonium torbecianum

Tabebuia conferta

Brunfelsia picardae

The orchids of Parc National Pic Macaya

There are at least 133 species in 42 genera of orchids in Parc National Pic Macaya. Of these 38 are endemic to the Massif de la Hotte (often the park area itself) and 58 are endemic to Hispaniola. The most important habitats for orchids are the mesic broad-leaved forests of the karst hills along the edge of the Plain of Formon between 950-1150 meters elevation. Many of the orchids in this area are small and inconspicuous, but none the less scientifically important.

The diversity of orchids growing in the upper areas of the park is considerably below the incredible diversity found in the forests of the karst hills. Only 40 species were found on a flat basin below the ridge of Formon at 1550 meters elevation, and even fewer orchids were found at higher elevations in the park.

The diversity of orchids in Parc National Pic Macaya is truly phenomenal. The presence of 133 species of 42 genera

in an area of less than 10 square kilometers is extraordinary, especially when it is realized that Hispaniola has fewer than 350 orchids recorded for the entire island. This means that almost 40% of all the orchids of the island occur in Parc Macaya. Almost all of these occur in the broad-leaved forests of the Plain of Formon. The region of Parc Macaya, and especially the region including the karst hills and Morne Cavalier (Bwa Formon and Bwa Deron) is a piece of ecology so valuable that it must be preserved.

C. Parc National Pic Macaya and itd butterflies

Eleven species of butterflies are known from Parc Macaya, which is almost half the number of species known to occur in Parc La Visite (20, and possibly 21). The two parks have six species in common. One species, Calisto loxias is known only from the Massif de la Hotte. The genus Calisto is predominantly an upland group, often restricted to one mountain massif. It is not surprising, therefore, that a member of this genus is apparently endemic to the Parc Macaya region while another is endemic to the Parc La Visite.

The reason so many more butterflies occur in the Parc La Visite region than in Parc Macaya is unresolved. Several species missing from Parc Macaya are widespread in

Hispaniola and it is a surprise that they are not found in the Macaya area. One explanation is clearly that Parc Macaya is more isolated than Parc La Visite. This appears to be one of the main explanations for why five endemic birds that are common in La Visite do not occur in Macaya. A second possible explanation may relate to the more complete forest cover in the Parc Macaya region, which may reduce the chance occurance of lowland forms. A list of the species of butterflies found in each park is presented in Table 4.

D. Parc National Pic Macaya and its Land Mollusks

Fifty seven species of land snails were reported from Parc Macaya (Thompson, 1986). Of these 23 are endemic species that are known only from the immediate area of the park. Twenty seven new species (two of which represent new genera) were collected in Parc Macaya.

The large number of new endemic taxa is an indication of the importance of the habitats included within the boundaries of Parc Macaya. The most important habitat for land snails in Parc Macaya is the "Bwa Formon" region along the escarpment at the edge of the Plain of Formon. This middle elevation region (1000 meters) is one of the few such undisturbed habitats left in Haiti. The higher elevations of the park are more depauperate in the number of species,

however nearly all species occuring in habitats above 1800 meters are locally endemic. Table 5 lists all of the land snails known to occur in Parc Macaya.

E. Parc National Pic Macaya and its herpetofauna

The Annotated List (Table 7) cites 26 amphibians and 33 reptiles in the Massif de la Hotte. This list and the analysis below do not take into consideration those taxa whose distributions are confined to coastal and low elevations sites (under 700 meters), and undescribed or unidentified taxa found during recent explorations. At least one of the new taxa is a unique frog from the ridge of Formon in the vicinity of Pic Le Ciel, Pic Formon and the north slope down to approximately 1650 meters. This species is now under study by Blair Hedges, Richard Thomas, and Richard Franz and will be described in a separate publication.

Collections from the study area include 18 frogs, 11 lizards, and 5 snakes. These represent approximately 58% of the taxa presented in the Annotated List. In general, Parc National Pic Macaya includes a mixture of both wide-ranging and highly restrictive species. The wide-ranging amphibians and reptiles are usually well represented in collections from lower elevations while the restrictive ones are confined to specific habitats and/or certain altitudes. The greatest species richness occurs at elevations under 1300

meters. As one ascends in elevation the number of species decreases markedly until there are but three species on Pic Macaya (elevation 2347 meters). Within the proposed park area (between 1600 and 2347 meters) eight species were found. Five were restricted to mid and high elevation sites, while three where wide-ranging. Only Eleutherodactylus ventrilineatus and the undescribed frog appear to be endemic to the proposed park itself.

Expansion of the park boundaries would increase the number of species present in the park. Inclusion of Morne Cavalier and south slopes of Pic Formon and Pic Macaya add an additional seven taxa (Eleutherodactylus nortoni, Celestus costatus costatus, Anolis coelestinus coelestinus, Chamaelinorops barbouri, Leiocephalus melanochlorus melanochlorus, Antilliophis parvifrons parvifrons, Darlingtonia haetiana haetiana). Inclusion of portions of the upper Plain of Formon, the karst hills to Sous Bois, and Grande Ravine du Sud add 15 more taxa (Eleutherodactylus chlorophenax, Eleutherodactylus lamprotes, Eleutherodactylus wetmorei wetmorei, Hyla heilprini, Hyla pulchrilineata, Hyla vasta, Osteopilus dominicensis, Celestes stenurus stenurus, Anolis cybotes cybotes, Anolis dolichocephalus sarmenticola, Anolis monticola quadrisartus, Anolis ricordi leberi, Epicrates gracilus hapalus, Epicrates striatus exagistus, Uromacer catesbyi catesbyi). Inclusion of portions of the north slope of Pic Macaya including areas near Castillon

(Mare Cochon) adds at least 16 more taxa (*Eleutherodactylus audanti audanti, *Eleutherodactylus abbotti, *Eleutherodactylus eunaster, *Eleutherodactylus glaphycompus, *Eleutherodactylus heminota, *Eleutherodactylus hypostenor, *Eleutherodactylus inoptatus, **Eleutherodactylus pictissimus pictissimus, *Eleutherodactylus sciagraphus, Eleutherodactylus semipalmatus, Sphaeodactylus elasmorhynchus, *Anolis darlingtoni, Anolis distichus suppar, Anolis dolichocephalus dolichocephalus, Anolis monticola monticola, Anolis ricordi viculus), and probably others (* = those taxa that may eventually be found in one of the other proposed areas of inclusion, ** = those taxa known to occur at lower elevations just outside of the park boundaries).

Many of the amphibians and reptiles listed above occur in very specific habitats. Those species occurring at elevations above 1300 meters are found in mesic broad-leaved and wet pine forest. Species found below 1300 meters are associated with wet forests and limestone. Both of these habitat types provide cool and humid environments for their inhabitants. Data suggest that when conditions become more arid through deforestation and agriculture many of the species disappear from the surface with some taking refuge in sinkholes and caves. Other species are probably extirpated. It is also apparent that certain species (Eleutherodactylus oyrhynchus, Osteopilus dominicensis,

Anolis coelestinus, Anolis distichus, Leiocephalus melanochlorus, Celestus costatus, Celestus stenurus, Darlingtonia haetiana) are apparently able to thrive under those new conditions and in some cases spread. This has probably enabled certain "weed" species to follow trails where the forest canopy has been removed into areas that were previously uninhabited by them. Franz and Cordier (1986) believe that Eleutherodactylus oxyrhynchus and Anolis distichus used these corridors to gain access to high altitude sites on Pic Formon, Pic Macaya and the ridge connecting these two parks. The intrusion of exotic species probably adversely impacts resident species.

The creation of a park within the Massif de la Hotte is absolutely essential for the survival of the region's herpetofauna. The region is an important center for endemism in southern Hispaniola and contains over 30 restricted species and subspecies. In addition, there are at least 15 other taxa which are also found in the Massif de la Selle area but are missing from intervening lowlands.

To preserve portions of the Massif de la Hotte means to provide sanctuary for approximately 30% of amphibian and reptile species known from Hispaniola (including 17 species which are found nowhere else in the world).

F. The birds of Pic Macaya

A complete list of all bird species of Parc National Pic Macaya is presented as Table 9. There are fewer resident bird species in Macaya because of the absence of five endemics that do not occur west of the Jacmel-Fauche depression ("Bond's line"), such as the Black-crowned Palm Tanager, Ground Warbler, Hispaniolan Parakeet, Palm Crow and La Selle Thrush. The group of year round residents is an assemblage of species that are found in a variety of habitats, mostly associated with the mesic broad-leaved forest (lower montane rain forest of Holdridge). This habitat occurs throughout the higher elevations of the Macaya region, while in the "Gran Ravin" subtropical rain forest occurs (Holdridge map, 1972 in OAS report on Haiti). This habitat does not occur in La Visite because less rainfall falls in the Massif de La Selle than in the Macaya region (OAS Holdridge map, Sedwitz and Canet, 1972; Atlas d'Haiti, Lasserre et al., 1985).

The pattern of isolation observed in Parc Macaya may be the result of ecological conditions rather than the geographical remoteness of the area. Indeed Macaya is not very distant from the Massif de la Selle, since the mesic broad-leaved forest of Morne D'Enfer is only 175 km distant from a similar forest on the ridge of Pic Macaya. The test of the ecological hypothesis would be if species from La Visite began to spread into Macaya as the habitat there is altered by human activities. This has not occurred in the

case of species such as the Black-crowned Palm Tanager, Ground Warbler or La Selle Thrush which are closely associated with mesic broad-leaved forest, the habitat that is being destroyed in the Macaya region. However, the White-winged Crossbill and Antillean Siskin showed up in the Macaya region for the first time during the course of this study. These birds are associated with open areas and mature pines. The expansion of their range into Parc Macaya may be the result of increased destruction of the mesic forest in the Macaya region that has been documented by Cohen (1984). The loss of the mesic forest is followed by rapid regeneration of pine making the area more suitable for species such as the crossbill and siskin. Large flocks of crossbills were present from 1982 through the last survey in November 1985. The transition is not complete, however, since Hispaniolan Parakeets and Palm Crows, two other species that do well in the open pine habitats of La Visite have not yet spread to Macaya. Should these two species spread into the Macaya region it would be a further indication that Macaya has been isolated by its abundant rainfall and rich, dense mesic forest. Therefore, the appearance of crossbills and siskins in the Macaya area, which at first thought seems to be a good sign since the species are important Antillean endemics, may be instead a reflection of the distribution of the rich mesic broad-leaved forest that covered the region until the last

two decades (Cohen, 1984). More research is necessary to clarify this question.

The list of resident birds is swelled by the addition of migrant species that arrive in late September and stay until April. This brings the total number of species found in the Macaya region to 65; two less species than found in Parc National La Visite. The difference in the number of bird species, however, is largely the result of the fewer number of endemics that occur in western Haiti. The difference in the number of species would be even more dramatic if it where not for the presence of the lower area of Parc National Pic Macaya in the region of the Plain of Formon at 1000 meters elevation. The broad-leaved forests of the karst hills along the edge of the Plain of Formon have a number of bird species that are characteristic of lower elevations (Broad-billed Tody, Loggerhead Kingbird, Mango Hummingbird) as well almost all of the species found in high montane regions (except for the White-winged Crossbill and Antillean Siskin). This mid-montane forest is the habitat that has been severely deforested in most parts of Haiti. It is the most important and vulnerable of all the habitats in Parc National Pic Macaya, as is readily apparent when the number of species found in this small subregion (500 ha) of the park is compared with the list of species occurring in the rest of the park (7000 ha). On the Plain of Formon and the adjacent karst hills 51 species

occur while in the montane zone of the park about 1300 meters elevation 47 species occur (Table 9).

The total number of individual birds is greater in Parc National La Visite than in Parc National Pic Macaya. During the winter census period on La Visite an average of 242 birds were seen per day, while in Macaya an average of only 151 birds were observed. A reason for this difference may be that in the open ruinate ("Raje") areas of La Visite during the winter months huge flocks of migrant warblers feed in abandoned corn fields and gardens. Some of these mixed flocks (mostly Yellow-rumped Warblers, Palm Warblers and Cape May Warblers) number over 300 individual birds. These flocks inflate the data on bird numbers, but are not a true reflection of species richness. It is true that the area of Parc National Pic Macaya above 1500 meters has fewer species than Parc National La Visite (Table 9). This is in part a reflection of the greater percentage of land area in La Visite above 1500 meters, as well as the reduced number of endemics in Macaya (see previous discussion). However, the combination of the very important mid-montane habitats of the Plain of Formon with the high montane forests of Pic Formon and Pic Macaya create a combined ecosystem in Parc Macaya that is richer in bird species than is the case in Parc La Visite.

The presence of breeding Black-capped Petrels on the south face of Pic Macaya is an important new observation.

The small colony of petrels on Macaya was discovered for the first time in January 1984 and surveyed in detail in January 1985. An additional colony may exist on the northwest face of Pic Formon. The presence of Black-capped Petrels in Parc Macaya adds special significance to the park since the species has been eliminated from most islands in the Antilles. The birds are nesting in burrows at about 2200 meters elevation at the transition zone between wet broad-leaved forest and scrubby second growth occurring where fires and erosion have disturbed the steep mountainside. Many rock slides further disturb the habitat below 2200 meters. The zone where the petrels nest is especially vulnerable to damage from below by fire as it sweeps up the mountain and kills the vegetation that provides cover for the petrels and protects the steep mountainside from further erosion. The open areas that occur following fires also expose the petrels to predation by dogs, cats and mongoose. Cats and mongoose now occur on the peak of Macaya where the density of Black and Norway rats is very high. All of these real and potential problems mean that the colony of breeding Black-capped Petrels is "threatened". Because the colony is small and the habitat has been badly damaged by fires that have swept over the area since 1978, the status of the colony will be changed to "endangered" if any more habitat is lost. The area below the petrel colony should be <u>totally protected</u>.

No gardens, ajupas, fires or deforestation should be allowed from the base of the mountain or on either side of the connecting ridge between Pic Formon and Pic Macaya. Since this is in the area of land claimed by the coffee cooperative (UNICORS) and several private individuals, great care must be taken to work with individuals and institutions in the area to insure that the petrel colony is protected.

G. The Mammals of Macaya

There were originally eighteen species of land mammals occuring on the Plain of Formon and the higher montane areas of Pic Formon and Pic Macaya (Table 11). The remains of these species were recorded in sinkholes on the upper Plain of Deron near Morne Cavalier as well as from a sinkhole on the ridge of Pic Macaya. These eighteen taxa were distributed between two rodents similar to the zagouti, two hutias of the kind kept by indians as a domestic species, one giant hutia, one small zagouti-like form and one new genus and species of rodent found no place else in Hispaniola (for a total of six rodents). In addition there were five insectivores, one monkey and as many as five ground sloths. Of these eighteen endemic land mammals, only one survives in abundance within the boundaries of the park today. This is Plagiodontia aedium, the "zagouti". It surveys in the karst hills along the edge of the Plain of

Formon and Plain of Deron, but does not occur in higher montane areas of the park where there are few areas of exposed rocks or large trees with cavities where the zagouti can find shelter.

The other surviving mammal, Solenodon paradoxus, is very rare within the boundaries of the park. It is most abundant in mid-elevation forested regions (500-1000 meters). It has been eliminated from most areas of the Plain of Formon by deforestation and because so many dogs are found in the region. Dogs kill large numbers of Solenodon, and this species, unlike the zagouti, has a difficult time surviving in areas where dogs and people are abundant even when large blocks of karst are available where the animals can take refuge in rock crevaces. Plagiodontia can escape from dogs and people by climbing into trees or running into rock crevaces, but Solenodon is less wary and more frequently killed. Solenodon continues to survive in the Parc Macaya region only in the mesic forest east of Pic Macaya and west of Catiche and Duchity (Mare Cochon area). If dogs and people are removed from the park, especially in the "Gran Ravin" area which is adjacent to the area where Solenodon is still found, then it is possible that the species will become more abundant in the region of Parc National Pic Macaya.

Plagiodontia and Solenodon are both abundant in the remote area east of the main ridge of Pic Macaya (designated

Diquillon and Mare Cochon on 1:50,000 topographic maps). This habitat is similar to the karst hills along the edge of the Plains of Formon and Deron that have been included within the boundaries of the park. Based on the results of the mammal survey (as well as the survey of the herpetofauna) we recommend that the park boundaries be expanded an additional 2000 ha to the northeast to include Mare Cochon region which is the most important habitat for mammals that remains in the vicinity of either natural park. In addition, we recommend that a buffer zone be created beyond this zone where coffee can be grown, but from which dogs and cats are eliminated and where mesic broad-leaved forest can return in a large block. An examination of the ecological maps by Holdridge (Sedwitz and Canet, 1972) and in the Atlas d'Haiti (Lasserre et al., 1985) reveals that this broad rough plateau is at about 1200 meters elevation in the area of Haiti with the most abundant precipitation. Plagiodontia and Solenodon thrive in this zone of mesic broad-leaved forest (much of which has been cut or burned), karst exposures and abundant rainfall.

The nine species of bats recorded from Parc Macaya represent more than twice the number of taxa collected in Parc La Visite during the survey period (Table 12). Four bat species were collected in Parc La Visite. An examination of cave and sinkhole deposits, however, indicate that eight bat species are known to have occurred in the

Parc La Visite area during the past several thousand years. The reason why fewer bats now occur in Parc La Visite than occurred there in the recent past or occur in Parc Macaya cannot be resolved with certainty. Some of the possible reasons are: 1) the disturbance of bats in the La Visite region by peasants burning the forest in ravines at the mouth of caves in order to plant gardens in the rich, mesic ravine habitats; 2) the general deforestation of the La Visite area; 3) the greater proportion of land area in La Visite that is above 1500 meters elevation which makes the habitat less suitable for frugivorous bat species. It is clear from the above data however that Parc Macaya is currently much more important to the preservation of bat species than is Parc La Visite. Parc Macaya is also more important for terrestrial mammals. Indeed, in terms of the conservation of all of the remaining endemic mammals of Haiti, the area of Parc National Pic Macaya including the Plain of Formon and the Mare Cochon region to the east of Pic Macaya is the most important region in all of Haiti. If this region can be protected from further deforestation and the "quality" of the habitat improved (regeneration of the mesic broad-leaved forest, removal of domestic and feral dogs and cats), then Solenodon paradoxus, Plagiodontia aedium and a number of bat species have a good chance of surviving in the country and being part of the natural ecosystem for decades to come. Research on the status of

Plagiodontia and Solenodon including specific studies on their habitat requirements and the impact of dogs, cats, mongoose, Black Rats and Norway Rats is necessary to insure proper data is available for use in wise management decisions.

Section 5.-Critical Areas and Topics of Special Concerns

Parc National Pic Macaya

The most significant geological, botanical and zoological features of Parc National Pic Macaya were discussed in the previous section. Significant regions and features of the park have been selected based on these data and the synthesis of the individual inventory reports. The areas in the Parc Macaya region that are in greatest need of protection or are of greatest significance are listed below.

Critical Areas

Area	Reason
1) Karst hills from Morne Cavallier southeast to Sous Bois (region called "Bwa Formon" and "Bwa Deron".	Most important habitat for endemic orchids. Also habitat with the greatest bird diversity. Only known habitat in region where Parrots are found. Only place Plagiodontia aedium still occurs in region unless Mare Cochon is added to Park.
2) Small ponds on Plain of Formon and Plain of Deron at 1000-1200 meters.	Water conservation. Only available aquatic habitat near karst forest. Habitat for Least Grebe.

3) Ridge of Formon from Pic Formon east across 2170 meter Pic Le Ciel and on east along the ridge of Formon to 1600 meter contour beyond Pic 1728.	The largest block of mesic broad-leaved forest left in Haiti. Water source for Riviere Ravine du Sud, Riviere l'Acul and Riviere de Port-a-Piment.
4) Western ridge of Pic Formon to 1600 meter contour.	Continuous with previous forest. Possible habitat for Black-capped Petrels. Suitable habitat for Plagiodontia aedium (re-introduction possible)
5) Pic Macaya	Breeding Black-capped Petrels. Extensive pine forest with White-winged Crossbills. Numerous nesting endemic birds. Water source for Riviere Ravine du Sud and Riviere des Roseaux.

