

INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE AND NATURAL RESOURCES
(I.U.C.N.)

✓
NATURE CONSERVATION SURVEY OF
THE REPUBLIC OF GUYANA

By: ✓
Consultant Arne Dalfelt
Tropical Agricultural Research and
Training Center
Turrialba, Costa Rica
1978

INDEX

	Pages
I INTRODUCTION.....	1
II OBJECTIVES.....	2
III METHODOLOGY.....	2
IV ROUTES FOLLOWED AND AREAS VISITED.....	4
V GROUPS AND PERSONS VISITED OR INTERVIEWED.....	5
VI BACKGROUND.....	6
a) Biogeographic provinces.....	7
b) Flora and Fauna.....	8
c) Nature Conservation in Guyana.....	14
VII THE RESOURCE.....	17
1) Mangroves.....	17
2) Coastal beaches.....	18
3) Wet Savannahs.....	18
4) Dry Savannahs.....	20
5) White sand forest.....	21
6) Swamp forest.....	22
7) Lowland rain forest.....	22
8) Highland rain forest.....	23
9) Mountain ecosystems.....	24
- Endangered or rare animals.....	25
a) Sea turtles.....	26
b) Manatees.....	27
c) Giant otter.....	28
d) Hoatzin.....	28
e) Arapaima.....	29
VIII OTHER ASPECTS.....	32
a) Environmental impact analysis.....	32
b) Environmental education.....	32
c) Technical training.....	33
d) Research.....	34
e) Organization.....	34
f) Legislation.....	36
IX WILDLAND MANAGEMENT OBJECTIVES.....	36
- Categories of Management.....	37
a) Biological reserves.....	38
b) Resource reserves.....	40
c) National parks.....	41
d) Natural monuments.....	43
e) Multiple Use Reserves.....	45
f) Wildlife refuges or sanctuaries.....	47
X SUMMARY OF PRIORITIES FOR ACTION.....	49
1) First priority actions.....	49
a) Administrative.....	49
b) Area management.....	50
2) Second priority actions.....	52
a) Administration.....	52
b) Area management.....	53
3) Third priority actions.....	54
a) Administrative.....	54
b) Area management.....	54
4) Fourth priority actions.....	55

BACKGROUND AND OBJECTIVES

I INTRODUCTION

This consultancy which formed part of an effort to establish a network of managed wildland units in the country was requested by the Hon. Minister of Information in the Republic of Guyana and directed to the Caribbean Conservation Association (CCA).

The CCA was at an early stage in contact with the consultant from the Tropical Center for Agricultural Research and Training, (CATIE), in Costa Rica about the possibility of carrying out this survey as part of a general conservation survey that the consultant was carrying out for the International Union for the Conservation of Nature and Natural Resources (IUCN) in the Middle American region at that time.

After a general agreement was reached between the CCA and the consultant to carry out the survey, IUCN was requested to take charge of the consultancy, and this was agreed to.

Meanwhile in Guyana, the responsibility for the survey was transferred from the Ministry of Information to the Ministry of Agriculture. From there the practical arrangements and organization of the survey was delegated to the National Science Research Council through its MAB (Man and Biosphere Committee), and Professor Jerry Niles from the University of Guyana was nominated as project counterpart.

Due to time and financial restraints only two weeks were allocated to this first surveying effort.

The survey was carried out between the 1st and the 14th of May 1978 and the write up was finalized in late June 1978.

II OBJECTIVES

The objectives for this survey were the following:

- 1) To identify areas that could form a base for a national network of conservation units, with special attention to critical habitats and unique or rare ecosystems.
- 2) To identify priorities for action to be undertaken in relation to the areas identified to be based on national priorities, threats to ecosystems, socio-economic factors, enforcement possibilities, and other considerations.
- 3) To suggest an approach towards the establishment and implementation of this network of conservation units, types of management, etc., taking into consideration the local administrative structure.

III METHODOLOGY

Due to the short time available for this survey, a methodology was sought that would give maximum general knowledge of the conservation situation and the status of wildlands and wildlife in the country within the possibility set by the time. Such methodology first called for a perusal of available information - some of it carried out before arriving in Guyana - a series of intensive interviews and meetings during the first days with groups or individuals that had demonstrated a knowledge of the country and the themes involved or who were responsible for related projects or activities. Thereafter a few overflights of key

areas in the country were made, followed by ground field trips to get a general appreciation for the country, its vegetation and landscape types, and in a few cases, a ground inspection over actual and potential project sites.

The result of this first phase survey is therefore mainly based on published information manuscripts and oral knowledge, gathered from interested and cooperative groups or individuals in Guyana. It should not be considered the result of direct field research, except for a few cases.

The country was stratified into major biome types using available vegetation maps and literature to ensure a relatively adequate coverage of these biomes in a national parks system. Furthermore rare or endangered species populations were considered, seeking to the extent possible to ensure their inclusion in the network.

Finally, the most spectacular scenic resources of the country were considered for inclusion in the network along with some conveniently located potential sites for environmental education.

In the priority listing, the endangered species or habitats were given the highest priority for immediate protective action, especially where their existence were threatened by major works or projects.

Another priority consideration parameter was the appraisal of "successful enforcement potential" for the proposals made and their intrinsic educational value.

IV ROUTES FOLLOWED AND AREAS VISITED

1.

Flight to Bartica. Car to Kwapau on the Mazaruni highway.

Boat from mouth of Cuyuni river to Marshall Falls. Car from Kwapau to Marshall Falls.

Car from Kwapau to Peters Mine on the Potaro river, then back to Rockstone and east to junction 7 miles west of Linden. Then South on the new road to the Great Falls forestry project site on the Demerara river. Then back over Linden to Georgetown.

2.

Boat to Santa Mission and nearby savannahs and swamp forest on river, accross the Demerara river from the Timehri International Airport.

3.

Car to roadcrossing on Abary river on highway to New Amsterdam. Then with boat up river for 50 miles beyond irrigation dam project.

4.

Overflight with Cessna from Georgetown to Kamarang on the upper Mazaruni, then on to Ibaimadai, then on to Kaieteur National Park and back to Georgetown.

5.

Overflight to Lethem and review of the Kanuku montains and the Paracaima escarpment.

V GROUPS AND PERSONS VISITED OR INTERVIEWED

Minister of Information and Sports.

Miss Shirley Field-Ridley

Permanent Secretary, Ministry of Information and Sports

Miss G. Parris

Permanent Secretary, Ministry of Agriculture

Mr. Maurice King

Permanent Secretary, Ministry of Energy and Natural Resources

Mr. Cumberbatch

Permanent Secretary, Ministry of Economic Development and Cooperatives

Regional Minister, Mazaruni, Potaro District

Mr. Carmichael

National Science Research Council, MAB Committee:

Dr. Patrick A. Munroe, Secretary General

Dr. M.A. Phang, Deputy Commissioner, Surveys

Prof. Jerry Niles, University of Guyana

Mr. C.C. Cumberbach, Princ. Assit. Sec. Min. of Agric.

Mr. Oscar Pollard, Assist. Manager Mazaruni Hudropower project

Dr. Leslie Potter, Head, Geography Dept. Univ. of Guyana

Dr. Rawana, Ministry of Health

Miss. Sybil Patterson, Dept. of Sociology

Mr. Adrian Thompson

Mr. Ivan Welch, Forester, Forestry Department

Mr. David Persram Deputy Forest Conservator

Mr. Mohamad Hanif

Mrs. Lucille Campbell, Geographer

Mr. Roheit N.S.R.C.

VI BACKGROUND

The Republic of Guyana is situated on the North Coast of South America between the Amazon and the Orinoco rivers and covers approx. 83,000 sq. mi. It has a population of about 750,000 inhabitants. Of these 90% live on the coastal plains. The agricultural economy is based on sugar cane and rice as chief crops. Coffee, coconuts, cacao and timber are also important.

Guyana is one of the worlds principal producers of bauxite. Gold and diamonds are mined.

The climate is typical tropical, hot and humid with an average temperature ranging between 74°-83° F. in the lowlands). It is cooler with elevation in the Southern highlands.

The vegetation of Guyana is varied and includes extensive mangrove swamps, herbaceous swamps, seasonal forests, various types of rain forests, semi-arid and wet savannahs and others.

The coastal belt East of the Essequibo river is mostly reclaimed swampland made productive through a system of extensive dams and dikes.

South of these areas towards to the Northeast, extensive wet savannahs and swamps are found. In the Northwest the country is dominated by extensive swamp forests, wetlands and undulating low hills.

South of this are found dense swamp and rain forest areas on laterite.

However, in the Eastern portion, there is a broad belt of white and brown sand in between. Towards Venezuela the land rises with spectacular flat top sand-stone mountains and jungle clad escarpments.

To the Southwest the rain forest give place to extensive dry savannahs.

To the Southeast uninhabited primary rain forest stretch for hundreds of miles towards Brazil.

Geologically the area is known as the Guyana Shield with an extremely old base, at places protruding in rugged hills and peaks but mostly covered with a strata of younger rocks. Extensive areas of sand and laterite are found in the interior while deep clay is found in the coastal belt. Most of the interior soils are very leached and improverished and sustain fragile forests cover or coarse grass savannahs. The continental shelf is shallow and the beaches and coastal waters are muddy.

a) Biogeographic provinces

According to the Udvardy's biogeographic system, Guyana lies within the Guyanan and the Campos Limpos biogeographical provinces and borders with the Amazonian biogeographical province in the south.

According to Cabrera and Willink (1973) Guyana lies within the Amazonian and the Guyanan Provinces.

However, Udvardy's Guyanan biogeographical province falls within the Amazonian biogeographical province of Cabrera and Willinks system, and the Campos Limpos province of Udvardy more or less corresponds to the Guyana biogeographical province of Cabrera and Willink.

In view of IUCN's acceptance of Udvardy's biogeographical system, this nomenclature will be used below.

b) Flora and Fauna

1) Guyana biogeographic province

FLORA: The vegetation is generally characteristic of what is expected from tropical rain forests: a large mixture of species per unit of surface when drainage is appropriate. Occasionally the **stands** may be dominated by one or a few species, particularly when there are specially prevailing soil conditions (impeded drainage, flooding and other). Annual rainfall is between 2000 and 3000 mm. depending upon the site.

The topography is undulating with a dense network of rivers marshes and ponds. Altitude is close to sea level and rivers commonly extend over their borders during the wet season and flood extensive forest areas.

The tree heights are between 30 and 50 meters and the **trunks** are commonly buttressed. Palms, lianas, and epiphytes are common.

The coastal mangrove areas are characterized by Rhizophora mangle, Avicennia marina and Laguncularia recemosa.

The wet savannahs to the northeast are characterized by Grasses and Cyperaceas.

The white sand belt is characterized by the fairly homogenous Wallaba (Eperua falcata) forest. (Also called xeromorphic rain forest). The undergrowth consist partly of young canopy trees and partly of species peculiar to the Wallaba forest. Palms are occasional to frequent. The Wallaba forest have been subject to intensive logging over the years.

The brown sand areas and well drained areas bordering on the white sand are characterized by the Greenhart forest, (Ocotea rodioi) mixed forest and the Morabukea forest with shrubs, lianas and epiphytes common.

In the more swampy areas with clay loam and alluvial silt Mora forests (Dimorphandra mora) are found with a shrub layer dominated by palms and ferns.

The central western, central and south eastern rain forest areas have a flora and fauna typical of the Amazonian region.

FAUNA: According to Poonai (1973) the following fauna species are rare or threatened in Guyana: Giant anteater, Giant armadillo, bush dog (Speothus venaticus), Giant otter, Manatee, Orinoco river turtle (Podocnemis expanse) Black caiman (Melanosuchus niger), Agami heron (Agamia agami), Capped heron (Phalacrocorax pileatus) and the Orinoco goose (Neochern jubata).

The following animal species are under pressure; if unchecked it could lead to their status in the category of threatened: Howler monkey, Puma, Little otter (Lutra enudris) Ocelot, jaguar, bearded river turtle (Podocnemis unifilis), Cayenne river turtle (Podocnemis cayennensis) spectacled caiman (Caiman crocodylus), Boa constrictor, Anaconda, Maguari stork (Euxenura maguari), Jabiru and buff-necked ibis (Cercibis oxycerca).

The yellow-crowned night heron (Nyctanassa violacea), the whispering ibis (Phimosus infuscatus) the limpkin (Aramus guarana) and the hoatzin (Opisthocomus hoazin) now only exist in very reduced and local populations.

According to Poonai (1973) the scarlet ibis (Eudocimus ruber), comb duck (Sarkidiornis melanotos), Muscovy duck (Cairina moschata), crested eagle (Morphnus guianensis), harpy eagle (Harpia harpyja) and ornate hawk eagle (Spizaetus ornatus), after being on the

marginal list for a long time, have recovered reasonably well, and vultures are also seen in larger numbers than previously. Whistling ducks, parrots and greater cow birds have increased, and large flocks do some damage to crops. Jaguars are killed in cattle rearing areas whenever encountered, and reports of attacks on cattle are fairly frequent.

Hawks, owls and the larger macaws have never been very numerous, but they are widely distributed. Owls have adjusted well to man's presence. The larger hawks are not often seen but are by no means in danger, while the Everglade kite (Roethramus sociabilis), threatened elsewhere, is common. Recently flocks of up to a hundred blue and yellow macaws (Ara ararauna) have been seen.