6) Eastern extension of the ridge of Pic Macaya to the north into the Diquillon region and eastward onto Mare Cochon.	Largest number of endemic herps. Only area where Solenodon paradoxus still occurs (and also habitat for Plagiodontia aedium). Orchid habitat. Water source for Riviere Ravine du Sud, Riviere des Roseaux and Riviere Glace.
7) "Gran Ravin" down to an elevation of 500 meters where the two branches of the Riviere Ravine du Sud merge.	Mesic forest to low elevation Abundant rainfall and water conservation for Riviere Ravine du Sud. Controlled access to "Gran Ravin".

Special concerns

1. Protecting the Black-capped Petrels along the south face of Pic Macaya by preventing all fires in areas below their nesting colonies.

2. Protecting the few remaining "zagouti" (Plagiodontia aedium) in the karst hills on the Plain of Formon.

3. Expanding the protected area (national park) to the north and east of the main ridge of Pic Macaya to include 2000

hectares of critical additional habitat (Mare Cochon) for Plagiodontia aedium and providing the only suitable habitat available for Solenodon paradoxus.

4. Removing the dogs and cats from the karst hills of the Plain of Formon. This will be difficult because so many people live in the area.

5. Removing sheep and goats from the "Gran Ravin", the Plain of Formon and the Plain of Deron.

6. Establishing a program of guardians to patrol the park and prevent deforestation and exploitation (now underway).

7. Completing an official boundary survey (now underway). Note: This survey should resolve the conflict with COSAR in the "Cadiene" area near Morne Cavalier and the area between Pic Macaya and Pic Formon.

8. Establishing a Park Headquarters near a permanent source of water. The best spot for a Park Headquarters is at Bwa Pipirit on a prominent hillside at 1428 meters elevation.

9. Initiating a soil conservation program in the "Gran Ravin" that will stabilize the steep slopes of the ravine. Pines and hardwoods (such as Persea anomala, the wild avocado) should be planted in suitable areas. Grass should not be planted unless seeds of an appropriate native species is available.

10. Replanting the areas around the small ponds on the Plain of Formon and Plain of Deron to keep them from filling in with surface soil. Rapid erosion from the newly cleared land surrounding the ponds is threatening them.

11. Protecting all areas of the "Rak Bwa" growing in the karst hills. This area is being rapidly deforested.

12. Replanting trees (pines and broad-leaved endemics) on the Plain of Formon and Plain of Deron and in the foothills to the north, especially in ravines and badly eroded areas. Heavy rains carry away enormous quantities of soil and nutrients in these areas. Planting can be in strips along the ravines, in blocks around the ponds, and in patches in especially suitable habitats. These patches in addition to stabilizing the soil will create "edges" of habitat that will increase the diversity of the otherwise ruinate open areas of the Plain.

Section 6.- Zones and Areas of Parc National Pic Macaya

A. Recreation Area

Recreation and tourism are not likely to be as important in Parc Macaya as in Parc La Visite because Macaya is remote and the trails in most sections of the park are steep and difficult to traverse, many tourists will not want to undertake the exhausting hike necessary to get to Pic

Macaya or into the "Gran Ravin". Recreational facilities should be available in the park, however, to accomodate adventurous visitors and an effort should be made to develop a program in wilderness tourism. The basic facilities and recreational plan for Parc Macaya should include the following.

1. A Park Headquarters at "Bwa Pipirit".
2. A camping area near Park Headquarters.
The camping area should have a latrine and a permanent source of pure water.
3. A nature trail from the Park Headquarters up the ridge of Formon and descending into the "Gran Ravin" at 1050 meters elevation where there is a picturesque waterfall, pure water and a pleasant place to construct a permanent campsight. There are several spectacular views from this trail. Visitors should be encouraged to employ a guide
4. A trail from the Park Headquarters westward and up the ridge of Formon, across Pic Le Ciel to Pic Formon. A camping area (log lean-to) should be constructed on Pic Le Ciel. The trail that crosses the ridge from Pic Formon to Pic Macaya should be closed to the public. The trail up Macaya is extremely steep and dangerous in several places as it passes over exposed areas of loose rock. The top of Pic Macaya is one of the most dramatic and remote areas in all of Haiti (see

following section). Visitors to Pic Le Ciel and Pic Formon should be encouraged to employ a guide.

5. The Citadelle Des Platons near the town of Les Platons should be included into the biosphere reserve and Parcs Haiti should work with ISPAN to develop the site. There should be information about the Citadelle available there, and also information about the park (a three hour hike or a ten kilometer drive if the road is completed). The view of the mountains from Les Platons is very impressive.

6. Consideration should be given to constructing a trail from the park headquarters to the cave where the Riviere l'Acul rushes from the mountain as a fully formed stream. This area is outside of the park, but in the buffer zone, and therefore part of the biosphere reserve.

B. Special Permit Area

We recommend designating the top of Pic Macaya as a combined "Recreation Area" and "Biological Preserve Area". This designation acknowledges the exceptional mystique of Pic Macaya. The birdlife is interesting because of the large numbers of endemic species, the towering pine forest is impressive, the vistas from the trail ascending the peak are spectacular and there is an almost spiritual mystique about being on Pic Macaya. These features mean that there

is a recreational dimension and tourist attraction about the area that should be acknowledged and carefully cultivated. The area is also very fragile. The trails are easily damaged, the deep pine litter make the zone susceptible to forest fires. The colony of Black-capped Petrels on the south side of the mountain are "threatened". Therefore, we recommend that a shelter be built at the top of Pic Macaya with a safe and secure place to build a fire. Everything possible should be done to maintain the "wilderness" aspect of this area. Trees should not be cut down for firewood and fallen branches should not be burned because the burning of excess wood is counter to maintaining the area in a "wilderness" state. Firewood should be carried in, when possible or more appropriately camp stoves should be used to cook on. Visitors to the park should only be allowed to climb Pic Macaya (and camp there) with written permission (a permit) obtained at the Central Office of Parcs Haiti. We recommend that a fee be charged for the permit. There should be a place for the Park Supervisor of Parc Macaya to also sign the permit to insure close supervision of all who climb Pic Macaya. Two local guides (one to return for help should a visitor fall and become injured) should accompany all climbers. Since the trail to the peak is dangerous the permit should include a signed waver to release Parcs Haiti from any legal liability in case of injury.

The top of Macaya is first and foremost an area of great biological significance, and set aside as a Biological Preserve Area. Therefore, what we have here is a small part of the Biological Preserve Area being set apart in the category of a "Designated Use Zone" even though it is in the middle of a "Restricted Area".

C. Biological Preserve Area

There are so many endemic species of plants and animals in Parc Macaya that one of the most important functions of the park is conservation of these species, many of which are threatened or endangered. Another important function of the park is watershed conservation which is best accomplished by increasing the percent of natural forest cover in the region. Large sections of Parc Macaya should be set aside as conservation zones. The term "Biological Preserve Area" should be used for all these conservation areas.

The most important areas to set aside as "Biological Preserve Area" are listed below.

1. All of the karst hills along the margin of the Plain of Formon from Sous Bois to Morne Cavalier (with the exception of a well marked educational trail that will pass through this zone).

-This biological preserve is essential to protect the zagouti (Plagiodontia aedium), the Hispaniolan Parrot and many species of endemic orchids which only occur in the park in this region.

2. All of the eastern ridges of Pic Macaya as well as the adjacent Diquillon and Mare Cochon areas.

-This is the most important wilderness area left in Haiti.

3. The "Gran Ravin" from 500 meters elevation upward (westward) to the ridge connecting Pic Formon with Pic Macaya.

This area is severely degraded by overgrazing and recurring landslides. It has great biological significance, and is of importance in water conservation for the Riviere Ravine du Sud.

4. The "Basin Dalest" is one of the few extensive flat areas at moderate elevation (1500-1600 meters) in the park. It still has extensive patches of mesic forest and some giant pines. The basin is rich in bird life. The entire basin and eastern extension of the ridge should be protected as a "Biological Preserve Area".

5. The wet steep mountainside NE of the ridge connecting Pic Le Ciel with Pic Formon.

6. The entire area of Pic Macaya (which is also designated as a "Recreation Area").

-This is designated as a Biological Preserve Area in order to protect the breeding colony of Black-capped Petrels and the unique "mesic" pine forest.

D. Restoration Area

The following areas are in need of management in order to return to their biological potential or to correct severe environmental problems that threaten their future and the future of adjacent regions. Some of the areas are isolated from other zones, while others are within a "Biological Preserve Area", but have been severely degraded. The areas of special concern are listed below.

1. The Plain of Formon has been severely degraded and must receive immediate protection (see recommendations under Section 5, Special Concerns, Number 12).

2. The ponds on the Plain of Formon and Plain of Deron need special attention to prevent them from filling in with mud, and to enrich the areas around them for wildlife. Endemic shrubs and trees should be planted in a zone 20 meters wide around the ponds. Beyond that for a distance of 100 meters Pinus occidentalis should be planted to serve as a transition zone and to provide shelter and protection.

3. The "Basin Delest" is designated as a "Biological Preserve Area". The degradation and deforestation on the bottom of this basin near a small house with a metal roof is especially severe. New gardens have been planted in the past year and many large pines have been cut. The house should be removed. All gardens should be destroyed. Pinus occidentalis should be planted in the gardens.

4. The steepest areas of the "Gran Ravin" on the south side of Pic Macaya are eroding away very rapidly. Special attention should be given to "securing" this area. The area is naturally unstable and extremely difficult to get to. Grass scattered onto the hillside would stabilize the slope. One grass that could be planted to stabilize the hillside is Rhychletrum repens a beautiful grass with a pinkish red inflorescence that is a native of Africa. This grass is very aggresive and has been planted in large sections of the Dominican Republic and in the Massif de la Selle. Seed of this grass in readily available. There are many problems associated with planting this grass, however, and we do not recommend using it. The grass is an aggresive non-native species that will crowd out other important plants. The presence of dried stems will also create a severe fire hazard. Therefore we recommend planting pines on the hillside where ever possible. Grass should only be planted if seed of a native species can be obtained.

Special attention should be paid to removing goats and sheep from the hillsides since they are overgrazing the vegetation and starting erosion and landslides by walking in steep areas. Pinus occidentalis should be planted along flatter areas of the steep slopes and along the margin of badly eroded areas. The pines area a natural feature in the successional sequence of the region and would not only increase the stability of the fragile slopes but also increase the habitat available for White-winged Crossbills.

E. Maintenance and Service Areas

The following areas should be set aside in the park as part of activities associated with maintenance and service.

1. Park Headquarters

2. The "road" [illegible] headquarters.

3. A depot and [illegible] Madame Robert's house.

4. A supplemental headquarters at "Des Glace" near water at 1040 meters in the "Gran Ravin".

5. A supplemental headquarters in the "Guinaudee" region of the ravine of the Riviere de la Guinaudee (sometimes called Riviere Tordeau). We recommend that this be at 700 meters elevation in the ravine just outside of the Park boundaries. Access to this area from Beaumont and Duchity is not

difficult. This would allow for access into the park to be from both the north and south. The long range goal of having a hiking trail that would pass from Les Platons to Beaumont would create the need for a facility on the north side of the park. There is also a need for a security station in the area (see below) which could be part of the supplemental headquarters.

F. Security and Information Areas

The following items are closely linked to preventing further environmental degradation in the park, and to making the park a safe and secure place to visit.

1. A sign describing the park should be placed at Les Platons.

2. A sign about the Citadelle Des Platons should be placed adjacent to the Citadelle along the access road to Parc Macaya. We recommend that the Citadelle become part of Parc Macaya Biosphere Reserve program.

3. A sign about the park should be placed near the entrance to the park beyond Sous Bois (near Portal Formon). This sign should outline.

a. Park rules

b. Park features

c. Map of Park

5. A guard station should be established at the depot near the trail as it passes Portal Formon.

6. At some point within the next decade a guard station should be constructed near the supplemental park headquarters on the north side of the park in the valley of the Riviere Guinaudee along the acess route (to be developed) from Beaumont and Duchity.

7. A guard station should be set up in association with the supplemental Park Headquarters in the "Gran Ravin" at or near 1040 meters.

G. Education Area

The remoteness of Parc National Pic Macaya means that it is not necessary to construct a site museum or to invest in many local site exhibits. The emphasis of the park should be on soil and water conservation and the preservation of endemic species of plants and animals. Recreation of the "wilderness experience type" should also be encouraged. Should the park ever develop into a major tourist facility, then the site museum can be constructed at or near the Citadelle Des Platons to take advantage of the historical importance of that facility and the remarkable view of the mountains.

During the first 10 year phase of the park, the main education zone will be an exhibit of two double sided

educational panels set up at the Park Headquarters. These exhibits would provide a guide to the most significant features of the park. The two panels would have four exhibits.

1. Water Conservation
2. Geological and Physical Features
3. Major Forest and Plant Associations
4. Fauna of Parks

As part of the development of an access route to Parc Macaya a nature trail should be constructed through part of the karst hills of the Plain of Formon (Bwa Formon).

H. Research Area

1. Three climatological research stations should be set up in the park to record air temperature, soil temperature, barometric pressure, rainfall, wind direction, and wind speed.

These stations should be at:

1. Plain of Formon at "Depot" (1000 meters)
2. Summit of Pic Le Ciel (2170 meters)
3. "Gran Ravin" outpost (1040 meters)

No other research area is necessary. Since such large sections of the park are classified as "Biological Preserve Zones", care must be taken to preserve and protect the ecosystems in the areas. Collecting for plants or animals

in any region of the park should be carefully regulated and reviewed. As with Parc National La Visite, we recommend that eight research projects be undertaken during the next five years. These projects are:

1. A quantitative analysis of the composition of each major plant association in the park.

2. An analysis of microhabitat requirements of each endemic plant species as well as information on growth and regeneration.

3. An in depth study of the ecology of the endemic mammals in an effort to develop an effective management program.

4. A detailed analysis of the habitat requirements and breeding biology of the Black-capped Petrel to develop an effective management program.

5. A continuing analysis of the distribution and abundance of birds in an effort to understand the habitat requirements of the endemic species.

6. An in depth analysis of the habitat requirements of numerous invertebrate species, and an effort to document additional new species.

7. An in depth analysis of the specific habitat requirements of each species of amphibian and reptile in an effort to learn how to manage habitats to protect endemic species.

8. Baseline studies on the climate of each microhabitat in the park.

Section 7.- Plan for Parc National Pic Macaya

As with Parc National La Visite, the plan for Parc Macaya will be divided into nine topics. Each topic is briefly discussed in this chapter as it relates to the local situation in Parc Macaya.

A. Administration

As with Parc National La Visite, there should be a full time "Park Supervisor" assigned to the park. The facilities within the park at this stage in its development are not suitable to house the quality person necessary to manage all aspects of the park, so a Park Headquarters should be constructed at "Bwa Pipirit" as soon as possible following the architectural plans we have submitted.

Duties of "Park Supervisor"

1. Seek resolution of conflicts of land use with local landholders, farmers, peasants.

2. Coordinate the improvements on the road and access route to the park to improve access.

3. Serve as an active and effective spokesman for the park, add the concept of conservation on the Cayes region.

4. Coordinate and supervise all routine activities in the park as designated by the Director and Assistant Directors.

-maintenance

-security of the park

-implementation of park plan

B. Maintenance

There should be a full time team of maintenance workers who carry out the instructions of the Park Supervisor via the designated "crew chief". The size of the group of workers will depend on the amount of work at any one season, or at any one time in the implementation of the park plan. However, there should be a nucleus of workers under permanent contract (a "crew chief" and 14 full time workers is the suggested size). They should be hired from personnel living in the region.

The maintenance crew is responsible for improving and maintaining access to the parks, building basic park facilities and assisting in reforestation.

C. Security

As with Parc La Visite there should be a team of full time guardians for Parc Macaya. This group should be under the direction of a "Chief of Guards" who answers directly to the Park Supervisor.

It is important that guardians be trained and placed within the park as soon as possible since there has been so much recent exploitation of the park for lumber and gardens. It is extremely important, however, that the presence of guards not become a bigger problem than the problem they are there to guard against. If the guards themselves are not correctly supervised, then they may organize the peasants to make gardens, harvest wood and graze animals. The guards will also need to be fed and sheltered, and these compromise the security of the habitat. Some guard posts in the national parks of the Dominican Republic have been associated with exploitation of the habitat, especially when the posts are located in remote areas.

With the above special concerns in mind, guard posts should be established in appropriate places (near water and suitable services) of Parc Macaya. One guard post should be near Portal Formon. This post would secure the trail to Sous Bois (and the lowland areas to the south including Port-a-Piment and Coteaux) as well as the main route back to Les Platons (Chantal, Le Duc, Torbeck and Cayes). This

should be the main guard post for Parc Macaya and include enough guards to secure the trail, as well as patrol the south boundaries of the Park.

As noted in the discussion of security for Parc La Visite, we do not believe that guards should live inside the park. Because of the remote nature of Parc Macaya, however, this is a special problem in the region of the Plain of Formon, and an even greater problem for the outpost on the north side of the park. No easy solution is at hand because of the difficulty of transportation in the region. If the guards live in the nearby community they will in time tend to watch out for the interests of that community and be vulnerable to conflicts of interest. For that reason we recommend incorporating a security post into the depot facility of Parc Macaya at Portal Formon. This would be the main security facility for the park.

A second guard post should protect the north and northwest margins of the Park. This would secure the routes to Chardonnieres and below Des Barrieres on the north side of Macaya. There is water there, and easy access from both Duchity and Beaumont. This guard post would be part of the park headquarters outpost in that region. A third small guard post can be set up in the "Gran Ravin" for occassional use by the guardians from Portal Formon as they patrol the "Gran Ravin". Special care should be taken to prevent this

area from being exploited since it is remote and already the site of considerable agricultural activity.

D. Recreation and Tourism

As with the discussion of Parc La Visite, the major features of a recreational program are outlined under the discussion of the "Recreational Areas" in Section 6 of this chapter. The development of these facilities [1) Park Headquarters; 2) trail to "Gran Ravin"; 3) trail to Pic Formon; 4) trail to source of Riviere de l'Acul; 5) campgrounds at Park Headquarters, Pic Le Ciel and "Gran Ravin"; 6) special permit only campsite on Pic Macaya] will provide tourists with something to do in Parc Macaya that is unique and appropriate for the region. It will also allow the park to be publicized, and provide a public image for the park that can be advertized in Port-au-Prince where Macaya seems remote and poorly understood.

A nature trail through the karst hills of the Plain of Formon will allow the public and important visitors to view some of the best features of Parc Macaya without their having to hike into the remote sections of the park. This nature trail should have well placed and appropriately designed signs to identify geological and botanical features. The trail can be incorporated into the access route to the park in some areas. If carefully planned the nature trail will not conflict with the conservation goals

of the "Biological Preserve Areas" of the karst hills region.

The Pic Macaya area has been set aside as a "Biological Preserve Area" because the habitat is so sensitive to damage by fire and disturbance by overuse. We have also recommended that a "Recreation Area" also be included on Pic Macaya. We have, therefore, designated the area of Pic Macaya as both a recreation and preservation region. Recreation should be allowed on Pic Macaya (because the area has such significant recreational features), but only under carefully controlled and well supervised conditions (see Section 6-B). There should be an attractive and secure campsite on the top of Pic Macaya, and a hiking trail along the ridge.