The four species of marine turtles breeding on the Guyana shores-green, leathery, hawksbill and Pacific ridley - are still heavily hunted, both eggs and adults being taken in large numbers, with adverse effects on world populations. In addition many nesting beaches are being eroded by the sea, thus reducing the breeding areas, and others are becoming more accessible to exploiters.

Migrant waders from the north, visiting the shores and swamps of Guyana each year on their way to their wintering grounds in the Chaco and Pampas, are heavily hunted; large numbers are netted or killed with guns and primitive devices, and the annual flocks greatly reduced. At least one species, the Eskimo curlew (Numenius borealis), has been exterminated. The American flamingo (Phoenicopterus ruber) no longer nests on the Guyana shores, but visits occasionally.

2) The Campos Limpos province extends into the westernmost central and southern parts of Guyana on the **plateaus** of the Guyana shield.

The region is characterized by isolated flat-top mountains of Pre-Cambrian origin, **rising** abruptly from the plateau to often more than 2000 m. In the southwestern part of the country, the plateaus **are** covered by extensive savannahs, only broken by gallery forests along the rivers.

Because of their old age and isolation, the biogeographic province is floristically very rich with more than 8000 registered vascular plants of which over half are endemic.

According to Hershovitz (1969), the fauna is more similar to the surrounding area and few endemics have been recorded. (One notable exception however, is the Podoxomys roraimas, an endemic found at 2600 meters altitude.

Among the more spectacular fauna found in this area and the savannahs are the cock of the rocks (Rupicola rupicola), the Harpy eagle, the Arapaima (Osteoglossidae), the electric eel and others.

Stratification of biomes and species

For the purpose of this study the following very general stratification of ecological zones has been used, leaving the finer details to future and more in-depth ecological analysis.

1. Mangroves
2. Coastal beaches
3. Wet savannahs (coastal)
4. Dry savannahs (Campos limpos)
5. White sands (Wallaba forests) forests
6. Swamp forests and wetlands
7. Black rivers
8. Rain forest, lowland
9. Medium and highland rain forest (Pacaraima forest)
10. Mountain ecosystems (Roraima formations)

The following animal species are specially considered by this study because of significant human pressures on their populations:

- a) Sea turtles (4 species)
- b) Manatee
- c) Hoatzin
- d) **Giant otter**
- e) Arapaima

c) Nature conservation in Guyana

A programme for nature conservation in Guyana has to be built in a different way than for example in the Central American countries if it is to be meaningful for the local public.

In fact, close to 90% of the Guyanese territory is in a state of natural wilderness, all of it Government owned.

A limited part of this wilderness has been high graded for a few species of valuable timbers. Extensive forestry has mostly concentrated on the relatively homogeneous wallaba forests in the white sand belt, where regeneration is represented by a poor shrub vegetation. However there are vast areas of virgin or primary rain forest areas, swamp forests and savannahs further inland. Some of the most interesting national park sites are located in the sandstone formations area of the interior west or the deep south, but these are still inaccessible and at this stage, have basically none or insignificant uses.

A proposal for a network of parks or reserves will therefore necessarily be rather an effort to indicate where some of the potential areas are, since it cannot be expected yet that the Government of Guyana will open access to most of these areas, neither would it be wise to do so in most cases.

In spite of the generally well protected (by nature) wildland resources in the country there are some areas which are accessible,

severely threatened and of very high value for conservation and protection. Because of this combination of factors, such areas should naturally receive the highest priorities for action following the general IUCN criteria for conservation priorities.

Further, in reviewing the following chapters on priorities for action, it must be born in mind that the general economic situation in the country has been considered. Basically the economic situation in the country was very weak in 1978 and will probably continue so for a few years more.

The technical capacity is represented by a small number of professional people in the country which are very conscientious and interested in conservation. Most of them are professionals from various disciplines, often not related to natural resources but still with a good knowledge of conservation philosophy.

Conservation in an administrative, organizational and official context is treated in a very unscientific and unplanned way. There is no national parks law or ordinance nor is there any general wildlife law.

There exists a wild birds protection ordinance and a fisheries ordinance. The last is including protective measures for the manatee.

There is also a special ordinance protecting the Kaieteur National Park, the only national park in the country.

Organizationally the picture is rather confusing. The Ministry of Agriculture is in charge of wildlife. There exists a

fairly recently created Wildlife Committee -with 7 members appointed by the Ministry of Agriculture- plus 5 from the Wildlife Exporters Association.

Professor Niles from the University of Guyana is presently chairman of the committee.

Their task is to control the export of wildlife products and hunting including the establishment of hunting seasons and bag limits.

The Ministry of Agriculture has one official in charge of conservation of wildlife. He is also a member of the Wildlife Committee.

The Ministry of Public Works has a Parks Commission, but so far this has only incorporated recreational parks, city parks, and other **urban areas within** its area of activities.

Forestry is under the Ministry of Energy and Natural Resources. In spite of the Forestry Department having people interested in conservation and wildlife, these two aspects are entirely outside the area of responsibility of this department.

The Ministry of Education has a National History and Arts Council with a National Trust Committee, that has demonstrated interest in conserving samples of the natural heritage of the country, in the form of national parks, wildlife reserves, etc. Because of unclear responsibilities this has to date however only amounted to a few written reports and no field activities.

The Ministry of Economic Development and Cooperatives houses the National Science Research Council, under which the MAB Committee belongs. Presently this is the organization taking the most active part in natural area conservation.

VII THE RESOURCE

1) Mangroves: Significant mangrove areas are now only found on the northwestern coastline of the country, west of the mouth of the Essequibo river. It is being encroached upon mainly on the Eastern part where it borders with urban areas and farms.

These mangroves plays an important role for the general ecological health of the coast.

Apart from securing the habitat, areas of feeding and reproduction of fish and shrimps etc., they also play an important role in stabilizing the beaches and serve as buffers to prevent excessive erosion carried by rivers reaching the seas.

The mangroves should receive adequate scientific and technical management that will secure its continued function. Part of the area should be fully protected for its important role as nursery and spawning grounds for fishery resources. A detailed coastal survey is needed to determine areas for full protection and areas where certain forms of management may take place.

With reference to the fully protected area or sample of mangroves this should if possible be combined with the proposed beach reserve and the sea turtle wildlife reserve to form one large single conservation unit.

2) Coastal beaches: The only significant undisturbed coastal beach ecosystems in the country are found on the Northwestern coast of the country. The beaches are muddy and practically useless for recreation and tourism. However they are important biologically and ecologically because of their rich invertebrate fauna, sea turtles and other animals that use these beaches, including a rich avifauna. A sizeable stretch of the beach should be protected with special emphasis on the nesting population of sea turtles that regularly visit these beaches on their migratory runs.

The coastal beach reserve should if possible include -or at least be located adjacent to- the proposed mangrove reserve and together form the conservation unit that also protects the sea turtle nesting areas. A possible site for such a comprehensive conservation unit appears to be the well known Shell Beach.

3) Wet savannahs: The wet and semi wet savannahs are found in the Northeastern portion of the country (see map).

Some of these savannahs in West Berbice and East Demerara Districts are now threatened by extensive agricultural and irrigation projects.

These savannahs are cut by winding slow flowing river systems, gallery forests and forest patches that forms the habitat of many interesting species including manatees, hoatzins, giant otters, giant armadillos, caimans and a large number of bird species.

It is likely that more and more of these savannahs are going to be developed for different kinds of utilization projects, thus reducing significantly this habitat. Already, a large scale ~~dam~~ project connecting the Abary river, the Mahaicony river and the Mahaica river is well underway and with the possibility of significant impacts on the fauna and flora of these lower river systems, including the possibility of increased salinization due to tidal effects.

High priority should therefore be given to the prompt establishment of a sizeable reserve to provide protected habitat for several of these species.

It appears that the most feasible site for such savannah and river wildlife sanctuary would be in the Ikuruwa river basin.

However, further studies are needed to determine if this area has adequate habitat for all the species mentioned.

A sample of the semi-wet savannahs ecosystem together with its fauna, should also be selected for protection because of the special scientific interest. It appears that a representative sample of such could be found in the area North and East of the Ituni river. This reserve does not need as urgent an action as the first reserve in the Ikuruwa river basin.

It may also be necessary to protect some of the upper parts of the Abary, Mahaicony and Mahaica rivers with tributaries to ensure the protection of sufficient habitat, together with hunting control in the lower parts.

4) Dry savannahs: The dry savannahs of the interior are being extensively used by cattle ranchers.

Extensive areas of this biome are inundated every year leaving behind shallow lakes for a long time; these constitute excellent wildlife habitats. Some of these shallow lakes keep water all year round.

Good samples of the dry savannah ecosystems can probably be found in conjunction with some of these lakes and any protected areas should attempt to incorporate the ecological gradient between the two.

A savannah biological reserve in this area (Rupununi) should also seek to include sections of the Rupununi and Rewa rivers to protect an adequate stock of Arapaimas, electric eels, river turtles, otters, caymans and monkeys.

Three areas may be looked into as possible sites for a combined savannah ecosystem and wildlife reserve.

1. Karanambo lake and adjacent sections of Rupununi River.
2. Orinduik Falls and surrounding savannahs (national park)
3. Rewa (Illiwa) River.

In a survey of the dry savannahs, the area south of the Kanuku Mountains should not be forgotten either. Considering the use that these savannahs are presently receiving a detailed survey of potential sites for conservation for biological and ecological reasons is of medium to high priority.

5) White sand forest: Although the white sand area covers extensive regions in the country the original ecosystems on these sands are getting rarer every day.

The most common natural forest on white sand is the relatively homogenous wallaba forest that are suitable for economic exploitation. The white sand area is also relatively accessible to the major cities in the country and has therefore been fairly systematically exploited for its timber. Regeneration however is extremely difficult on these soils leaving only a bush vegetation for years afterwards.

Samples of this forest ecosystem may perhaps best be preserved under a biosphere reserve concept in connection with regular forest reserve development projects, allowing for regeneration research to be carried out in buffer zones adjacent to the protected nucleous zones. Due to the general accessibility of these areas, educational facilities could also be attached.

Two areas look promising from this point of view.

One is the triangle formed by the Mazaruni Road, the Mazaruni River up to above Marshall Falls and over to the Kwapau roadconstruction headquarter on the Mazaruni Road.

The ecosystem here is fairly intact and the area also includes brown sand forest, riverine ecosystems and river island ecosystems. The other area could be a series of smaller protected areas within or nearby the Great Falls Forestry Project on the Upper Demerara river, including the island network on the Essequibo river, the Mabura Hill, the Iron Hill and marsh areas to the South (Kurupukari). One should not forget to include samples of the typical average forest in this area. These reserves should receive high priority for implementation for economic, political and feasibility reasons.

6) Swamp forest: The extensive swamp forest area in the north west of the country should be surveyed to determine a suitable site for a representative sample of this forest ecosystem. Action is however less urgent. A possible site has been identified by Poonai (1973) at Biara-Barra Barra.

7) Lowland rain forests: This forest ecosystem in general terms covers more than half of the country and include vast areas that have never been touched by man to any significant degree. Ultimately this forest should have several protected representative conservation units covering the full diversity that exist within this biome from North to South in the country.

Even if present priority for such a network may be low, because of the extension of virgin forests and even if it may appear premature to some decision makers and scientists in the country, it would be wise to begin surveying this ecosystem with the long term view of establishing a network of representative wildland units with different intensities of management. For conservation purposes it seems that such survey should initiate on the Upper Barama river in the North West District (site identified by Poonai (1973)) and it should also look into the need for anthropological reserves and resource reserves in the South and South East Rupununi District.

Even if such reserves would only be "on paper" for a long time, they would however avoid future losses of time and resources and if well integrated in the national development plan may prove to be extremely useful for all kinds of purposes (scientific, educational, tourism, protection, etc.).

8) Highland rain forest: This rain forest is mainly found on the Pacaraima plateau in Central Western Guyana. This region is very scenic with sharply rising mountains of different shapes, some very spectacular. Basically two areas are proposed for immediate attention. The existing Kaieteur National Park should be increased in size to incorporate an adequately sized sample of the ecosystems present and be given active protection. The park should at least go as far

down the Potaro river (to the Northeast) as to the Uewany river and include areas well beyond the escarpment on both sides of the valley below the Kaieteur Fall. The border should also be extended for some distance up the river (to the Southwest of the present park boundary).

The other area that should immediately be declared as a national park because of threatening settlement schemes and because of its natural beauty, is the area surrounding Kumarow Falls and the Macreba Falls on the Kurupung river including a stretch that separated both.

9) Mountain ecosystems: These mountain ecosystems are found scattered through the highland rain forest or savannah areas on the Pacaraima plateau and include the mountains of the Upper Mazaruni District in Western Guyana, the Pacaraimas in the Central West, the Kanuku Mountains and the isolated ranges in the deep south of the country. Most of these mountain ecosystems are still well protected. The following list includes the more spectacular, majestic and biologically interesting mountains that can be mentioned for the purpose of this survey, although they are not the only ones that in the future should be incorporated in the country wide wildland unit system:

- a) Mount Roraima which may best become a "tri-national" national park. It is the highest mountain in the country (9094 feet)
- b) Ayangaik, a spectacular flattop mountain that should be declared a national monument.
- c) Ayanganna Mountains which could be a future national park or multiple use forest reserve.
- d) Kanuku Mountains, that could become a national multiple use forest reserve.

Endangered or rare animals

Several species of fauna that are classified as endangered or rare by IUCN exist in Guyana.

However, in most cases these species are in general not severely threatened within Guyana because of the vast wildlands that still exist in the country with minimal disturbance.