Eventually (within the ten year plan) plans should be made to develop a hiking trail that passes from Les Platons across the Plain of Formon, up the ridge of Formon, across Pic Formon, up the ridge of Macaya to Pic Macaya, down the north ridge of Macaya across the "bump" at Zapoti to the Riviere de La Guinaudee (or R. Tordeau as it is called in the region), up to Desbarrieres and out to the town of Beaumont. This hiking trail is difficult to traverse because of its steep inclines. However, if properly maintained it could be an attractive feature of the park area. The climb to Macaya (from either Les Platons or Beaumont) could be like climbing Mt. Kilimanjaro in Kenya

where certain hardy visitors are drawn by the mystique of the place and name. Fees could be charged for this "adventure" that would include campsite and guide fees (see Section 6-B). This would generate some revenue for the park, provide a focal feature for the park and yet "control" the use of the zone so that a minimum of damage was done to the flora and fauna.

E. Education and Interpretation

The main educational goals for Parc Macaya for the first ten years are discussed in Section 6-G under the description of the "Education Area". These activities should be carefully coordinated with "Recreation and Tourism" activities. The major education and interpretation goals for the first ten years are listed below.

1. A sign at Les Platons about the Citadelle.

2. A sign at Les Platons about Parc Macaya.

3. A nature trail along the access route to the Park Headquarters. This trail should be a unit in itself, but should allow hikers from Les Platons the added feature of hiking along the trail as they approach the Park Headquarters. It should have a number of information signs about the natural history of the area.

4. Two exhibits in the Park Headquarters (see Section 6-G).

5. Good maps should be completed of the park, along with publications on the flora and fauna of the area. These would be useful in recreation, education and management.

F. Public Relations

As with Parc La Visite, this park should be promoted in the media in Port-au-Prince after adequate facilities exist. The important features of Parc Macaya should be illustrated in an entrance signs for the park that are prominently displayed near the entrance near Portal Formon and at the Park Headquarters. There should be exhibits on Parc Macaya at MUPANAH.

The Park Supervisor of Parc Macaya should be the chief spokesman for the park in the region. The person or a representative of the Central Office should give speaches in Les Cayes and other towns in the area, and should work with organizations in the area such as the Union des Cooperatives de la Region Sud d'Haiti (UNICORS). There are a number of conflicts or potential conflicts in the area that could damage the park. The park supervisor in association with the Director and Assistant Directors should be responsible for working at the local level to overcome these.

A tape/slide presentation should be available that can be used by the Park Supervisor and administrative staff in the Central Office to promote an understanding of the reasons behind the park and the objectives of Parc Macaya.

G. Research

As much as possible Parc Macaya should be a "Biological Preserve Zone". The area should be allowed to recover from overexploitation. All research in the park should be carefully regulated. No extensive collecting of plants or animals should be allowed without a permit and permission of the Director of Parcs Haiti. However, information from research is an important tool in developing sound programs in management and conservation. Research should, therefore, be allowed when a good case is made of its relationship to the conservation goals of the park or to the development of an educational program for the park. Parcs Haiti should also keep in mind that the Massif de La Hotte is one of the most significant biological and geological regions of the Antilles. There will be a number of requests for important studies that have international significance. Where possible these requests should be approved when assurances are given that the results will be made available to PANAHA, and when personnel from Haiti are included in the research process.

All research in the park should be carefully coordinated with Parcs Haiti. Written requests must be approved before research is allowed. Final reports must be submitted. A Haitian counterpart should be assigned to each project. Where possible the counterpart should work in the field with the investigators, and become part of the

processes of documentation and analysis. Where appropriate the counterpart should also be a part of the publication process.

For Parc Macaya we have determined the most important research goals for the next five years to be eight major projects. These are listed in Section 6-G.

H. Conservation Goals

The major conservation goals for Parc Macaya for the next ten years are listed below.

1. Preservation of the unique mesic broad-leaved forest between Sous Bois and Morne Cavalier. The preservation of this forest will by association preserve numerous endemic plants and animals.

2. Preserve Plagiodontia aedium and Solenodon paradoxus in Parc Macaya. The only way to be sure of doing this is to include the Mare Cochon area in the park, and to carefully manage the area. "Management" in the park for these endemic mammals means that dogs and cats must be excluded (actively hunted) from the park as well as protecting the area from further deforestation. An active research program on the habitat requirements of both species should be undertaken.

3. Preserve the colony of breeding Black-capped Petrels in the park. Wise management will require additional information based on an active research project.

4. Promote the preservation of Hispaniolan Parrots in the park.

5. Conservation of the endemic plants and animals most closely associated with mesic broad-leaved forest (Hispaniolan Trogon, Chat Tanager and especially the White-winged Warbler).

6. Undertake a major program in watershed management that will increase the forest cover of Parc Macaya and stabilize areas where soil erosion is a major problem (Plain of Formon and "Gran Ravin"). These measures should increase the quality and quantity of water in the Riviere de l'Acul, R. des Roseaux, R. Port-a-Piment, R. Ravine du Sud, R. Glace and the numerous tributaries of these major rivers. Research must be done on the propagation of endemic species and the best way to regenerate the diverse mesic broad-leaved forest that once characterized the entire region.

I. Ten Year Plan for Parc Macaya

The major features of the plan for Parc Macaya for the next ten years are discussed and outlined in the previous eight sections (A-H). All of these goals, and more are

possible to accomplish with a modest commitment of personnel and funds, and with a clear plan of operation. These goals are listed and summarized below.

1. Select a full time Park Supervisor and staff (Highest priority).

2. Develop a Park Headquarters, at Bwa Pipirit (High Priority).

3. Complete the boundary survey including the addition of all areas recommended in this report (High Priority).

4. Establish "Biological Preserve Zones" to protect all plants and animals in the zones (water resources and geological features would also be protected).

5. Develop an associated historical site at Les Platons in conjunction with ISPAN. Initiate an active training program for all Parc Macaya staff and make sure Park Supervisor is part of major training program for park administrators.

6. Design, manufacture and put in place signs for the park (entrance, boundary, information).

7. Resolve issues of conflict between UNICORS and other individuals and organizations in the region.

8. Improve the public image of the park in the area by clearly demonstrating the advantages of the park via a series of public meeting and workshops with local residents.

9. Complete a series of research projects that will ensure the conservation of endemic species of plants and animals.

10. Create educational exhibits for the Park Headquarters or Les Platons area. These exhibits should be carefully coordinated with MUPANAH.

11. Initiate the biosphere reserve by developing a buffer zone of 10,000-20,000 ha around the park and work with land holders in this zone to create a mutually satisfactory land use policy within the buffer zone (agriculture that does not damage the watershed or lead to extinction of endemic species).

12. Complete a recreational development program for the park and buffer zone that encourages visitors to make use of the scenic and aesthetic features of the park.

13. Improve access to the park via Les Platons.

14. Develop supplemental park headquarters (outpost) and security stations on the north side of the park and in the "Gran Ravin".

15. Design and construct nature trails.

16. Develop an international fundraising program to be associated with the park.

17. Design an informational booklet or brochure on Parc Macaya.

18. Complete a ten year climate study of the region.

19. Complete a series of maps of the park and buffer zones.

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Literature Cited

Cohen, W.B. 1984. Environmental Degradation in Haiti: an analysis of aerial photography. Unpublished report. U.S. Agency for International Development, Haiti, Port-au-Prince. 35 pp.

Ekman, E.L. 1926. Botanizing in Haiti. U.S. Naval Med. Bull., 24(1):483-497.

Ekman, E.L. 1928. A botanical excursion in la Hotte, Haiti. Svensk Botanisk Tidskrift, 22(1-2):200-229.

Ekman, E.L. Unpublished field notes in his "Catalogue of Hispaniolan plants". On deposit in the Department of Phanerogamic Botany. Swedish Museum of Natural History.

Franz, R. and D. Cordier. 1986. The herpetofaunas of the proposed National Parks in southern Haiti. Unpublished Report, U.S. Agency for International Development, Haiti, Port-au-Prince. 73 pp.

Gali, F. and A. Schwartz. 1986. The Butterflies (Lepidoptera:Rhopalocera) of Morne La Visite and Pic Macaya, Haiti. Unpublished Report. U.S. Agency for International Development, Haiti, Port-au-Prince. 16 pp.

Holdridge, L.R. 1947. The pine forest and adjacent mountain vegetation of Haiti considered from the standpoint of a new climatic classification of plant formations. PhD Dissertation. Univ. Michigan, Ann Arbor. 186 pp.

Judd, W.S. 1986. Floristic study of La Visite and Macaya National Parks, Haiti. Unpublished Report U.S. Agency for International Development, Haiti, Port-au-Prince. 98 pp.

Lasserre, G., P. Moral and P. Usselmann. 1985. Atlas d'Haiti. Centre d'Etudes Geographie Tropicale (CNRS). Bordeaux (France). No page numbers.

Lowenstein, F. 1984. Le deboisement du perimetre "Pic Macaya" et son impact sur la Plaine des Cayes. Unpublished report to Ministre d'Agriculture, des Ressources Naturelles et du Developpement Rural. Port-au-Prince, Haiti. 22 pp.

MacFadden, B.J. 1986. Geological setting of Macaya and La Visite National Parks, southern peninsula of Haiti.

Unpublished Report. U.S. Agency for International Development, Haiti, Port-au-Prince. 33 pp.

Sedwitz, W.J. and G.A. Canet. 1972. Haiti; Mission d'Assistance Technique Integree. Organisation des Etats Americains. Washington. 656 pp. + maps.

Thompson, F.G. 1986. Land Mollusks of the proposed National Parks of Haiti. Unpublished Report. U.S. Agency for International Development, Haiti, Port-au-Prince. 19 pp.

Valdman, A. 1981. Haitian Creole-English-French Dictionary. Creole Institute, Indiana University. Bloomington, vol.I, pp.1-582; vol.II, pp.1-222.

Wetmore, A. 1927 + 1931. Unpublished field notes, Haiti. On file U.S. National Museum. Washington, D.C.

Wetmore, A. and F.C. Lincoln. 1933. Additional notes on the birds of Haiti and the Dominican Republic. Proc. U.S. Nat.Mus. 82(25):1-68.

Wetmore, A. and B. Swales. 1931. The birds of Haiti and the Dominican Republic. Bull.U.S.Nat.Mus., 155:483 pp.

Woods, C.A. 1986. The mammals of the National Parks of Haiti. Unpublished Report. U.S. Agency for International Development, Haiti, Port-au-Prince. 90 pp.

Woods, C.A., J.A. Ottenwalder and W. Oliver. 1986. Lost Mammals of the Antilles. Dodo (Jersey Wildlife Pres. Trust). 22:

Woods, C.A. and R.C. Rosen. 1977. Evaluation Biologique d'Haiti: Statut du Plagiodontia aedium et Solenodon paradoxus - Recommendations en ce qui concerne les preservations naturelles et les parcs nationaux. Unpublished Report to Service de Conservation du Sol, des Forets et de la Protection de la Faune, DARNDR, Damien, Haiti. 32 pp. + 4 maps.

TABLES

Table 1. Fungi collected in La Visite and Macaya National Parks, Haiti.

All collections are identified by Dr. Jack Gibson unless otherwise indicated. Fungi collected in Parc La Visite are indicated bu "LV"; those collected in Parc Macaya are indicated by "M". Mycorrhizal taxa are indicated by an asterisk.

Boletus sp.; LV, also coll. M, specimen rotted; Judd 4819.*
Collybia cf. laccata Dennis; M; Judd 4202.
Cortinarius sp.; M; Judd 3849, 3927b.*
Cyathus striatus Willd.; M; Judd 3995.
Daldinia cf. concentrica (Bolt. ex Fries) Cesati & DeNotaris; M; Judd 3827a.
Favolus cucullatus Mont.; M; Judd 3740.
Fomes grenadensis (Murr.) Sacc. & Trott.; M; Judd 3718, 3781, 3845.
Fomes subroseus (Weir) Overh.; M; Judd 4075, 4204.
Fomes sp.; LV; Judd 4631.
Lepiota sp.; M; Judd 3926.
Marasmius sp.; M; Judd 3717.
Morchella deliciosa Fries; LV; Judd s. n.*
Nidularia emodensis (Berk.) Lloyd; M; Judd 4203.
Paneolus campanulatus (L. ex Fr.) Quil.; LV; Judd s. n.
Pholiota cf. trinitensis Dennis; M; Judd s. n.
Polyporus vinosus Berk.; LV; Judd 4630.
Polyporus sp.; LV; Judd s. n.
Stereum lobatum (Kunze) Fries; M; Judd 3456.

Note: Many specimens collected by Dr. Charles Woods and Dr. Richard Baird have not yet been identified.

Table 2. Macrolichens collected in La Visite and Macaya National Parks, Haiti.

All collections are identified by Dr. Richard C. Harris unless otherwise indicated. Lichens collected in Parc La Visite are indicated by "LV"; those collected in Parc Macaya are indicated by "M".

Bulbothrix ventricosa (Hale & Kurokawa) Hale; LV; Judd 4591c.
Caloplaca crocea (Krempelh.) Hafellner & Poelt; LV; Baird LV-15.
Cladina confusa (R. Sant.) Follm. & Ahti; LV; Judd 4622.
Cladina rangiferina (L.) Nyl. subsp. abbayesii (Ahti) Culb.; LV; Judd 4957.
Cladina subtenuis (des Abb.) Hale & Culb.; LV; Judd 4958.
Cladonia ceratophylla (Sw.) Sprengel; LV; Judd 4869.
Cladonia didyma (Fee) Vainio var. didyma; LV; Judd 4624.
Cladonia didyma (Fee) Vainio var. vulcanica (Zoll.) Vainio; LV, M; Baird LV-7, Judd 3681, 3710, 3745b, Skean 1452.
Cladonia furcata (Hudson) Schrader; LV, M; Judd 4187, 4278, Skean 1453.
Cladonia merochlorophaea Asah.; LV, M; Judd 3682b, 4168, 4745a.
Cladonia multipartita (Mull. Arg.) Ahti; M; Judd 3682a.
Cladonia pocillum (Ach.) O.J. Richard; LV; Baird LV-14, Judd 4626.
Cladonia ramulosa (With.) Laundon; LV; Judd 4745b.
Cladonia spiculata (Ach.) Ahti; M; Judd 4172.
Cladonia squamosa Hoffm. var. subsquamosa (Nyl. ex Leight) Vainio; M; Judd 4060.
Cetrariastrum vexans Culb. & Culb.; LV, M; Judd 3746, 4702.
Coccocarpia pellita (Ach.) Mull. Arg.; M; Judd 3574.
Dictyonema sp.; M; Judd 3784. Det. Jack Gibson.
Heterodermia circinalis (Zahlbr.) ined.; LV; Judd 4628.
Heterodermia leucomelos (L.) Poelt subsp. boryi (Fee) Swinsc. & Krog; M; Judd 3846b.
Hypotrachyna costaricensis (Nyl.) Hale; LV; Judd 4703.
Hypotrachyna croceopustulata (Kurokawa) Hale; LV; Judd 4294a.
Hypotrachyna degelii (Hale) Hale; M; Judd 3919.
Hypotrachyna sp.; LV, Judd 4294b.
Leptogium azureum (Sw.) Mont. s. lat.; LV; Judd 4818.
Leptogium sp.; LV, M; Judd 3552, 4685.
Pannaria sp.; M; Judd 3675b.
Parmelina minarum (Vainio) Skorepa; LV; Baird LV-6, LV-10, LV-20.
Parmotrema conferendum (Hale) Hale; LV; Baird LV-3.
Parmotrema crinitum (Ach.) Choisy; M; Judd 3683.
Parmotrema haitense (Hale) Hale; LV; Baird LV-18.
Parmotrema mellissii (Dodge) Hale; LV; Judd 4293a.
Parmotrema reticulatum (Taylor) Choisy; LV; Baird LV-2.
Parmotrema robustum (Degel.) Hale; LV; Judd 4293b, 4638.

Parmotrema tinctorum (Nyl.) Hale; LV; Baird LV-5, LV-8.
Parmotrema sp.; LV; Judd 4279.
Pertusaria texana Mull. Arg.; LV; Baird LV-9.
Peltigera sp.; M; Judd 3750 (det. W. S. Judd), 4212, s. n., Skean 1381.
Pseudocyphellaria aurata (Ach.) Vainio; LV M; Judd 4817b, Skean 1544.
Pseudoparmelia texana (Tuck.) Hale; LV; Baird LV-17.
Ramalina sp.; LV; Judd 4385b.
Sticta damaecornis (Sw.) Ach.; LV, M; Judd 3570, 3586 (det. W. S. Judd), 4686, Skean 1286.
Sticta laciniata Ach.; M; Judd 3694b.
Sticta tomentosa (Sw.) Ach.; M; Judd 3704b.
Sticta sp.; LV; Judd 4627, 4817a.
Teloschistes flavicans (Sw.) Norm.; LV, M; Judd 3552b, 3846a, 4386.
Usnea rubicunda Stirton; LV, M; Baird LV-4, LV-11, Judd 3748, 4576b.
Usnea spp.; LV, M; Baird LV-13, LV-14, Judd 3747, 3847b, 4167, 4274, 4385a, 4574, 4576a, 4746.

Table 3. Hispaniolian Endemic seed plants occuring in Parc Macaya and Parc La Visite, Haiti

Abbreviations and symbols: Occurring in Parc Macaya--M; occurring in Parc La Visite--LV; plant endemic to either Massif de la Hotte or Massif de la Selle--*.