For example, it would not make much sense to establish parks or reserves to protect the habitat of wild cats. In many of these cases, the protection at present should be towards more effective control of hunting and the prohibition to export these animals or their products.

In fact, an effort is already being done to this effect by the before mentioned wildlife committee.

Some few species however, need urgent attention in the form of establishment of protected reserves:

a) Sea turtles

The four existing species (Green, Hawksbill, Atlantic Ridley and Leatherback) use the extensive beach area on the Northwest coast for breeding (mouth of Moruca River to Waini Point). Sea turtles and their eggs have been used for food in Guyana since man came to this region. Thousands of turtles have been and are being killed every year on this extensive beach. However, increased hunting in Guyana as well as heavy exploitation all around the Caribbean, together with reduced habitat are resulting in an ever decreasing turtle population. Along the Northwest coast of Guyana in addition to sand and clay, the beach is made up of coarse to finely ground ~~fragments~~ of shells from marine mollusks, forming a ~~crust~~ of varying width along the coastline. In some areas pure shell deposits reach quite deep. Turtles use these fine shell deposits for nesting partly because they are well drained. Presently there are plans for a large scale governmental project to exploit the shell resources on this beach. The shells will be used for cement in view of Guyana's lack of limestone or other suitable material for such production. A large scale uncontrolled and unrestricted exploitation of the shell deposits on this coast will have serious detrimental effects on the turtle population that is using these beaches, in addition to increasing significantly the risk of serious beach erosion.

It is important and urgent to establish a protected turtle reserve in this area in addition to regulating the harvest of turtles within the whole country. Further, specific guidelines to reduce the negative effect of an eventual shell exploitation project must be elaborated for the Government, including measures for beach stabilization after exploitation of shell deposits.

The turtle nesting reserve should be combined with the proposed beach and mangrove biological reserves.

b) Manatees

Manatees are apparently still fairly common in some of the river systems of Guyana. Especially the rivers in the Northeastern portion of the country form an adequate habitat and contain a good population of these animals. These rivers are however in several cases subject to water management and alterations for agricultural purposes. Damming, channeling, irrigation, dredging and other operations are presently changing the habitat of several watersheds and threatening the existing population of manatees.

It is therefore important and urgent to establish reserves or sanctuaries of sufficient size where appropriate habitat still exists, to secure the survival of this specie.

Luckily, there are still several areas that may fulfil this purpose. The preliminary review indicated that the area around the Ikuruwa river basin and upper Canje river is one of the better regions for a large wildlife sanctuary.

Also the upper reaches of the Abary and Mahaicony rivers, above the present dam project, may be suitable for a sanctuary.

c) Giant otter (Pteronura brasiliensis)

This animal is found in small numbers in several areas throughout Guyana. However, they have been heavily hunted near urban areas and villages and are rare in most of the country. Presently, the Berbice river, Upper Mazaruni and the Kanukus are said to have good populations. The possibility of establishing effective controls to stop or limit the hunting of these animals in the central and upper Berbice river should be looked into, possibly by establishing some kind of river reserve.

d) Hoatzin (Opisthocomus hoazin)

This unique bird is still common in some very local areas in Northeastern Guyana. They are particularly easy to be seen in the lower Abary, Canje and Mahaicony rivers. However, river water utilization projects, uncontrolled hunting and riverine habitat destruction is seriously threatening the future of this pheasant like bird. The suggested wildlife sanctuary on the Ikuruwa and Canje river, and the upper Abary, Mahaicony will probably play a very important role for the survival of this species.

However, this should be followed up by intensive wildlife management in the lower stretches of the mentioned rivers to stop hunting and habitat destruction along the riverbanks.

e) Arapaima (Arapaima gigas)

This, Latin America's largest freshwater fish, is getting rarer all over its original range which includes most of the Amazon basin. In Guyana it is only known to be common in the Rupununi river. It is however under heavy exploitation pressure.

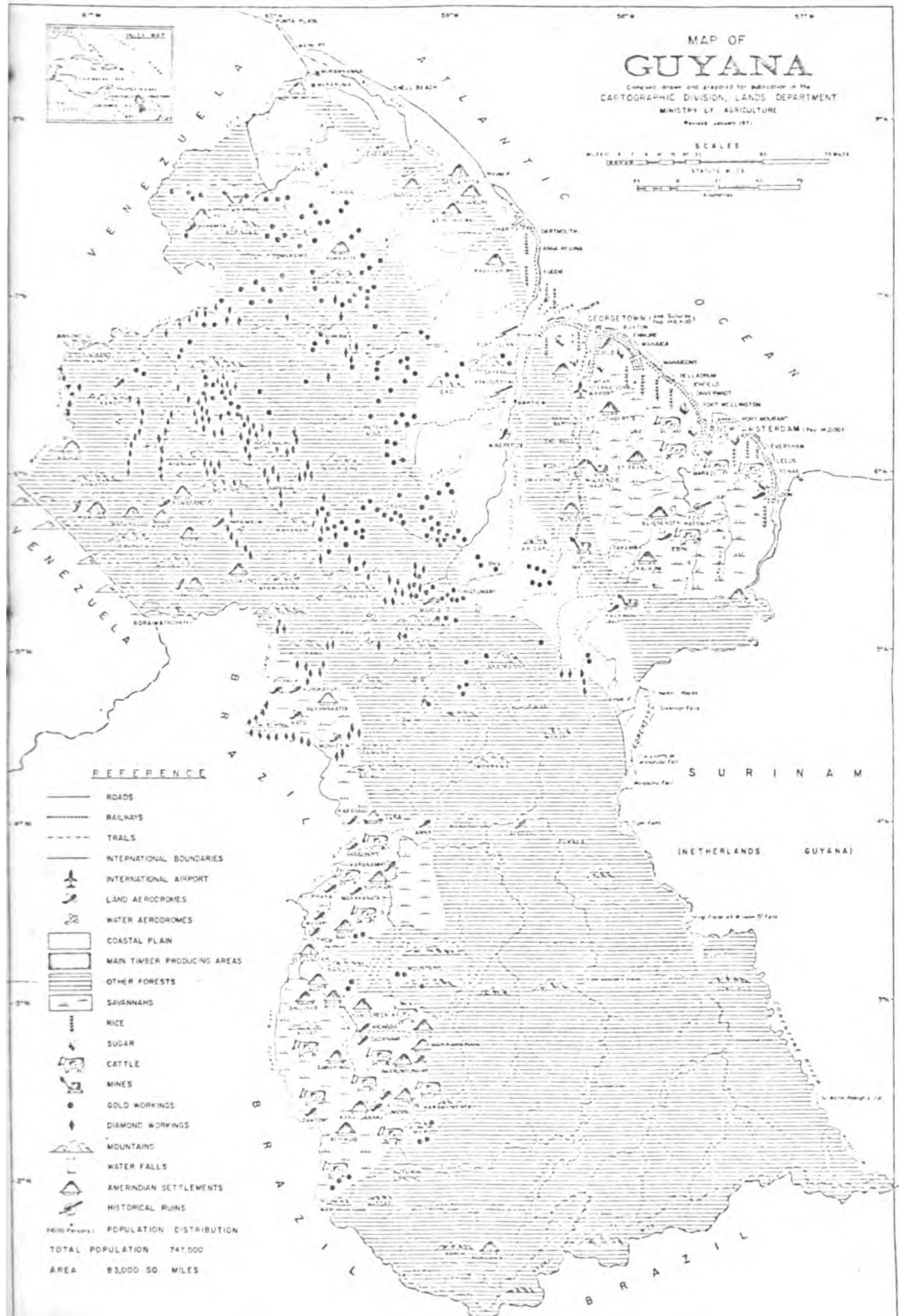
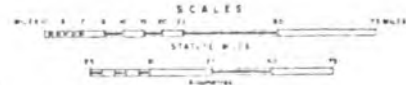
An adequate reserve for this species should be established, perhaps combining it with the proposed savanna reserve (or in the ecological gradient to the rain forest), to ensure the survival of a basic stock. Several people in Guyana believe that the Arapaima gets a yearly input of new individuals from the nearby Amazon tributaries in the flood periods, since their stock seem to recuperate every year from increasingly heavy exploitation. This needs of course further research.

As mentioned earlier, there are several more species in Guyana that are listed as threatened or endangered. However, in view of the general character of the country with respect to wildlands, conservation measures for these animals should for the time being be limited to the control of hunting pressures, as well as the sale and export of live and ~~dead~~ specimens or parts of them or the products derived.

Resource	Suitable region or area for conservation unit	Possible location of conservation unit	Proposed management category	Urgency of implementation
1. Mangroves	Waini Point to mouth of Moruka river	Shell beach	Biological Reserve	Medium
2. Coastal beaches	Waini Point to mouth of Moruka river	Shell beach	Wildlife Sanctuary Biological Reserve	High
3. Wet savannah	Area between the Ituni and Wiruni rivers. Central and upper Ikuruwa and Canje river area	Ikuruwa river area	Biological Reserve	High
4. Dry savannah	a. Orinduik area b. Middle and Upper Rupununi River area	1) Orinduik 2) To be identified (Possibly including the Karanambo swamp area)	National Park Biological Reserve	High Medium
5. White sand forest	Essequibo - Demerara Rivers area	1) Kwapau-Mazaruni triangle 2) Upper Demerara Forest Project (including Great Falls and Iron Mountains)	Biosphere Reserves (MAB-UNESCO) Biosphere Reserve	High High
6. Swamp forest	Northwest District	To be identified (Possibility: Biara Barra Barra)	Biological reserve	Low to medium
7. Lowland rainforest	a) Northwest District b) Southeast Rupununi District	1) Upper Barama river area 2) Kassikaituy & Sipu 3) To be identified	Biological reserve Resource reserve	Low to medium
8. Highland rainforest	Upper Mazaruni and Upper Potaro rivers areas	1) Kumarow Falls to Macreba 2) Kaieteur N.P. extension	National Park National Park	High Medium
9. Mountain ecosystems	a) Upper Mazaruni b) Kanuku Mts. c) Ayanganna Mts.	1) Roraima Mts. 2) Ayangaik 3) Kanuku Mts. 4) Ayanganna Mts.	National Park National Monument Multiple Use F. Res. National Park or Multiple Use F. Res.	Low to Medium Medium Low Medium Low to Medium
a. Sea turtles	Waini Point to mouth of Pomeroun river (North west coast)	Shell beach	Wildlife Sanctuary	High
b. Manatees	Berbice District	Ikuruwa River basin and Canje river	Wildlife Sanctuary	High
c. Giant otter	Berbice District Upper-Mazaruni	Berbice River, Ikuruwa basin, Canje river	Wildlife Sanctuary	High
d. Hoatzin	Berbice District	Mahaicony, Abary, Canje, Ikuruwa rivers	Wildlife Sanctuary	High
e. Arapaima	Rupununi District	Rupununi River	Wildlife Sanctuary	Medium
f. Giant Armadillo	Rupununi District	Ikuruwa and Canje river areas	Wildlife Sanctuary	High
Scenic Mountains	Rupununi District Upper Mazaruni	Mount Ataraiapu on Rewa River Ayangaik Mts.	National Monuments National Monuments	Low Low
Caves	Upper Mazaruni	Phillipai Caves	National Monument	Low
Scenic Waterfalls	Essequibo R. Rupununi Dist. Demerara River	Great Falls, Essequibo Great Falls, Demerara	National Monument National Monument	Low Low
	Upper Mazaruni, Karowiong Kamarang River	Maipuri Falls and rapids Utshi Falls and surroundings	National Monument National Monument	Low Low
	Kuribrong River East Berbice District	Amaila Falls Christmas rapids	National Monument National Monument	Low Low

MAP OF GUYANA

Compiled from the statistics for publication in the
 CARTOGRAPHIC DIVISION, LANDS DEPARTMENT
 MINISTRY OF AGRICULTURE
 Revised January 1971.



REFERENCE

- ROADS
- RAILWAYS
- - - TRAILS
- INTERNATIONAL BOUNDARIES
- ✈ INTERNATIONAL AIRPORT
- ✈ LAND AERODROMES
- ✈ WATER AERODROMES
- ▭ COASTAL PLAIN
- ▭ MAIN TIMBER PRODUCING AREAS
- ▭ OTHER FORESTS
- ▭ SAVANNAHS
- ☞ RICE
- ☞ SUGAR
- ☞ CATTLE
- ☞ MINES
- GOLD WORKINGS
- DIAMOND WORKINGS
- ⌄ MOUNTAINS
- ⌄ WATER FALLS
- ⌄ AMERINDIAN SETTLEMENTS
- ⌄ HISTORICAL RUINS
- (with numbers) POPULATION DISTRIBUTION

TOTAL POPULATION 747,000
 AREA 83,000 SQ MILES

VIII OTHER ASPECTS

a) Environmental impact analysis

At present there seems to be no laws, rules or regulations in the country demanding that environmental impact analysis and statements be made before approving major or medium sized development projects.

There are several such projects presently underway and they will undoubtedly will have serious environmental, social and economic consequences for the country since they have never been seriously analyzed or given much consideration in relation to the environment.

The Abary, Mahaica, Mahaicony water regulation project and the Mazaruni hydropower project are some examples. In a country like Guyana, with so many uninvestigated resources, such impact analysis should be included as a prerequisite for any governmental or private projects so as to avoid unnecessary irreversible or serious losses of economic or social values, both viewed in the short term and long term.

It is specifically recommended that environmental impact analysis be incorporated as a prerequisite for the approval of large and medium sized development projects as part of the Governments general development policy.

b) Environmental education

The wise, balanced and sustained utilization and conservation of the country's resources, can only be achieved if the people of Guayans are convinced that this is indeed a basic need.