Agave antillarum M, LV	Amyris apiculata M*
Andropogon urbanianus LV	Ardisia fuertesii M, LV
Ardisia picardae LV*	Arthrostylidium haitiense M, LV
Asketanthera picardae M*	Baccharis myrsinites M, LV
Banara splendens M	Begonia domingensis LV
Begonia platyptera LV*	Begonia plumieri M
Begonia pycnantha M	Brunfelsia picardae M
Buddleja domingensis LV	Bumelia subintegra LV*
Bunchosa ekmanii LV*	Calycogonium apiculatum M*
Calycogonium calycopteris M	Calycogonium torbecianum M
Calyptranthes densiflora LV*	Calyptranthes hotteana M*
Calyptranthes nummularia M,LV	Carex ekmanii LV
Castilleja haitiensis M*	Cestrum bicolor M*
Cestrum brevifolium LV	Cestrum coelophlebium M, LV
Cestrum filipes M*	Cestrum inclusum M, LV
Cestrum mononeurum LV	Cestrum picardae M
Cestrum violaceum LV*	Cleyera ternstroemioides M*
Coccoloba pauciflora M	Coccoloba picardae LV*
Coccothrinax montana M	Cyperus picardae LV
Danthonia domingensis LV	Daphnopsis crassifolia M, LV
Dendropanax selleanus M	Dendropemon bistratus LV
Dendropemon pycnophyllus LV	Dendrophthora brachystacha M
Dendrophthora carnosa M*	Dendrophthora versicolor M*
Didymopanax tremulum M, LV	Ekmaniocharis crassinervis M*
Epilobium coloratum LV	Erigeron dissectus LV
Erigeron domingensis M	Eugenia christii M*
Eugenia formonica M*	Eugenia lineata LV
Eugenia picardae LV*	Eugenia cf. tiburona M*
Eupatorium cabaionum LV*	Eupatorium flavidulum M*
Eupatorium illitum LV	Eupatorium microchaetum M
Eupatorium porphyrocladium M*	Eupatorium sp. nov. A. LV*
Eupatorium stigmaticum M	Eupatorium urbanii M*
Exostemma picardae M	Fuchsia pringsheimii M, LV
Fuchsia triphylla LV	Galium brevipes LV
Gesneria aspera M	Gesneria fruticosa M
Gesneria hypoclada LV*	Gesneria viridiflora ssp. acrochordonanthe M*
Gnaphalium eggersii LV	Gnaphalium selleanum LV*
Guzmania ekmanii M	Haenianthus oblongatus M*
Henriettella elliptica M	Hyeronima domingensis M
Hypericum fuertesii LV	Hypericum millefolium LV*
Hyptis schusteri M	Ilex fuertesiana LV
Ilex sp. nov. A. LV*	Illicium ekmanii M
Jacaranda poitei M	Juniperus ekmanii LV*
Laplacea alpestris LV	Lobelia sp. nov. A. M*
Lunania mauritii M	Lyonia buchii LV
Lyonia microcarpa LV*	Lyonia truncata var.truncata LV*
Lyonia rubiginosa var. costata M, LV	
Malpighia macracantha LV*	Maytenus hotteana M*

Mecranium microdictyum M*
Mecranium sp. nov. A. M*
Mecranium tuberculatum M
Meliosma impressa LV
Melothria domingensis LV
Meriania sp. nov. A. M*
Meriania squamulosa M*
Miconia barkeri M*
Miconia lanceolata LV
Miconia ossaeifolia M*
Miconia selleana LV*
Miconia subcompressa M, LV
Mikania cyanosma M*
Mikania tripartita LV*
Myrcia tiburoniana M*
Myrsine magnoliifolia M*
Ocotea acarina LV*
Ossaea setulosa M*
Pachyanthus blancheanus M*
Peperomia dominicana M
Peperomia michelensis M*
Phyllanthus lindenianus var. inaequifolius LV*
Phyllanthus myriophyllus M*
Pilea baltenweckii M
Pilea distantifolia M*
Pilea formonensis M*
Pilea hepatica M, LV
Pilea lapidincola LV*
Pilea propinqua LV
Pilea serpyllacea M*
Pilea torbeciana M*
Piper oviedoi M
Podocarpus aristulatus LV
Psychotria baltenweckii LV*
Rheedia barkeriana M*
Rhynchospora elongata var. ekmanii M
Rhytidophyllum bicolor Urb.
Rondeletia christii LV*
Rubus argentifrons LV
Rubus haitiensis LV
Salvia arborescens M
Sapium buchii LV
Senecio buchii LV*
Senecio picardae LV
Siphocampylus caudatus LV*
Solanum hotteanum M*
Stevensia hotteana M*
Tabebuia conferta M*
Tillandsia hotteana M, LV
Wallenia aquifolia M
Wallenia sp. nov. A. M*
Vernonia saepium M*
Zanthoxylum tetraphyllum LV*

Mecranium salicifolium M*
Mecranium tricostatum M*
Meliosma abbreviata M*
Meliosma recurvata M*
Meriania involucrata LV
Meriania sp. nov. B. M*
Miconia apiculata M*
Miconia hypiodes M*
Miconia markgraffii LV*
Miconia rigidissima LV*
Miconia sp. nov. A. M*
Miconia xenotricha M, LV
Mikania dissecta M*
Mitracarpus decumbens LV*
Myrica picardae M, LV
Narvalina domingensis M
Ossaea curvipila M*
Ossaea sp. nov. A. M*
Pachyanthus hotteanus M
Peperomia leonardii LV
Peratanthe ekmanii M*
Picrasma selleana LV*
Pilea cephalantha LV*
Pilea domingensis M, LV
Pilea franquervilleana LV*
Pilea lanceolata LV
Pilea leptocardia M
Pilea psilogyne LV*
Pilea stolonifera M
Pinus occidentalis M, LV
Pitcairnia elizabethae M
Psychotria alpestris M*
Psychotria liogieri M, LV
Renealmia densiflora M*
Rondeletia carnea LV*
Rondeletia formonica M*
Rubus eggersii M
Rubus selleanus M, LV
Salvia sp. nov. A. M*
Sapium haitiense M*
Senecio hotteanus M*
Senecio stenodon M*
Siphocampylus sonchifolius M
Solanum formonense M*
Symplocos hotteana M*
Ternstroemia barkeri M*
Turpinia picardae M, LV
Wallenia ekmanii M*
Vernonia buxifolia M
Zanthoxylum haitiensis M*
Zeugites haitiensis M

Table 4

Butterflies of the National Parks of Haiti

	Parc La Visite	Parc Macaya
Urbanus proteus domingo	0	+
Wallengrenia druryi	+	+
Paratrytone batesi	+	+
Panoquina sylvicola woodruffi	+	0
Panoquina nero	+	0
Eurema pyro	0	+
Nathalis iole	+	0
Dismorphia spio	+	0
Strymon columella cybirus	+	0
Hemiargus hanna watsoni	+	0
Heliconius charitonius churchi	+	0
Dryas iulia hispaniola	+	0
Junonia evarete zonalis	+	0
Vanessa cardui cardui	+	0
Vanessa virginiensis	+	+
Calisto archebates	+	0
Calisto loxias	0	+
Calisto chrysaoros	+	+
Calisto tragia	+	0
Calisto hysia	?	+
Calisto clenchi	+	0
Danaus cleophile	0	+
Danaus plexippus megalippe	+	+
Anetia briarea briarea	+	0
Anatia jaegeri	+	+
	20	11

Total number of families 7

Total number of species 25

Table 5

Land Mollusks of the National Parks of Haiti

Taxon	National Park	
	La Visite	Macaya
Camaenidae		
Polydontes obliteratus (Ferussae)	0	+
P. undulatus Ferussae)	+	0
Coloniconcha n. sp. ?	+	0
Xanthonychidae		
Coryda sp.	0	+
C. n. sp.	0	+
C. cerosa	+	0
Plagioptycho n. sp. A	0	+
P. n. sp. B	+	0
Cepolis cepa (Miller)	0	+
Mcleania n. sp.	+	+
Sagdidae		
Hojeda inaguensis (Weinland	0	+
H. micromphala (Pilsbry)	+	+
Odontesanda n. sp. A	0	+
O. n. sp. B	0	+
O. n. sp. C	0	+
O. n. sp. D	0	+
O. n. sp. E	+	0
O. n. sp. F	+	0
O. n. sp. G	+	0
O. n. sp. H	+	0
Sagdidae n. gen., n. sp.	0	+
Suavitus taenioraphe (Pfeiffer)	+	+
S. sp.	+	0
S. sp.	0	+
Lacteoluna selenina	0	+
Urocoptidae		
Autocoptis sp.	+	0
A. juliae (Clench)	0	+
Archegocoptis n. sp. A	0	+
A. n. sp. B	0	+
Brachypodella obesula (Pilsbry)	0	+
B. n. sp. A	0	+
B. n. sp. B	0	+
B. n. sp. C	0	+
B. sp.	0	+
B. n. sp. D	+	0
B. n. sp. E	+	0
B. n. sp. F	+	0

Table 5 Continued

Taxon	National Park	
	La Visite	Macaya
Helicinidae		
Helicinidae n. gen. n. sp. A	0	+
Helicinidae n. gen. n. sp. B	+	0
Helicinia n. sp. A	0	+
H. n. sp. B	0	+
H. n. sp. C	0	+
H. n. sp. D	0	+
H. n. sp. E	+	0
H. n. sp. F	+	0
Lucidella sp.	0	+
L. n. sp. A	+	0
L. n. sp. B	+	0
Fedeyenia n. sp. A	0	+
F. n. sp. B	+	0
Ceratodiscus n. sp. ?	+	0
Helicidae		
Helix aspersa (Muller) (introduced European Garden Snail)	+	0
Zonitidae		
Guppya gundlachi (Pfeiffer)	+	+
Glypyhyalina sp.	+	0
G. n. sp. A	+	0
G. n. sp. B	+	0
G. n. sp. C	0	+
G. n. sp. D	0	+
Habroconous n. sp. A	+	0
H. n. sp. B	0	+
Hawaia minuscula (Binney)	+	+
Zonitoides arboreas (Say)	+	+
Zonitidae n. gen. n. sp. A	+	0
Zonitidae n. gen. n. sp. B	+	0
Oleacinidae		
Varicella sp. A	0	+
V. sp. B	0	+
V. sp. C	0	+
V. n. sp. A	+	0
V n. sp. B	+	0
Oleacina sp. A	0	+
O. sp. B	0	+
O. sp. C	+	0
O. sp. D	+	0
O. sp. E	+	0

Table 5 Continued

Taxon	National Park	
	La Visite	Macaya
Spiraxis n. sp.	+	0
Sigmataxis sp. A	0	+
S. sp. B	0	+
S. n. sp. A	+	0
Streptostylops n. sp. A	0	+
S. sp.	+	0
Subulinidae		
Lamellaxis gracilis (Hutton)	+	+
Obeliscus n. sp.	+	0
O. sp.	0	+
O. dominicensis (Pilsbry)	0	+
Annularidae		
Chondropoma manni (Clench and Aguayo)	+	0
Orcuttipoma rollei (Weinland)	0	+
Weinlandipoma sp.	0	+
Colobostylus n. sp.	0	+
Cyclophoridae		
Crocidopoma sp.	+	0
Proserpinidae		
Proserpina n. sp.	+	0
Pupillidae		
Gastrucopta pellucida (Pfeiffer)	0	+
Succinidae		
Succinea sp.	0	+
Clausiliidae		
Nenisca n. sp.	0	+
Haplotrematidae		
Haplotrematidae n. gen. n. sp.	0	+
Bulimulidae		
Drymaeus sallei (Pilsbry)	0	+
Totals		
Species	45	57
Species unique to each park	38	50
New Taxa	27	27

TABLE 6

ANNOTATED LIST OF AMPHIBIANS AND REPTILES KNOWN FROM THE MASSIF DE LA HOTTE AND ADJACENT AREAS.

The following 54 amphibians and reptiles were reported in Schwartz and Thomas (1975) Henderson and Schwartz (1984), and/or this report, as occurring in the Massif de la Hotte in the western Tiburon Peninsula, Haiti. * = indicates those taxa listed in the literature from the Massif de la Hotte, but not reported from the study area; ** = includes those taxa represented in collections from the study area; 1 = includes those taxa not previously listed from the Massif de la Hotte, but are represented in our collections. Those species without notation are reported as occurring in the general area by Henderson and Schwartz (1984) and may eventually be found within the study area.

Order ANURA

Family Leptodactylidae (22 taxa)

Eleutherodactylus abbotti Cochran
** Eleutherodactylus apostates Schwartz
* Eleutherodactylus audanti audanti Cochran
** Eleutherodactylus bakeri Cochran
** Eleutherodactylus brevirostris Shreve
** Eleutherodactylus chlorophenax Schwartz
** Eleutherodactylus counouspeus Schwartz
* Eleutherodactylus eunaster Schwartz
** Eleutherodactylus glandulifer Cochran
* Eleutherodactylus glaphycompus Schwartz
** Eleutherodactylus heminota Shreve and Williams
* Eleutherodactylus hypostenor Schwartz
Eleutherodactylus inoptatus Barbour
** Eleutherodactylus lamprotes Schwartz
1 Eleutherodactylus nortoni
** Eleutherodactylus oxyrhynchus Dumeril and Bibron
** Eleutherodactylus pictissimus pictissimus Cochran
** Eleutherodactylus ruthae aporostegus Schwartz
* Eleutherodactylus sciagraphus Schwartz
* Eleutherodactylus semipalmatus Shreve
** Eleutherodactylus ventrilineatus Shreve
** Eleutherodactylus wetmorei wetmorei Cochran

Family Hylidae (4 taxa)

** Hyla heilprini Noble
** Hyla pulchrilineata Cope
** Hyla vasta Cope
** Osteopilus dominicensis Tschudi

Order SQUAMATA

Suborder SAURIA

Family Gekkonidae (1 taxon)

* Sphaerodactylus elasmorhynchu, Thomas

Family Anguidae (3 taxa)

** Celestus costatus costatus Cope
** Celestus stenurus stenurus Cope
* Sauresia sepsoides Gray

Family Iguanidae (19 taxa)

1 Anolis armouri Cochran
** Anolis coelestinus coelestinus Cope
** Anolis cybotes Cope
* Anolis darlingtoni Cochran
** Anolis distichus aurifer Schwartz
* Anolis distichus suppar Schwartz
* Anolis distichus vinosus Schwartz
** Anolis dolichocephalus dolichocephalus Williams
* Anolis dolichocephalus sarmenticola Schwartz
* Anolis koopmani Rand
* Anolis monticola monticola Shreve
** Anolis monticola quadrisartus Thomas and Schwartz
** Anolis ricordi leberi Williams
* Anolis ricordi viculus Schwartz
* Anolis rupinae Williams and Webster
Anolis semilineatus Cope
* Anolis singularis Williams
** Chamaelinorops barbouri Schmidt
** Leiocephalus melanochlorus melanochlorus Cope

Family Boidae (2 taxa)

** Epicrates gracilis hapalus Sheplan and Schwartz
** Epicrates striatus exagistus Sheplan and Schwartz

Family Colubridae (3 taxa)

** Antillophis parvifrons parvifrons Cope
** Darlingtonia haetiana haetiana Cochran
** Uromacer catesbyi catesbyi Schlegel

TABLE 7

ANNOTATED LIST OF AMPHIBIANS AND REPTILES KNOWN FROM THE MASSIF DE LA SELLE AND ADJACENT MOUNTAIN AREAS.

Sixty-five taxa are listed as potentially occurring in, or are known from, the Massif de la Selle and adjacent mountain areas (Schwartz and Thomas 1975, and Henderson and Schwartz 1984). * = indicates those taxa listed in Henderson and Schwartz (1984) from these mountain areas, but were not reported from the park; ** includes those taxa either reported in the literature as occurring in the park or represented in our collections. Those taxa without notation are reported to occur more generally in the area and may eventually be found in or near the study area.

Order ANURA

Family Leptodactylidae (18 taxa)

** Eleutherodactylus abbotti Cochran
** Eleutherodactylus armstrongi Noble and Hassler
** Eleutherodactylus audanti audanti Cochran
** Eleutherodactylus darlingtoni Cochran
* Eleutherodactylus fowleri Schwartz
** Eleutherodactylus furcyensis Shreve and Williams
** Eleutherodactylus glanduliferoides Shreve
* Eleutherodactylus heminota Shreve and Williams
* Eleutherodactylus hypostenor Schwartz
Eleutherodactylus inoptatus (Barbour)
** Eleutherodactylus jugans (Cochran)
** Eleutherodactylus leoncei Shreve and Williams
* Eleutherodactylus norton Schwartz
** Eleutherodactylus oxyrhynchus (Dumeril and Bibron)
* Eleutherodactylus pictissimus pictissimus Cochran
? Eleutherodactylus ruthae aporostegus Schwartz
* Eleutherodactylus semipalmatus Shreve
* Eleutherodactylus wetmorei ceraemerus Schwartz

Family Hylidae (4 taxa)

** Hyla heilprini Noble
Hyla pulchrilineata Cope
* Hyla vasta Cope
Osteopilius dominicensis (Tschudi)

Order SQUAMATA

Suborder SAURIA

Family Gekkonidae (6 taxa)

Gonatodes albogularis notatus Reinhardt and Lutken
Hemidactylus brooki haetianus Meerwarth
* Sphaerodactylus altavelensis brevirostratus Shreve
* Sphaerodactylus armstrongi Noble and Hassler
* Sphaerodactylus cinereus
* Sphaerodactylus streptophorus Thomas and Schwartz

Family Anguidae (3 taxa)

* Celestus stenurus weinlandi Cope
* Celestus costatus oreistes Schwartz
** Wetmorena haetiana haetiana Cochran

Family Iguanidae (13 taxa)

* Anolis alinger Mertens
** Anolis armouri (Cochran)
Anolis bahorucoensis southerlandi Schwartz
Anolis coelestinus coelestinus Cope
Anolis cybotes cybotes Cope
Anolis distichus dominicensis Reinhardt and Lutken
* Anolis hendersoni ravidormitans Schwartz
Anolis ricordi subsolanus Schwartz
Anolis semilineatus Cope
* Anolis singularis Williams
* Chamaelinorops barbouri Schmidt
Leiocephalus melanochlorus hypsistus Schwartz
Leiocephalus personatus personatus Cope

Family Teiidae (1 taxon)

Ameiva taeniura varica Schwartz

Suborder SERPENTES

Family Typhlidae (4 taxa)

* Typhlops capitulata capitulata Richmond
Typhlops hectus Thomas
* Typhlops pusilla Barbour
Typhlops sulcata Cope

Family Leptotyphlopidae (1 taxon)

* Leptotyphops leptepileptus Thomas, McDiarmid, and Thompson

Family Boidae (3 taxa)

* Epicrates fordi fordi Gunther
Epicrates gracilis hapalus Sheplan and Schwartz
Epicrates striatus striatus Fischer

Family Tropidophiidae (1 taxon)

Trophidophis haetianus haetianus Cope

Family Colubridae (9 taxa)

Alsophis anomalus (Peters)
Antillophis parvifrons protenus (Jan)
* Darlingtonia haetiana perfector Schwartz and Thomas
* Darlingtonia haetiana vaticinata Schwartz
Hypsirhynchus ferox ferox Gunther
Ialtris dorsalis (Gunther)
Uromacer catesbyi catesbyi (Schlegel)
Uromacer frenatus frenatus (Gunther)
Uromacer oxyrhynchus Dumeril and Bibron

Suborder Amphisbaenia

Family Amphisbaenidae (2 taxa)

Amphisbaena innocens Weinland
* Amphisbaena manni Barbour

TABLE 8. List of bird species of Parc National Pic Macaya indicating major habitat preferences for each species (% of observations within favored habitat in parentheses) and status within the park. All data are from December-February censuses.

SPECIES	MOUNTAINS >1300 m	FORMON PLAIN	MOUNTAINS	PLAIN	STATUS
Least Grebe	-	+		ND(100)	U/E
Black-capped Petrel	+	-	MC		C/T
Sharp-shinned Hawk	+	+	RB(100)	RBW(100)	U/T
Red-tailed Hawk	+	+	RB(100)	RBW(100)	C
American Kestrel	-	+		J(100)	C
Peregrine Falcon	+	-			R/M
Common Bobwhite	-	+		J(100)	U/I
Common Guinea-fowl	-	+		J(100)	U/I
Limpkin	+	+	RB(100)	RBW(100)	R/T
Killdeer	-	+		J(100)	U
Spotted Sandpiper	+	-	RR		C/M
Red-necked Pigeon	+	+	RB(84)	RBW(52)	C
Mourning Dove	-	+		RBW(100)	U
Hispaniolan Parrot	-	+		RBW(100)	C/T
Hispaniolan Lizard Cuckoo	-	+		RBW(54)	C
Smooth-billed Ani	-	+		J(100)	C
Barn Owl	+	+	RB(100)	RBW(100)	C
Collard Swift	+	-	GR(100)		U
Hispaniolan Emerald	+	+	RB(50)	RBW(41)	C
Antillean Mango	+	+	R(67)	BRW(100)	C
Vervain Hummingbird	+	+	BR(100)	BRW(80)	C

TABLE 8. CONTINUED

SPECIES	MOUNTAIN >1300 m	FORMON PLAIN	MOUNTAIN	PLAIN	STATUS
Hispaniolan Trogon	+	+	RB(85)	RBW(100)	C
Narrow-billed Tody	+	+	RB(43)	RBW(65)	C
Broad-billed Tody	-	+		RBW(100)	R/M
Antillean Piculet	+	+	RB(67)	RBW(67)	C
Hispaniolan Woodpecker	+	+	Bp(48)	RB(60)	C
Yellow-bellied Sapsucker	-	+		RBW(100)	R/M
Loggerhead Kingbird	-	+		BRW(67)	C
Stolid Flycatcher	-	+		BRW(100)	C
Greater Antillean Pewee	+	+	BR(50)	BRW(50)	U
G. Antillean Elaenia	+	+	BR(33)	BRW(100)	U
Golden Swallow	+	-	RB(100)		C
Northern Mockingbird	-	+		BRW(100)	R
Red-legged Thrush	+	+	RB(54)	RBW(100)	C
Grey-cheeked Thrush	+	-	RB(100)		R/M
Rufous-throated Solitaire	+	+	RB(69)	RBW(90)	C
Palm Chat	-	+		J(100)	
Black-whiskered Vireo	-	+		RBW(100)	U
Black and White Warbler	+	+	BR(41)	RBW(50)	C/M
Parula Warbler	+	+	BR(84)	RBW(100)	C/M
Cape May Warbler	+	+	BR(48)	RBW(100)	C/M
Black-throated Blue W.	+	+	RB(39)	RBW(60)	C/M
Yellow-rumped Warbler	+	+	BR(71)	BRW(100)	U/M

TABLE 8. CONTINUED

SPECIES	MOUNTAIN >1300 M	FORMON PLAIN	MOUNTAIN	PLAIN	STATUS
Black-throated Green W.	+	-	BR(100)		U/M
Yellow-throated Warbler	+	-	R(50)		U/M
Prairie Warbler	+	+	Bp(100)	RBW(100)	U/M
Pine Warbler	+	+	Bp(80)	BRW(100)	C
Palm Warbler	+	-	BR(100)		R/M
Ovenbird	+	-	BR(45)		U/M
Louisiana Waterthrush	-	+		BRW(100)	U/M
Common Yellowthroat	+	+	RB(66)	J(77)	C/M
White-winged Warbler	+	-	BR(80)		R/E
American Redstart	+	+	BR(47)	RBW(58)	C/M
Bananaquit	+	+	RB(68)	BRW(85)	C
Blue-hooded Euphonia	+	+	RB(100)	RBW(100)	U
Stripe-headed Tanager	+	+	BR(54)	RBW(94)	C
Grey-crowned Palm T.	+	+	RB(43)	BRW(75)	C
Chat Tanager	+	+	RB(75)	RBW(75)	C/T
Greater Antillean Grackle	-	+		RBW(100)	U
Antillean Siskin	+	-	BpR(100)		R
White-winged Crossbill	+	-	Bp(93)		C
G. Antillean Bullfinch	+	+	BR(57)	BRW(70)	C
Black-faced Grassquit	+	+	R(51)	J(100)	C
Yellow-faced Grassquit	+	+	R(100)	J(100)	C
Lincoln's Sparrow	+	-	BR(100)		R/M

TABLE 8. CONTINUED

Number of species in each region	47	51
Total number of species for Park (January)	65	
Total number of species for Park (May)	46	

Habitat: (Bp) Bwapen; (BpR) Bwapen Raje; (BR) Bwa Raje; (BRW) Bwa Raje Woch; (GR) Gran Ravine; (J) Jadin; (MC) Mountain Cliff; (ND) Nan Dlo; (RB) Rak Bwa; (RBW) Rak Bwa Woch; (RR) Riviere Ravine du Sud.
Status: (C) Common; (E) Endangered; (I) Introduced; (M) Migrant; (R) Rare; (T) Threatened; (U) Uncommon.