Environmental education, including conservation ecology and wildland management should therefore be incorporated in the curriculum of the schools, from the earliest grades. Guyana is still in the lucky situation of having time to develop the use of their natural resources in a wise way. But considering that education of people is a slow process this calls for urgent incorporation of environmental education in the school system. The Kanuni River and the area up to the Santa Reservation on the West side of the Demerara River across from the Timehri International Airport, offer an attractive possibility for the establishment of a small environmental educational reserve and outdoor laboratory for the use of schools and university students. Specific site determination and facilities needed would be the subject to further studies.

c) Technical training

The different options available for technical training of government and other employees responsible for natural resources management in conservation and wildland management should be surveyed and evaluated. Short courses or seminars given in Guyana would probably be quite effective as a first and immediate measure, while more formal training would have to be carefully planned and evaluated referring to opportunities available both within as well as outside

the country (Scholarship programmes). The role that CCA, IUCN and CATIE could play with regard to supporting short courses and seminars in the country should be given serious consideration.

d) Research

The University in the country should be encouraged to undertake more active research into national environmental aspects, including ecological and ecosystematic research, investigations on wildlife distribution patterns etc.

e) Organization

Wildland management, wildlife and conservation are not yet adequately organized in Guyana.

Three options seems to be feasible:

- a. Create an Environmental Institute with a Coordinating Unit for Environmental Affairs under the Minister of State for the Environment in the Office of the Prime Minister. This should ultimately lead to a Ministry of Environment in charge of all aspects of conservation of areas, natural resources and the environment in general. This alternative could be a powerful arrangement if sufficient interest is demonstrated by the Prime Minister and his Ministers.

- b. Create an Environmental Department side by side with the Forestry Department within the Ministry of Energy and Natural Resources that would be responsible for wildlife, a national park system and general natural environmental conservation in the country. However, this would have to be given adequate authority and funding. This is a feasible alternative but the danger is that limited funds, authority and insufficient technically trained personnel would undermine its efficiency.
- c. Provide increasing financial, technical and authoritative support for the National Science Research Council to be able to create a Managerial Section that would assure adequate management of wildlife, conservation units (National Parks) and environmental matters. The basic problem here is managerial capacity. The scientific basis is sound but an adequate solution to the management problem has to be found.

f) Legislation

The country needs a full revision of its environmentally oriented legislation and the creation of a comprehensive legal base for management of wildlife, national parks, environmental impacts requirements, etc. It would probably be a good idea for NSRC to seek the support of a high level international professional environmental law consultant for this purpose.

IX WILDLAND MANAGEMENT OBJECTIVES

Wildlands or those natural areas presently not under intensive agricultural or forestry management comprise an important factor in natural resources planning and management.

The objectives in wildland planning normally refer to products and services which have not traditionally been considered to require management and production practices. Since information on their biological and economic production is usually more difficult to obtain, much of the remuneration to production is accrued by indirect means, many of the products and services do not have assigned values which flow on the monetary market; and, many of the resources as well as the products and services are considered as social rather than market commodities. These and other factors make it necessary to carefully

consider aspects which often escape analysis, for example: how to achieve a sustained production of wood or water; how to minimize the irreversible loss of plant and animal species; how to guarantee that researchers and advanced students will have opportunities to study, monitor and compare natural areas to seek understanding for some of man's basic problems; how to assure that each citizen has the opportunity to enjoy quality outdoor recreation in the superlative natural areas of his nation? Some aspects are subject to analytical measurement while others require subjective criteria. Still others, such as the value of genetic resources, are evasive to quantitative study, yet reflection upon the many important medicines and agriculture commodities which have come from wildlands and which presumably will continue to be found, require governments to act swiftly and with determination in the absence of more specific guidelines.

CATEGORIES OF MANAGEMENT

After the basic and general analysis of the natural resources situation of the wildland areas of Guyana, as well as the analysis of information and existing literature had been accomplished and decisions made concerning the broad classification scheme based on the interests of the Guyanese counterparts, it becomes necessary to classify the identified key areas into land management categories. These categories should be administered within the framework of legally established land

management units by a governmental institution. Legislation will be necessary to legally create these areas in Guyana. In the following paragraphs the management categories are defined and the objectives and needs for each stated.

a) Biological Reserves

1. Introduction

The rapid alteration of the rich variety of natural environments has created a need for the establishment of areas which are absolutely free of human intervention and available exclusively for scientific research and study. The guaranteed protection of natural ecological processes is necessary if scientists are to have adequate areas for research and a more complete understanding of natural processes is to be obtained.

Other management classifications which are recommended such as national parks, multiple use forests and wildlife refuges, will facilitate scientific research and education and through zoning may provide complete protection, however increasing pressures for goods and services from these areas may jeopardize their scientific value. Many areas suitable for biological reserves will not have the combination of resources which would qualify them for protection in another management category.

2. Characteristics

A biological reserve is a large area (usually more than 5000 has) essentially undisturbed by human activity and containing ecosystems, features and/or species of flora and fauna of scientific value where the ecological processes may include actions that alter the biota existing at any given time such as naturally occurring fires, natural successions, insect or disease outbreaks, storms and the like, but necessarily excluding man-made disturbances of any kind.

The area is established for the purpose of science and preservation. Any other reasons for the establishment of this category of management should therefore be secondary to preservation. The area should be justified on the basis of having some biologically representative, unique or outstanding values of scientific or educational interest. Biological reserves will normally not have outstanding or superlative scenic or recreational values. Often the area will contain extremely fragile ecosystems or life forms, areas of biologic diversity or be of importance to the conservation of genetic resources.

3. Objectives

The general management objectives for biological reserves are to protect, preserve and maintain natural processes in an undisturbed state so that the area is available for scientific study and research,

environmental monitoring, education, and for the maintenance of genetic resources in a free, dynamic and evolutionary state.

4. Areas

(See map) Shell Beach. Ikuruwa River Basin, Rupununi, Upper Barama River area. (North West District).

b) Resource reserve

1. Introduction

The desirable action is to protect these areas from any exploitation or decisions concerning their use until adequate studies are accomplished. If these lands are not guaranteed protection, mismanagement may occur on an unplanned, single-use and shortterm economic exploitation basis. This in turn will undoubtedly cause problems and compromises, and limit future options when the country needs to rationally utilize the resources of the area. The result of utilization without sufficient knowledge will be resource damage, loss of long-term economic and social benefits and may force a land use which will not yield optimum benefits.

2. Characteristics

A resource reserve will normally comprise an extensive and relatively isolated and uninhabited area without or with difficult access, and generally forested. The knowledge or technology for the rational use of the resources within this management classification are unavailable, and national and human priorities and financial resources

have precluded field investigation, evaluation and development for the foreseeable future. Natural, social and economic values are not sufficiently identified to permit the area to be managed under another wildland management category or to justify its conversion to other land uses.