TABLE 9. List of the birds of Parc National La Visite indicating major habitat preferences for each species (% of observations within favored habitat in parentheses) and status in park.

SPECIES	SEASON		HABITAT		STATUS
	Summer	Winter	May	December	
Black-capped Petrel	-	+	RB		C/T
Sharp-shinned Hawk	-	+	Bp(100)		U
Red-tailed Hawk	+	+	R(100)	BR(66)	C
American Kestrel	+	+	Bp(100)	R(38)	C
Common Bobwhite	+	+	J(76)	J(100)	C/I
Common Guinea Fowl	+	+	J(100)	J(100)	U/I
Limpkin	+	+	RB(100)	RB(100)	R/T
Killdeer	+	+	R(100)	R(100)	C
Spotted Sandpiper	-	+		ND(100)	C/M
Red-necked Pigeon	+	+	RB(50)	RB(100)	C
Mourning Dove	+	+	J(42)	Bp(47)	C
Hispaniolan Parrot	-	+		B(100)	R/ E
Hispaniolan Parakeet	+	+	Bp(100)	Bp(100)	C
Hispaniolan Lizard Cuckoo	+	+	BpR(100)	Bpr(100)	C
Barn Owl	+	+	RB(100)	RB(100)	C
Collard Swift	+	+		RB(60)	C
Black Swift	+	-	Bp(87)		U
Hispaniolan Emerald	+	+	BR(63)	BR(65)	C
Antillean Mango	-	+		J(100)	R
Vervain Hummingbird	-	+		BR(100)	U
Hispaniolan Trogon	+	+	RB(100)	BR(100)	U/T
Narrow-billed Tody	+	+	BR(79)	BR(79)	C

TABLE 9. CONTINUED

SPECIES	SEASON		HABITAT		STATUS
	Summer	Winter	May	December	
Hispaniolan Woodpecker	+	+	Bp(64)	Bp(54)	C
Loggerhead Kingbird	-	+		BR(100)	R
Greater Antillean Pewee	+	+	BR(56)	BR(62)	C
G. Antillean Elaenia	+	+	BR(32)	BR(58)	C
Golden Swallow	+	+	R(81)	R(38)	C
Purple Martin	+	+	R(100)	RB(100)	U
Palm Crow	+	+	J(54)	Bp(82)	C
Northern Mockingbird	+	-	R(100)		R
La Selle's Thrush	+	+	BR(50)	BR(42)	C
Red-legged Thrush	+	+	BR(40)	BR(48)	C
Gray-cheeked Thrush	-	+		RB(100)	U
Rufous-throated Solitaire	+	+	RB(75)	RB(50)	U
Cedar Waxwing	-	+		BpR(60)	R/M
Palm Chat	+	+	L	L	R/P
Black-wiskered Vireo	+	+	L	L	R/P
Black and White Warbler	-	+		Bp(50)	C
Nashville Warbler	-	+		Bp(100)	R/M
Blue-winged Warbler	-	+		Bp(100)	R/M
Cape May Warbler	-	+		J(63)	C/M
Black-throated Blue W.	-	+		BR(58)	C/M
Yellow-rumped Warbler	-	+		J(56)	C/M
Black-throated Green W.	-	+		RB(33)	U/M

TABLE 9. CONTINUED

SPECIES	SEASON		HABITAT		STATUS
	Summer	Winter	May	December	
Yellow-throated Warbler	-	+		Bp(66)	U/M
Prairie Warbler	-	+		R(89)	U/M
Pine Warbler	+	+	Bp(80)	Bp(59)	C
Palm Warbler	-	+		J(40)	C/M
Ovenbird	-	+		BR(75)	C/M
Louisiana Waterthrush	-	+		ND(100)	C/M
Common Yellowthroat	-	+		BR(100)	U/M
Ground Warbler	+	+	BR(59)	BR(55)	C
White-winged Warbler	+	-	RB(100)		R/E
American Redstart	-	+		RB(38)	C/M
Bananaquit	+	+	BR(100)	BR(54)	C
Blue-hooded Euphonia	+	+	RB(100)	RB(100)	R
Stripped-headed Tanager	+	+	RB(50)	RB(55)	C
Black-crowned Palm T.	+	+	BR(72)	BR(68)	C
Grey-crowned Palm T.	-	(?)		BR(100)	
Chat Tanager	+	+	RB(75)	RB(66)	C/T
Greater Antillean Grackle	+	+	Bp(100)	BpR(62)	C
Antillean Siskin	+	+	Bp(50)	Bp(37)	C
White-winged Crossbill	+	+	Bp(100)	Bp(100)	C
G. Antillean Bullfinch	+	+	BR(91)	BR(64)	C
Black-faced Grassquit	+	+	BR(60)	BR(100)	C
Yellow-faced Grassquit	+	+	BR(43)	R(71)	C
Lincoln's Sparrow	-	+		BR(75)	R/M

TABLE 9. CONTINUED

No. species/season	41	62
Total number species	67	

Habitat: (Bp) Bwapen; (BpR) Bwapen Raje; (BR) Bwa Raje; (J) Jadin; (L) Lowlands; (ND) Nan Dlo; (R) Raje; (RB) Rak Bwa.
Status: (C) Common; (E) Endangered; (I) Introduced; (In) Indetermined; (M) Migrant; (R) Rare; (T) Threatened; (U) Uncommon.

TABLE 10. Bird species that are endemic (E) or restricted (R) to Hispaniola. Species endemic only to Haiti (E*); once found in Puerto Rico (extirpated) but now confined to Hispaniola (R-PR); restricted to Hispaniola in the Antilles but also occurring in North America (R-NA) or South America (R-SA).

SPECIES	STATUS
LAND BIRDS	
Cuculidae	
Saurothera longirostris	E
Hyetornis rufigularis	E
Caprimulgidae	
Siphonorhis brewsteri	E
Trochilidae	
Chlorostilbon swansonii	E
Psittacidae	
Amazona ventralis	E
Aratinga chloroptera	E
Trogonidae	
Priotelus roseigaster	E
Todidae	
Todus subulatus	E
Todus angustirostris	E
Picidae	
Melanerpes striatus	E
Nesoctites micromegas	E
Corvidae	
Corvus leucognaphalus	R-PR
Muscicapidae (Turdinae)	
Turdus swalesi	E
Dulidae	
Dulus dominicus	E
Vireonidae	
Vireo nanus	E

TABLE 10.- CONTINUED

SPECIES	STATUS
Emberizidae (Parulinae)	
Dendroica pinus	R-NA
Microligea palustris	E
Xenoligea montana	E
Emberizidae (Thraupinae)	
Phaenicophilus palmarum	E
Phaenicophilus paliocephalus	E*
Calyptophilus frugivorus	E
Fringillidae	
Carduelis dominicensis	E
Loxia leucoptera	R-NA
Zonotrichia capensis	R-SA
NON-LAND BIRDS	
Accipitridae	
Buteo ridgwayi	E

Nomenclature follows the American Ornithologists Union Check-list (1983).

TABLE 11

Mammals of the National Parks of Haiti
(Ex = extinct; Pr = present; NP = never present)

Endemic Land Mammals

	La Visite	Pic Macaya
Order Rodentia		
Family Capromyidae		
Plagiodontia aedium	Pr	Pr
Plagiodontia velozi	Ex	Ex
Plagiodontia araeum	Ex	NP
Isolobodon portoricensis	Ex	Ex
Isolobodon montanus	Ex	Ex
Hexolobodon phenax	Ex	Ex
New genus + species	NP	Ex
Family Echimyidae		
Brotomys voratus	Ex	Ex
Order Primates		
Family Cebidae		
Saimiri bernalensis	Ex	Ex
Order Insectivora		
Family Solenodontidae		
Solenodon paradoxus	Ex	Pr
Solenodon marcanoi	Ex	Pr(?)
Family Nesophontidae		
Nesophontes zamicrus	Ex	Ex
Nesophontes hypomicrus	Ex	Ex
Nesophontes paramicrus	Ex	Ex
Order Xenarthra		
Family Megalonychidae		
Synocnus comes	Ex	Ex
Parocnus	Ex	Ex
New Taxon	Ex	Ex
New Taxon	Ex	Ex
New Taxon	Ex	Ex
Total number of taxa	17	18
Number of surviving taxa	1	2
Number of endemics *not* found in other park	1	1

TABLE 12

Mammals of the National Parks

Bats

	La Visite	Macaya Plain	Mt
Order Chiroptera			
Family Mormoopidae			
Pteronotus quadridens fulginosus	0	0	+
**P. parnelli pusillus*	0	0	+
Family Phyllostomidae			
Monophyllus redmani clinedaphus	+	+	+
Artibeus jamaicensis jamaicensis	0	+	0
** *Phyllops haitiensis*	+	+	0
** *Phyllonycteris poeyi obtusa*	0(ex)	0	+
* *Erophylla sezekorni bombifrons*	0(ex)	+	0
Brachyphylla nana	0(ex)	0	0
Family Vespertilionidae			
Eptesicus fuscus hispaniolae	+	+	+
Lasiurus borealis minor	0(ex)	0	0
Family Molossidae			
Tadarida brasiliensis constanzae	+	0	+
Total number of surviving species	4	5	6
Total number of species	8	9	

** = Endemic in Hispaniola
* = Endemic in Hispaniola

TABLE 13

Mammals of the National Parks of Haiti

Introduced Land Mammals

Species	La Visite	Macaya
Order Rodentia		
Family Muridae		
Rattus rattus rattus (Black Rat) Brown morph	+	+
Rattus rattus rattus All grey morph	+	+
Rattus rattus rattus Grey & white morph	+	+
Rattus norvegicus (Norway Rat)	rare	abundant (Pic Macaya)
Mus musculus (House mouse)	+	
Order Carnivora		
Family Viverridae		
Herpestes auropunctatus (Mongoose)	+	+
Family Canidae		
Canis familiaris (Dog)	dom.& feral	dom.& feral
Family Felidae		
Felis catus (Cat)	feral	feral
Order Artiodactyla		
Family Bovidae		
Capra hircus (Goat)	dom. & feral	dom. & feral
Ovis aries (Sheep)	domestic	domestic
Bos taurus (Cow)	domestic	domestic
Order Perissodactyla		
Family Equidae		
Equus caballus (Horse)	domestic (feral?)	domestic
Equus asinus (Donkey)	domestic	domestic

Figures

FIGURE 1

HAITIAN PATRIMONY

Type of Heritage:	Cultural	Geological	Agricultural		Natural	
Examples:	Indian Artifacts Colonial Artifacts Art	Marble Quaries	Fisheries Forests Farms	Mountain View Seashores	Caves Wildlife Mangroves	Ekman's Juniper La Selle Thrush
Approach to Conservation:	Museum Monuments	Regulation	Soil Conservation Reforestation	Not Developed	Forest Reserve National Park	Zoological Garden Botanical Garden National Park
G.O.H. Authority:	INAHCA	DMRE	MARNDR		PARKS HAITI	

Types of Haitian Patrimony and the G.O.H. Authority Responsible
* indicates no designated authority
** indicates overlapping authority

FIGURE 2

NATIONAL PARKS AUHTORITY

Parcs Nationaux Naturels d'Haiti

(Parcs Haiti)

Director Parcs Haiti

Assistant Director for Administration

Assistant Director for Education and Recreation

Assistant Director for Conservation and Research

Staff

Park Supervisor (La Visite)

Staff

Park Supervisor (Macaya)

Staff

International Volunteers

Educational and Scientific Specialists

Research Investigators

Figure 3. Park Headquarters

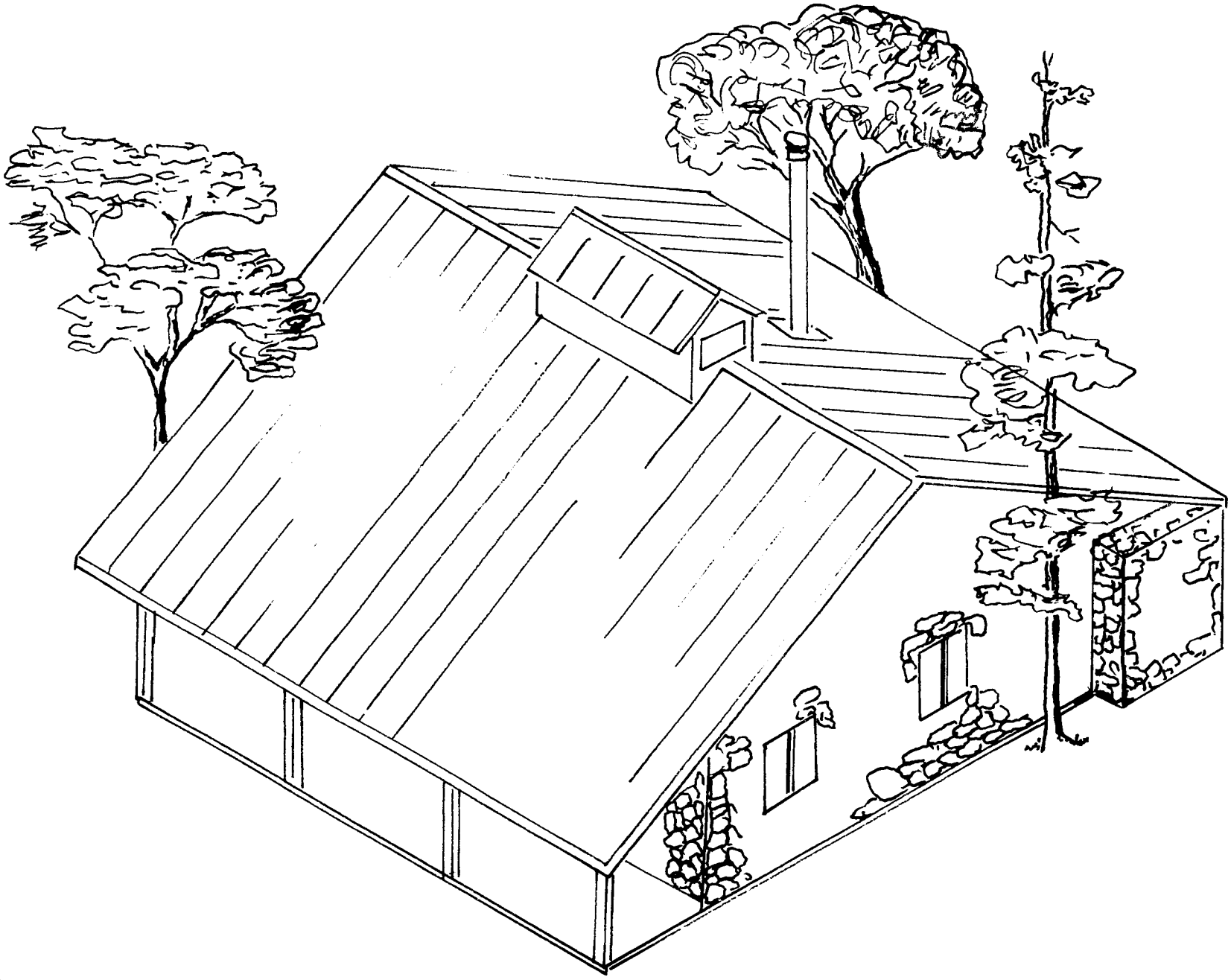


Figure 4. Units of Biosphere Researve and National Park

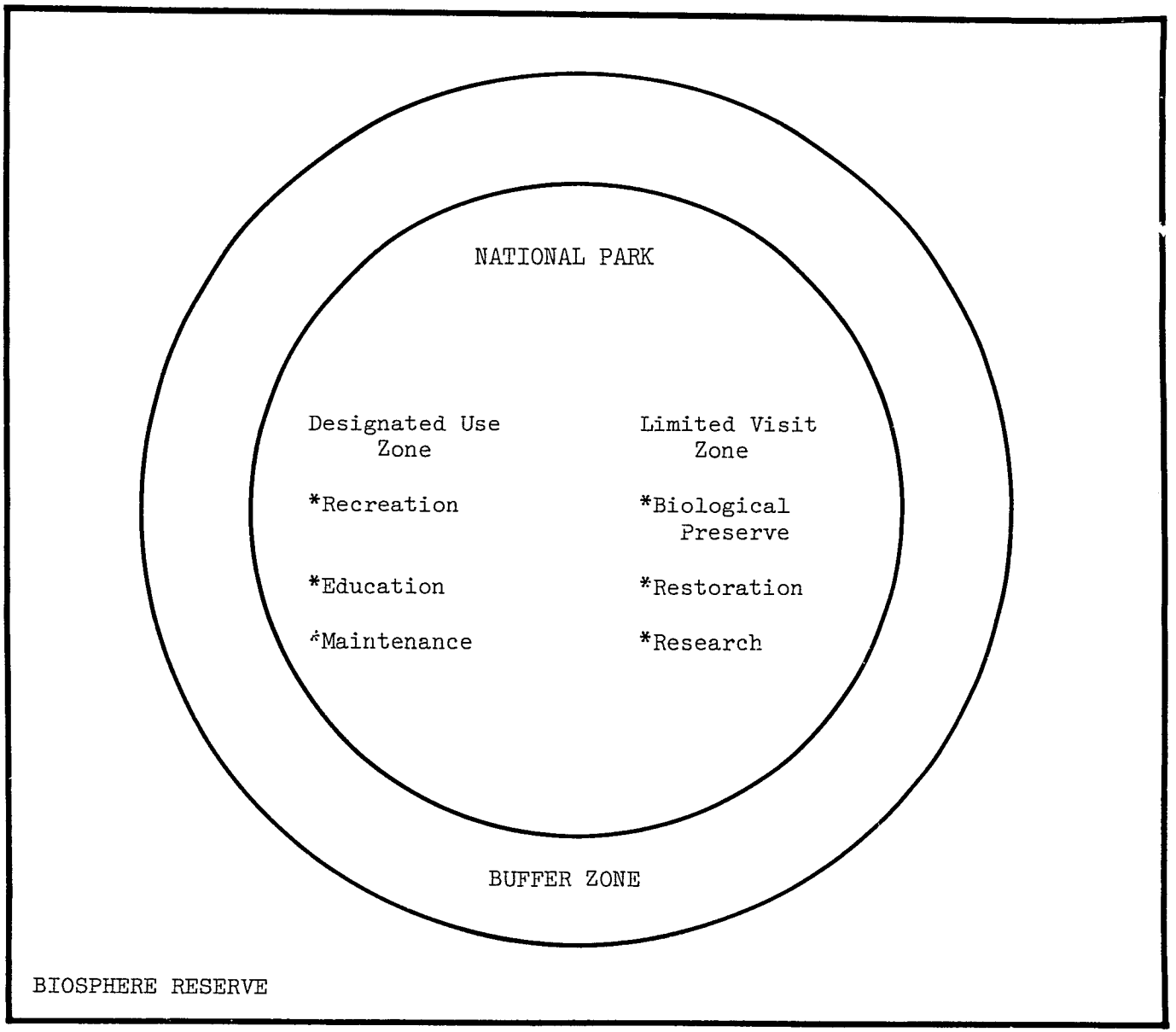


Figure 5

National Parks of Haiti

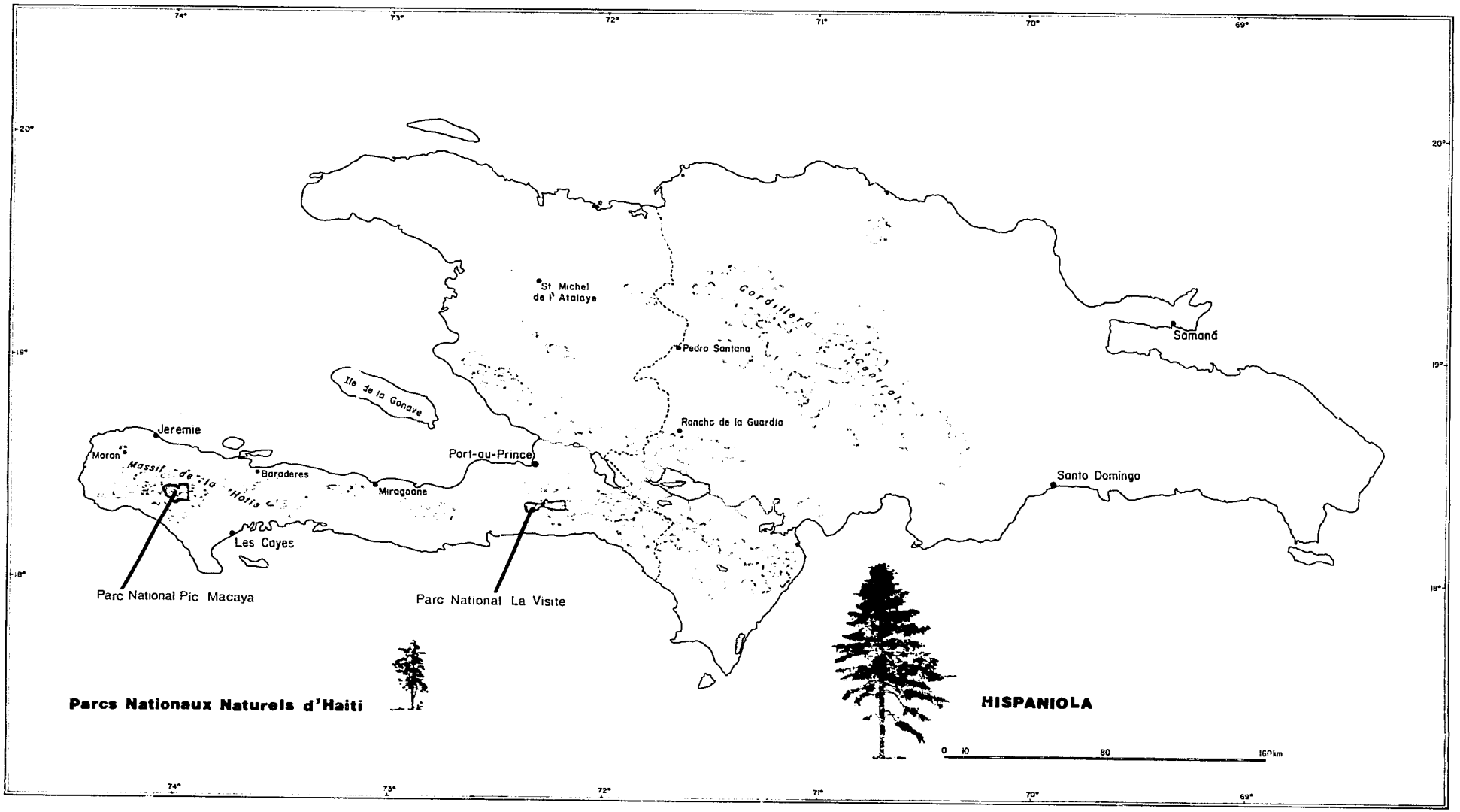
Item	Year 1 (1986)	2 (1987)	3 (1988)	4 (1989)	5 (1990)	Total
Set up office	72,400	-	-	-	-	72,400
Set up Parc La Visite	26,750	-	-	-	-	26,750
Set up Parc Macaya	26,750	-	-	-	-	26,750
Signs	2,000	-	1,000	-	-	3,000
Exhibits	-	8,000	-	-	-	8,000
Publications	25,000	5,000	5,000	-	20,000	55,000
Training Personnel	12,000	17,000	12,000	12,000	12,000	65,000
Research	43,000	63,000	43,000	28,000	28,000	205,000
Overhead	6,450	9,450	6,450	4,200	4,200	30,750
Operating Office	41,000	41,000	41,000	41,000	41,000	205,500
Operating parks	56,900	56,900	56,900	56,900	56,900	284,500
Operating vehicles	14,400	14,400	14,400	14,400	14,400	72,000
Salaries Office	100,200	105,210	110,470	115,993	121,793	553,666
Salaries Parks	92,400	97,020	101,640	106,491	111,573	509,124
Totals	519,350	417,080	391,960	379,084	409,966	2,117,440

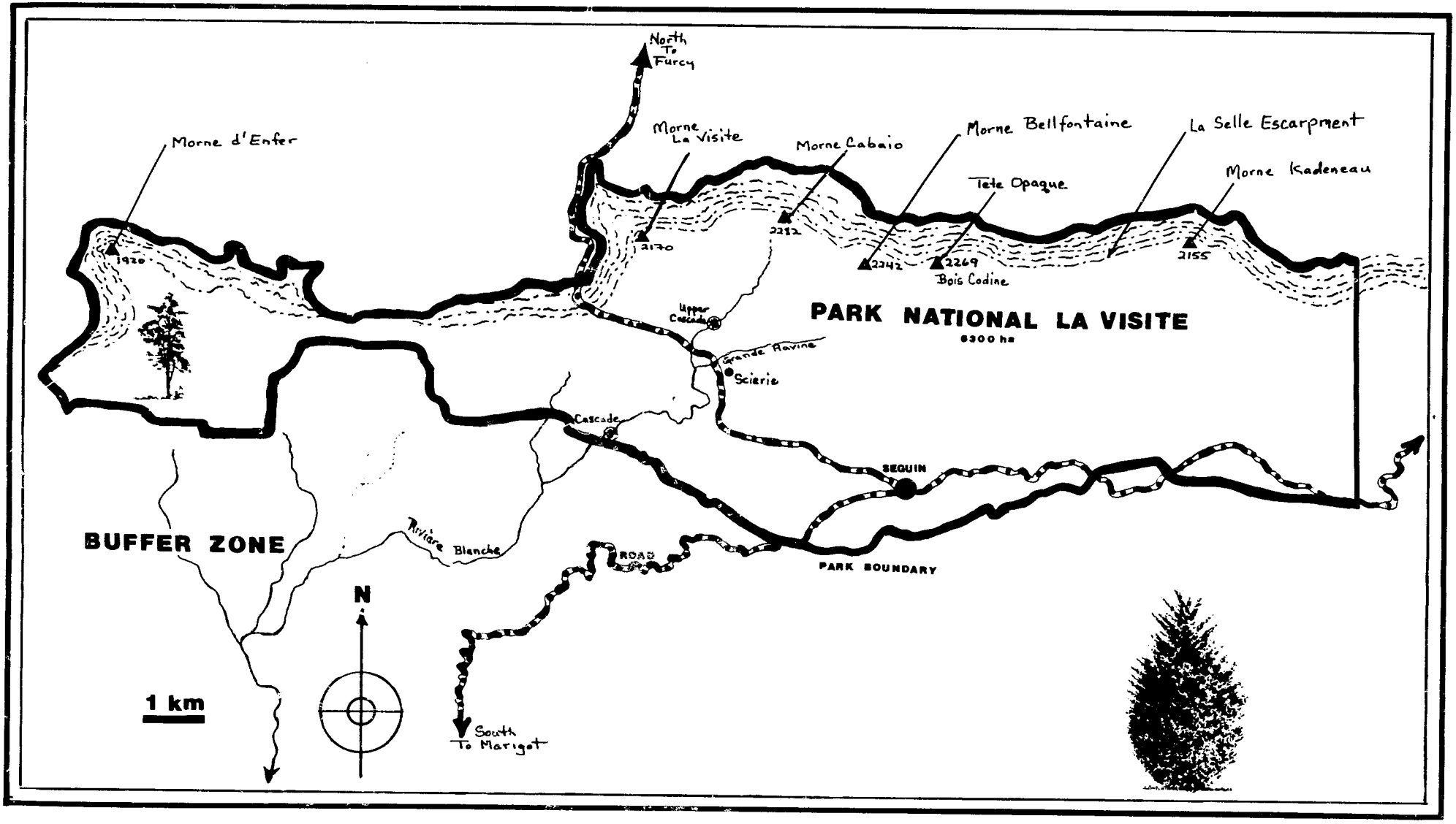
Figure 6

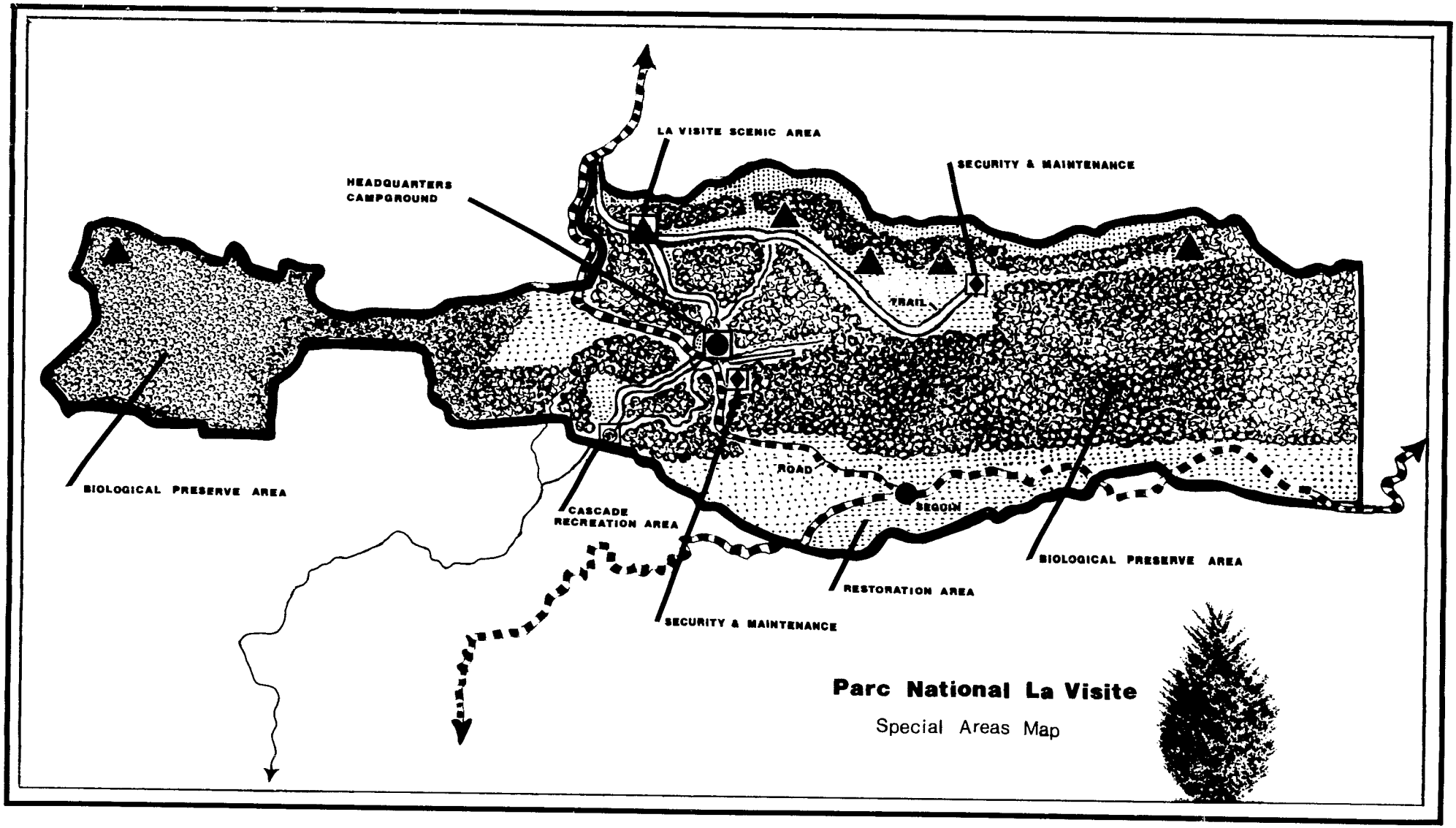
TRAINING PROGRAMS

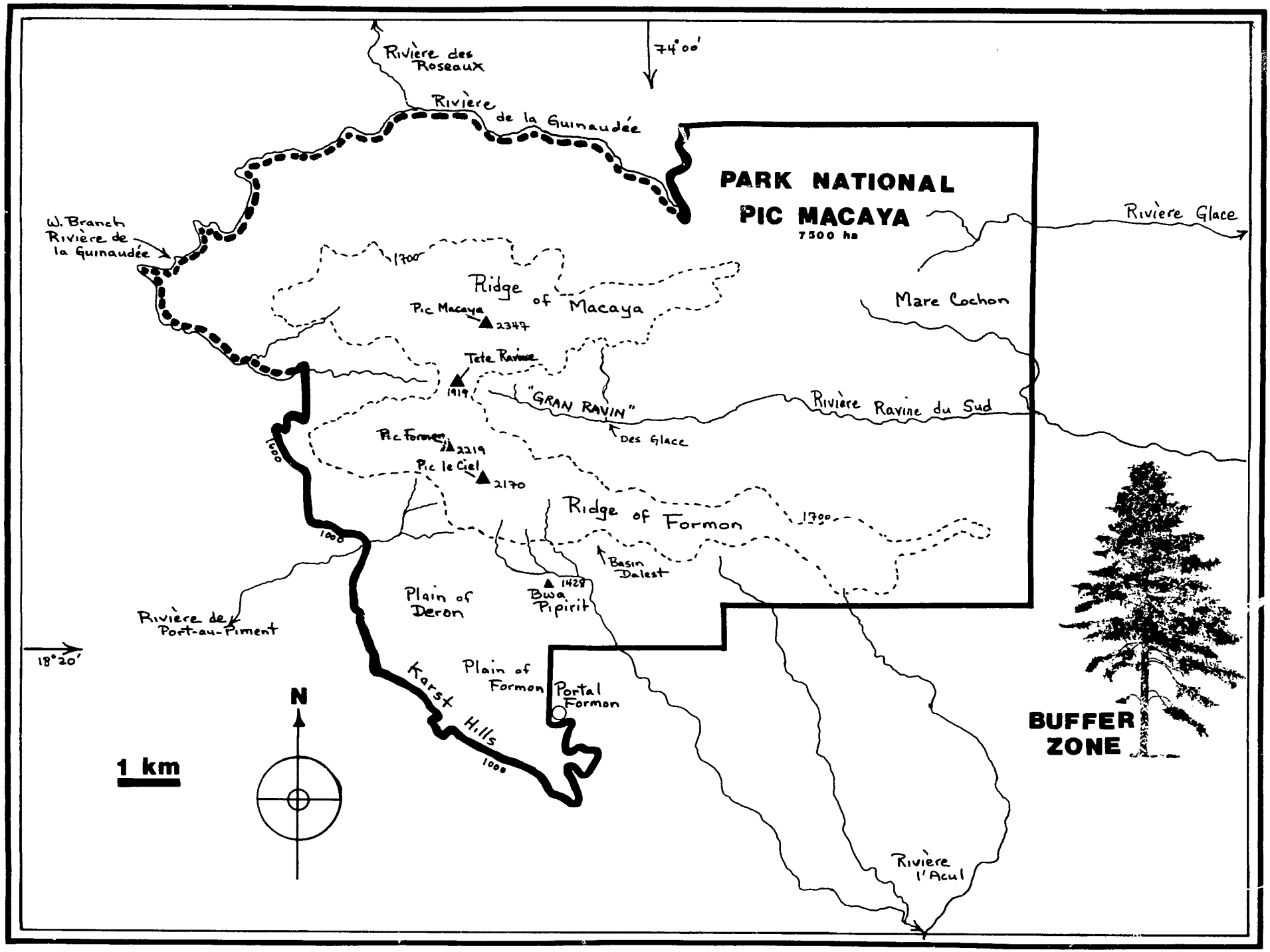
	Individuals	Topic	When	Location	Duration	Instructors
1.	Director Parcs Haiti Assistant Director Park Supervisors	Orientation Design Program	Spring 1986	PAP	One week	Raoul Pierre-Louis, Gaston Hermantin, Paul Paryski, Bob Wilson, Charles Woods
2.	Office Staff	Orientation	Spring 1986	PAP	One day	Director
3.	Park Staff	Orientation	Spring 1986	Parks	Two days	Park Supervisor
4.	Director, Asst. Directors, Park Supervisors	Training programs on Parks	Spring-Fall 1986-1990	PAP	Two weeks	International Parks Representative
5.	Director, Asst. Directors, Park Supervisors	Interpretation of park features, flora and fauna plus field techniques	Summer-Winter 1986-1990	PAP + Parks	Two weeks	UF/FSM Staff and Researchers
6.	Park Guards	Park features	Summer-Winter 1986-1990	Parks	Two days	UF/FSM Staff and Researchers
7.	Director	National Parks Seminar	Summer 1986	USA/ CANADA	Two weeks	Univ. of Michigan Parks Canada, USNPS

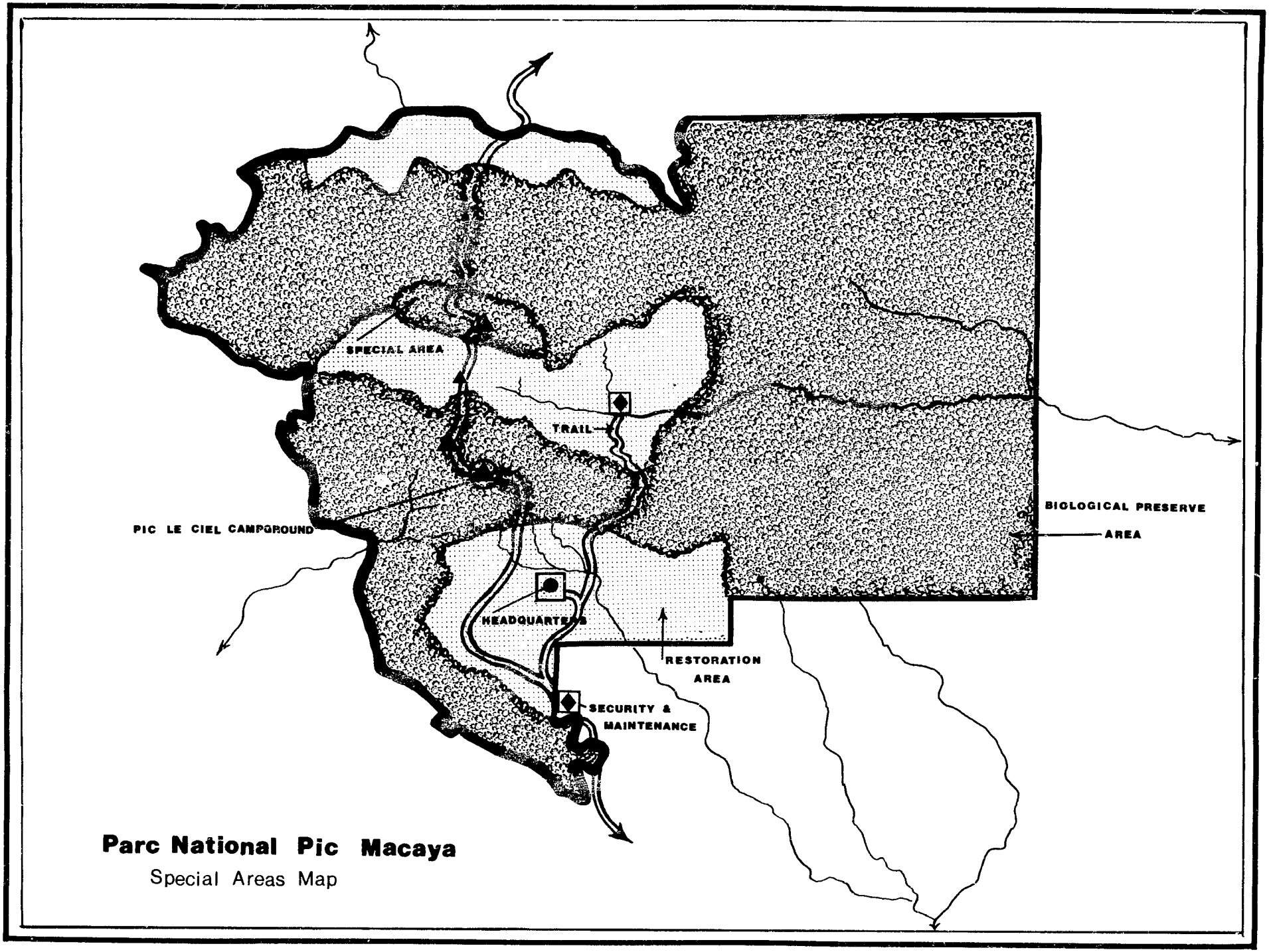
Maps


74°
73°
72°
71°
70°
69°
20°
19°
18°
St Michel de l' Atalaye
Cordillera Central
Pedro Santana
Samaná
Ile de la Gonave
Jeremie
Moron
Baraderes
Massif de la Hotte
Miragoane
Port-au-Prince
Rancho de la Guardia
Santo Domingo
Les Cayes
Parc National Pic Macaya
Parc National La Visite
Parcs Nationaux Naturels d'Haiti
HISPANIOLA
0 10 80 160km


North To Furcy
Morne d'Enfer
Morne La Visite
Morne Cabaio
Morne Bellfontaine
La Selle Escarpment
Morne Kadeneau
Tete Opaque
1920
2170
2232
2242
2269
Bois Codine
2155
Upper Cascade
PARK NATIONAL LA VISITE
6300 ha
Grande Ravine
Scierie
Cascade
SEQUIN
BUFFER ZONE
Riviere Blanche
ROAD
PARK BOUNDARY
N
1 km
South To Marigot


LA VISITE SCENIC AREA
HEADQUARTERS
CAMPGROUND
SECURITY & MAINTENANCE
TRAIL
BIOLOGICAL PRESERVE AREA
ROAD
CASCADE
RECREATION AREA
SEGOIN
BIOLOGICAL PRESERVE AREA
RESTORATION AREA
SECURITY & MAINTENANCE
Parc National La Visite
Special Areas Map


Rivière des Roseaux
74°00'
Rivière de la Guinaudée
PARK NATIONAL
PIC MACAYA
7500 ha
W. Branch Rivière de la Guinaudée
Rivière Glace
1700
Ridge of Macaya
Pic Macaya
2347
Mare Cochon
Tete Ravine
1419
"GRAN RAVIN"
Rivière Ravine du Sud
Des Glace
Pic Formon
2219
Pic le Ciel
2170
1600
Ridge of Formon
1700
1000
Basin Dalest
1428
Bwa Pipirit
Plain of Deron
Rivière de Port-au-Piment
18°20'
Plain of Formon
Portal Formon
Karst Hills
1000
N
1 km
BUFFER ZONE
Rivière l'Acul



Parc National Pic Macaya

Special Areas Map

Photographs

1. View from the air of Parc La Visite looking east. Photograph was made in May, 1983.

2. A. View of Morne Cabaio and the mesic basin in between M. Cabaio and M. La Visite. The photograph was made in September, 1977. "Raje" habitat is in foreground. "Rak Bwa" habitat is in basin. "Bwapen" can be seen on the edge of the plateau.

   B. Photograph of Hispaniolan Ground Warbler, Microligea palustris. This species is characteristic of the "Rak Bwa" habitats of the park.

3. A. View of the plateau of Parc La Visite in 1977. Note the extensive areas of pine forest "Bwapen").

   B. View of the plateau of Parc La Visite in 1985 from a nearly the same location showing the extensive deforestation. Both views are from a spot east of M. La Visite looking eastward towards Tete Opaque.

4. View of the Grande Cascade of Parc La Visite. The photograph was taken in 1984.

5. View of Parc Macaya looking north from the Ridge of Formon. The photograph was taken in January 1985.

6. View of Parc Macaya looking south from the Ridge of Formon. The photograph was taken in January 1985.

7. A. View of the extensive area of burned habitat on the southwest shoulder of Pic Macaya (see photograph 5). The photograph was made in November 1985.

   B. View of the central core of Parc Macaya taken from a small airplane in 1977. The area of the burn was forested in 1977 (note differences in vegetative cover by comparing with photographs 5 and 7A).

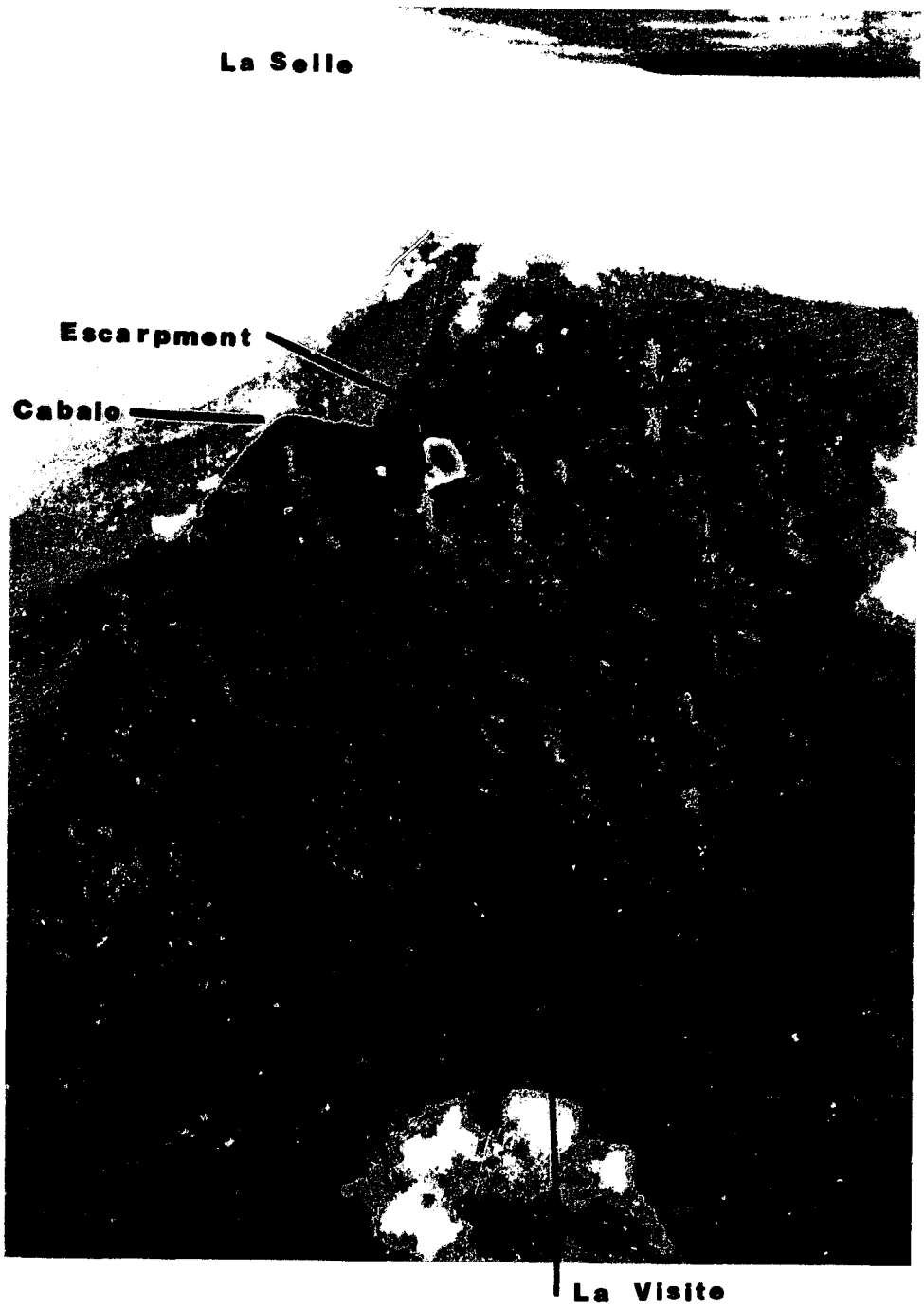
8. A. View of the central core of Parc Macaya taken from a small airplane in 1977. The trail to Pic Macaya passes along the crest of the ridge connecting Pic Formon with Pic Macaya. The extensive erosion of the soil in the upper ravine is visible in the center of

the photograph.

B. Photograph of the White-winged Warbler, Xenoligea montana. This species still occurs in "Rak Bwa" habitats in Parc Macaya, but is the rarest species of bird in Haiti.

9. A. View of the "ridge of Formon" from a hill in "Bwa Formon" along the trail approaching "Portal Formon". Pic Le Ciel in the center with clouds rising out of the Grande Ravine beyond. The photograph was taken in 1984.

B. View of the same area from Portal Formon showing the extensive deforestation in this region of the park.

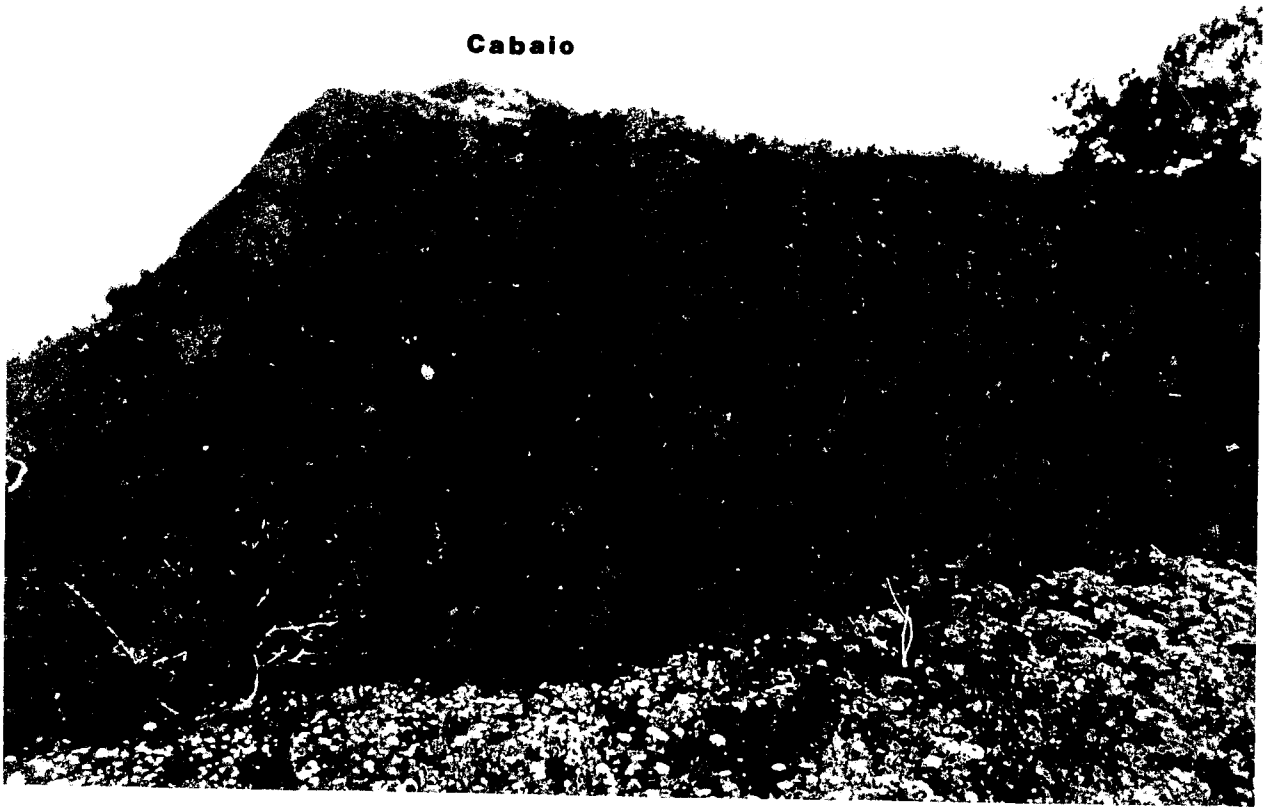


1983

Parc La Visite

A

Cabaio



La Visite

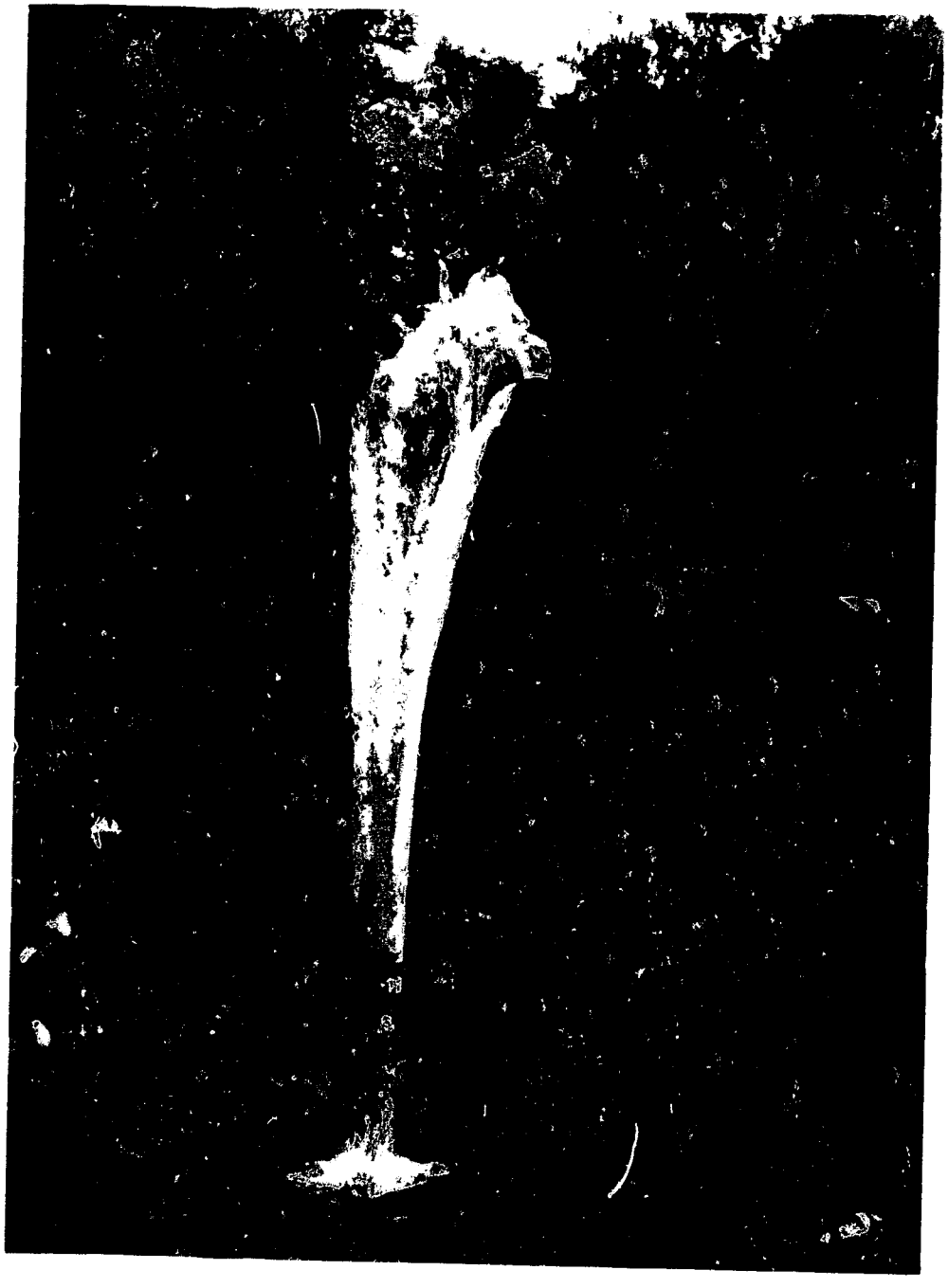
B

A

1977

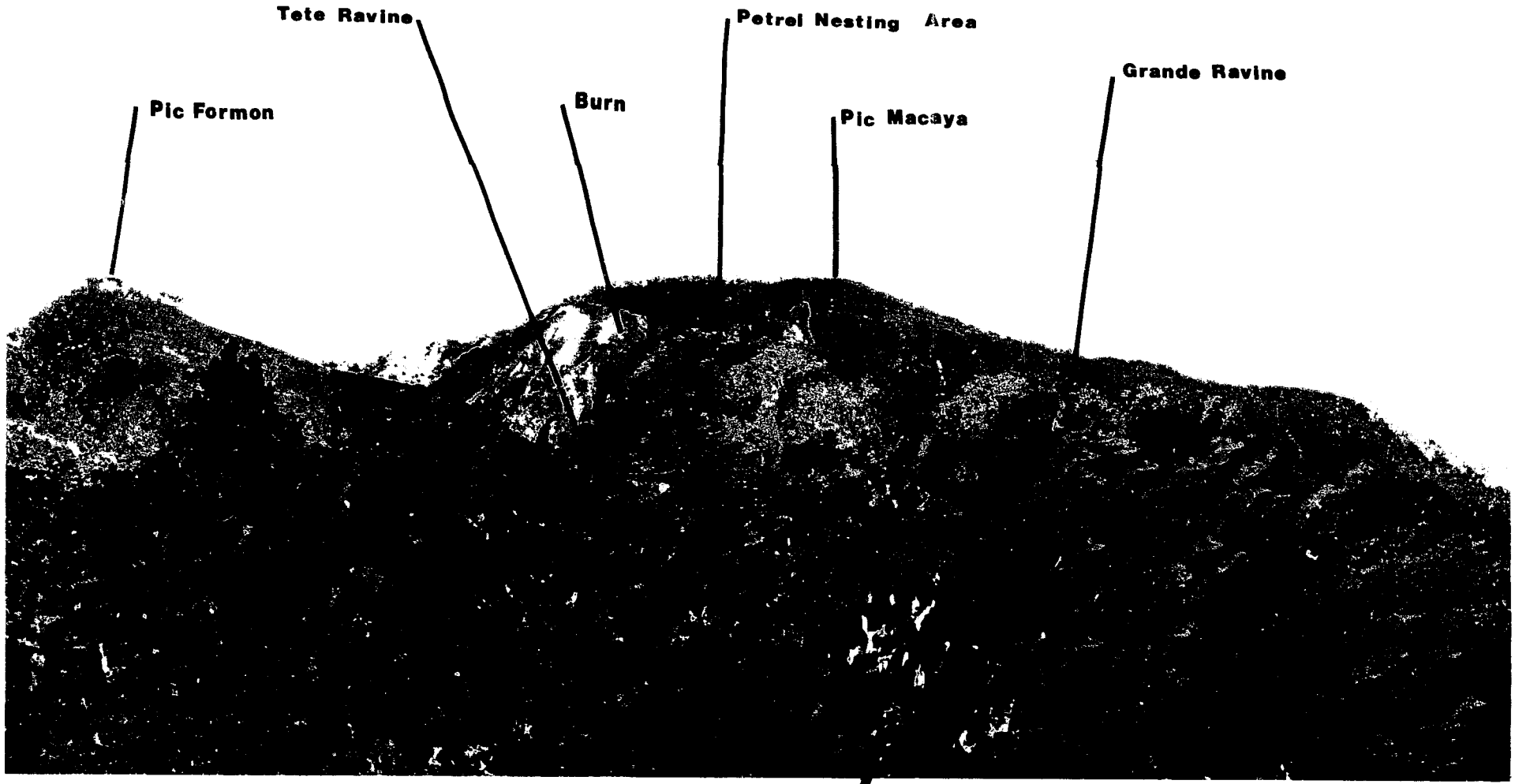
B

1985



GRANDE CASCADE

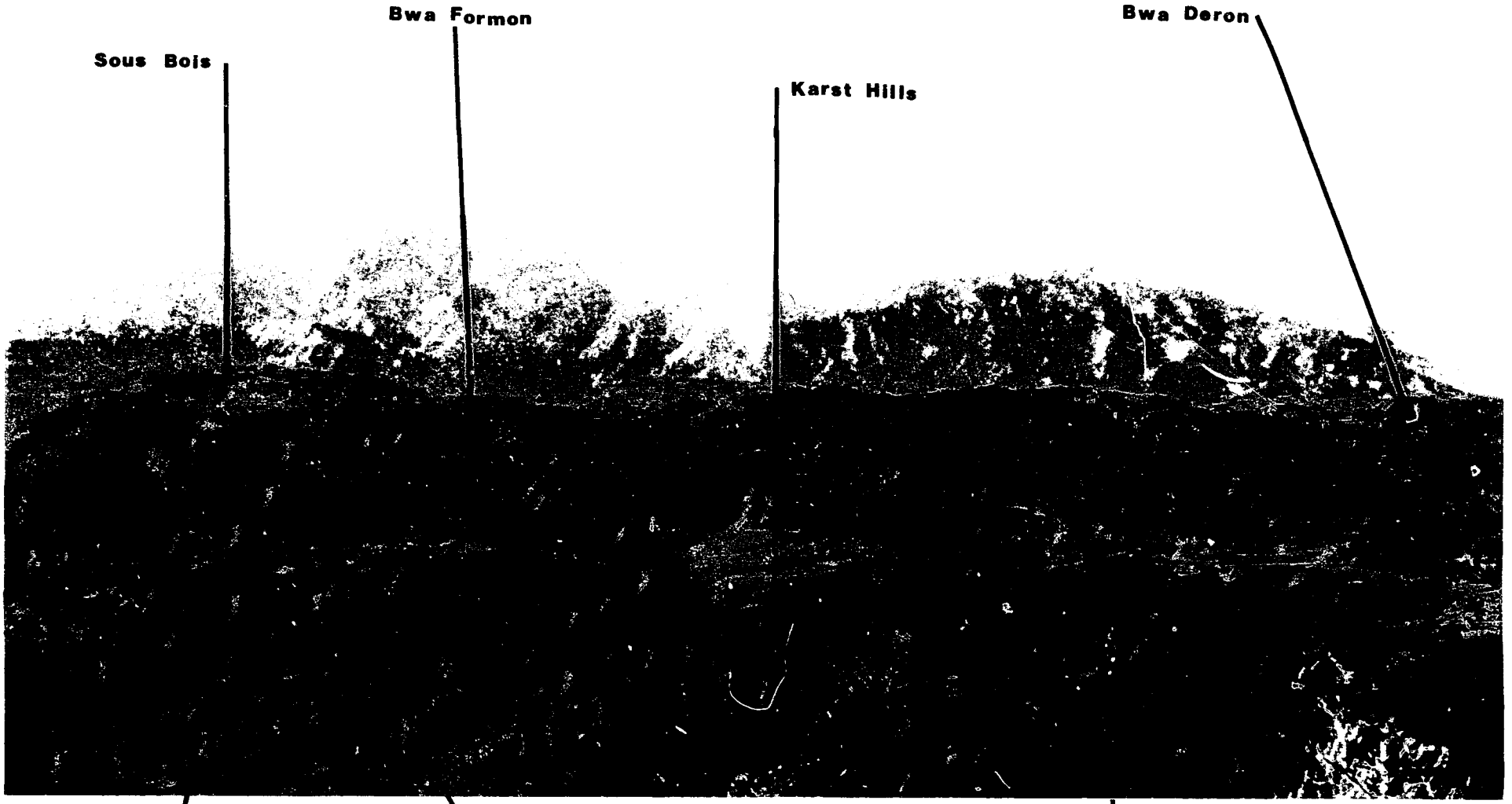
PARC MACAYA

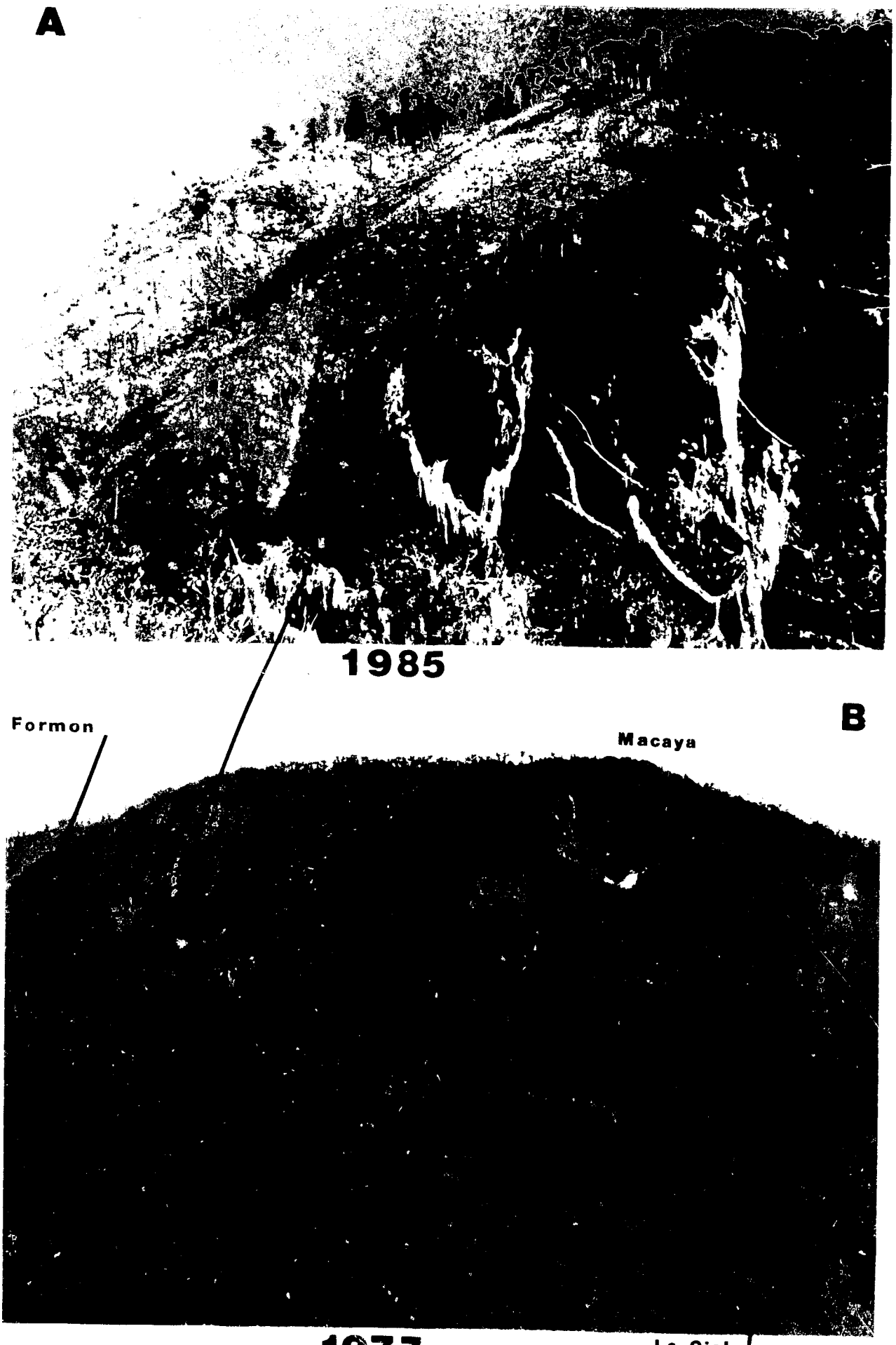


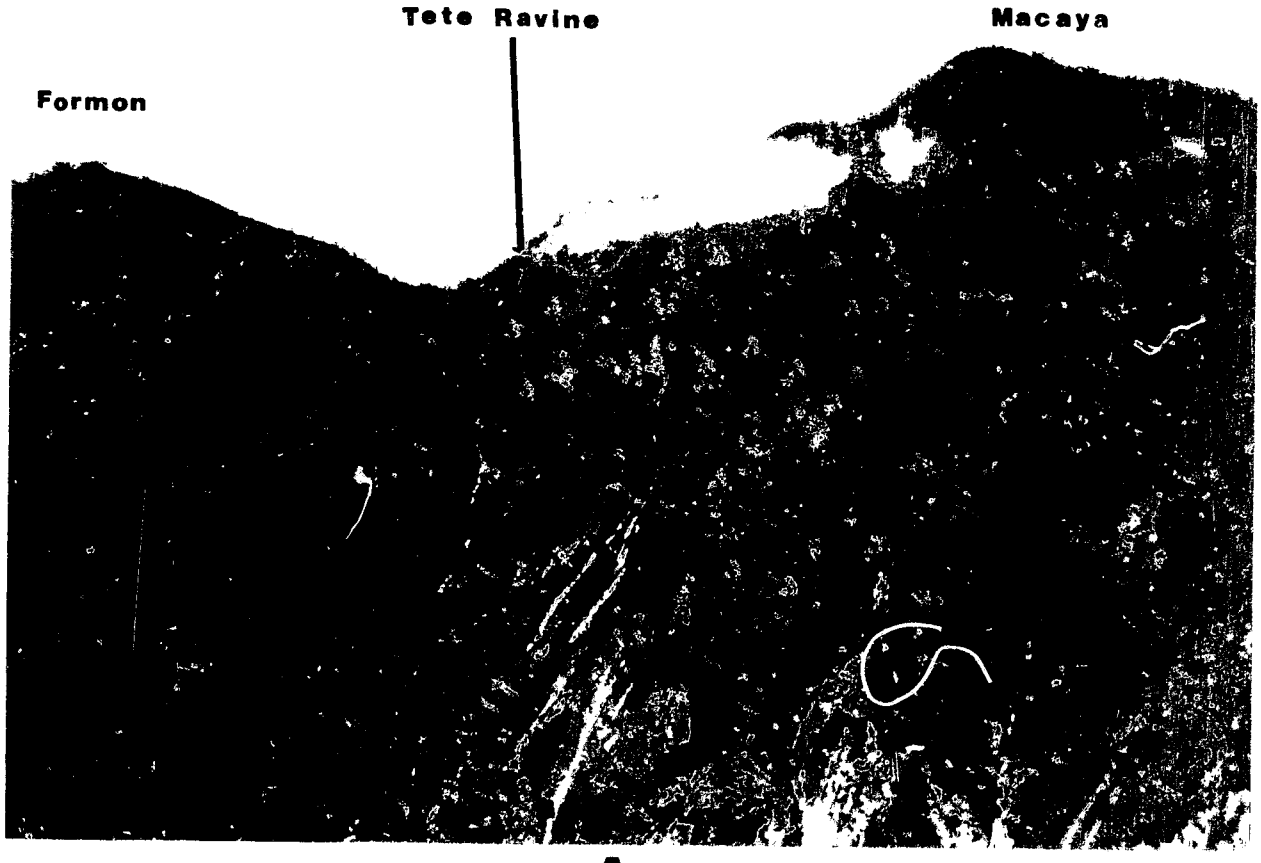
View From Pic Le Ciel Campground

1985

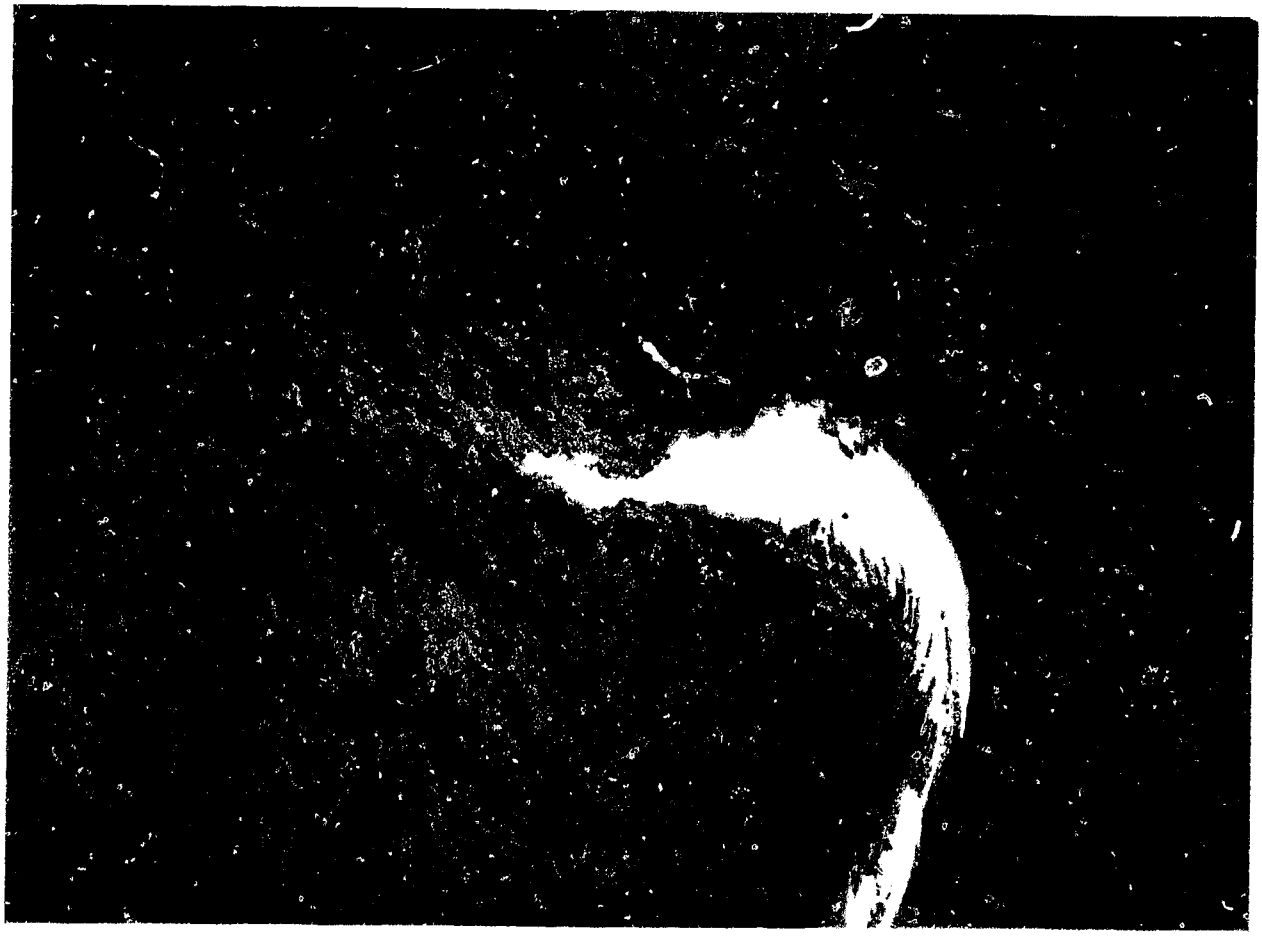
PARC MACAYA


Sous Bois
Bwa Formon
Karst Hills
Bwa Deron
Portal Formon
Plain Formon
1985
Plain Deron


A
1985
B
Formon
Macaya
1977
Le Ciel



A

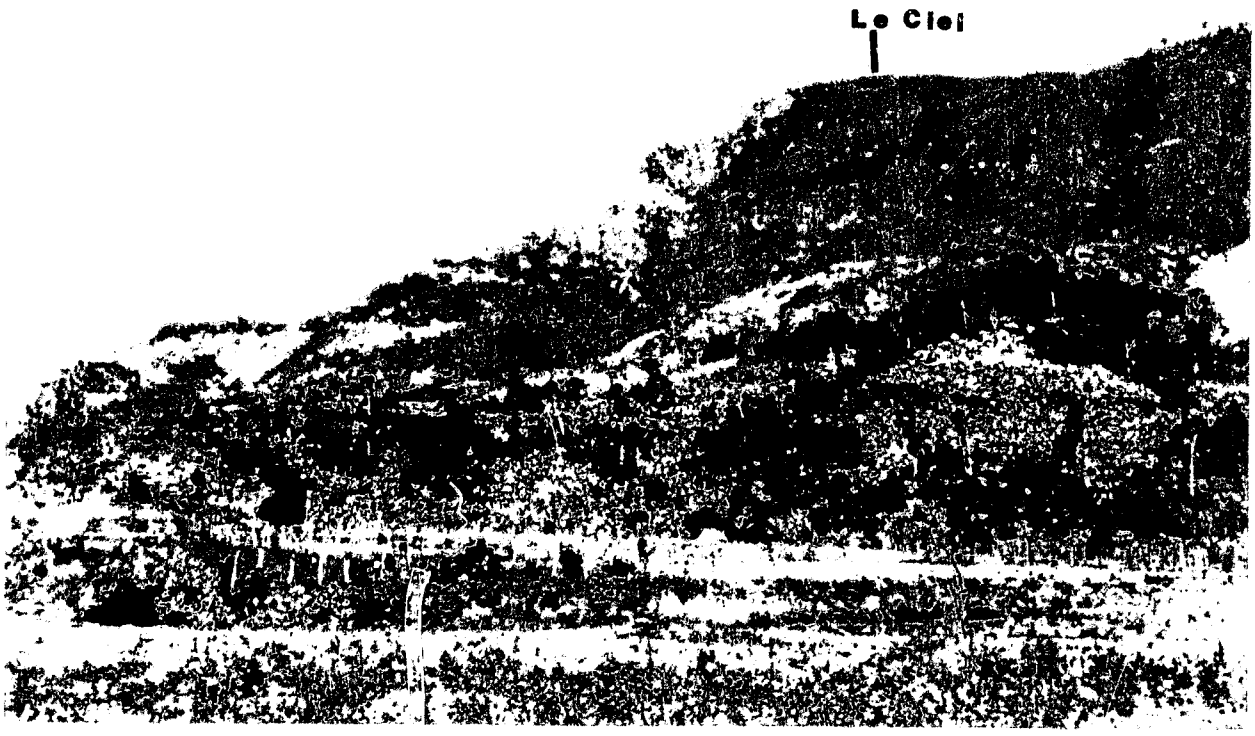


B

A

Bwa Formon

B



Portal Formon