3. Objectives

The general management objectives are to protect the natural resources of the area for future use and to prevent or contain development activities that could effect the resource until proper management objectives have been technically established, or an allocation of the area to a permanent wildland category or other land use has been decided.

4. Areas

(See map) South East Rupununi District, Upper Kassikatyu and Sipu.

c) National Parks

1. Introduction

With the creation of the Kaieteur National Park the government has recognized the need to set aside the most outstanding natural areas of the country to guarantee their protection and use by present and future generations.

The rapid technological advances and exploitation of the natural resources have demonstrated that unless the national government takes long term positive and decisive action to protect

the most outstanding examples of the country's natural heritage, these resources will be lost. The increasing trend of urbanization has created greater need to provide **opportunities for outdoor** recreation in natural settings. The desire of people to understand more fully the natural environment which they affect and which affects them is creating a more concerned citizen who is actively supporting and attempts to improve his environment. It has been demonstrated that national parks provide an excellent opportunity to teach these values through interpretation and environmental education programs.

There is also a constantly increasing need for areas where natural processes are carried out without interference by man, and where species of plants and animals can be conserved for scientific investigation.

The increasing visitation to national parks by foreign visitors is also recognized as a way of increasing **foreign** exchange earnings for the country.

2. Characteristics

A national park should be a relatively large land area, managed by the national government, which contains outstanding or unique natural features or scenery of national or international significance, comprising over 1000 hectares of relatively undisturbed land which can be managed in a natural or near natural state. The area should include a representative sample of an ecosystem of national significance, reflect little evidence of man or his activities,

have significant visitor attraction, and the resource be able to sustain recreation and educational uses on a controlled basis.

3. Objectives

a) Conserve natural and scenic areas of national significance for scientific, educational and recreational use.

b) Perpetuate in a natural state representative samples of physiographic regions, biotic communities, genetic resources and species in danger of extinction.

c) Provide environmental reference areas suitable for scientific study and environmental education.

d) Assure ecological stability and diversity.

4. Areas

(See Map) Orinduik Falls and savannah, Kaieteur National Park (extension), Kumarow Fall to Macreba Falls area, Roraima Mountains, Possibly the Ayanganna Mountains but the latter need further study.

d) Natural Monuments

1. Introduction

There are several areas in Guyana containing natural features with special interest or unique characteristics which should be guaranteed protection. There are for example areas containing unique species of flora or fauna, geological and geomorphological formations

and various superlatives such as outstanding waterfalls, spectacular natural scenery, etc. The country is rich in these features due to its ecological and geomorphological diversity. For the most part however these areas are not of the size nor do they contain the diversity of features which would justify their classification and management as a national park.

To manage these kinds of natural features it is recommended that the "natural monument" classification be established for the protection and use of these areas. Natural monuments along with the national parks should represent the finest examples of the country's and the region's natural heritage of land and water; the natural features must be of such scenic, scientific, educational and inspirational importance that they merit commitment by the highest national authority.

Although these areas may have recreational and touristic value and will provide for these activities, they should be managed in such a way that they remain relatively undisturbed of man's influences.

2. Characteristics

A natural monument is a land area which normally contains only one natural feature of outstanding national significance such as geological formations, unique natural sites, animal or plant species which either because of their uniqueness or because they are

threatened with extinction either as individuals or as a population, should be protected. The specific feature to be protected ideally should have little or no evidence of man's activities. The area may have potential value for public recreation and education. Although generally smaller than national parks, the size of a natural monuments is not a significant factor as the area should only be as large as necessary to achieve the management objectives.

3. Objectives

Management objectives are to protect and preserve the natural features of interest and to provide opportunities for recreation, environmental education and research.

4. Areas

(See Map) Ayangaik Mts., Great Falls on Essequibo river, Utshi Falls and surroundings, Maipuri Falls and rapids, Christmas rapids, Great Falls on Demerara river, Amaila Falls, Phillipai Caves (oil birds), A+araipu Mountain.

e) Multiple Use Reserve

1. Introduction

There are considerable land areas within the country unsuitable for agricultural production but with a significant production potential for forest related products and services. Most of these areas have low populations and are presently under insufficient or no technical management.

These areas can contribute significantly to the nation's economic and social needs if put under modern and intensive management. Generally these forest areas do not possess any unique or exceptional natural features, nor do they naturally lend themselves to any single purpose production. The multiple aspect of their production potential can provide for the production of a series of products and services if properly managed. Watershed protection for example may be of critical importance in addition to the timber producing aspect of forestry, recreation and wildlife. There is a need for classification, management and utilization of these areas so that they can best contribute to the development on a sustained yield basis.

2. Characteristics

This should be a large area generally, forested in most of its extension and containing considerable areas suitable for production of timber, water, pasture, wildlife and/or outdoor recreation. In some cases a multiple use forest reserve may contain some outstanding or unique features at the national level that deserves complete protection. Parts of the areas are often settled by human populations and may have been altered by man.

3. Objectives

To produce water, timber, wildlife, pasture, and outdoor recreation through multiple use forestry management practices so that the economical, social and cultural needs of the people may be satisfied in the most adequate manner with a minimum impact on other environmental factors.

4. Areas

(See Map) Kanuku Mts., Possibly the Ayanganna Mts.; the latter need further study.

f) Wildlife Refuges or sanctuaries

1. Introduction

The protection and management of wildlife forms an integral part of the larger problem of management of wild and marginal lands as part of national land use planning. Land suitable for the protection of certain wildlife species in Guyana is becoming more scarce as a result of increasing populations, more intensive cultivation of agricultural land and advancing technology. More and more land is affected by various forms of natural habitat alteration and this constitutes a serious obstacle to the effective protection and management of the wildlife resources. Illegal hunting is also endangering the survival of certain species. Even though several species are protected by ordinance, insufficiently trained personnel makes enforcement extremely difficult.

Although most of the other categories of management will play important roles in protecting and providing adequate habitats for fauna, it is essential that special areas be set aside where management techniques can be applied to guarantee the survival of threatened species and assure their availability in the future. Due to habitat destruction, there is a need to set aside areas to protect adequate breeding populations, habitat and breeding grounds, for protection of rare and endangered species and for public use and enjoyment of the wildlife. In Guyana this is particularly true of wetland and coastal areas.

The creation of wildlife refuges or sanctuaries implies a desire by the government, whether for economic, social, aesthetic, cultural or scientific reasons, to protect and otherwise favour animal species, particularly those which are rare or threatened with extinction.

2. Characteristics

A wildlife refuge or sanctuary is an area where protection is essential to the continued existence of individual specie(s) or population(s) of resident or migratory fauna (marine or terrestrial) of regional, national or global significance. The area need not be entirely natural and may require habitat manipulation in an effort to create optimum conditions for the species or community according to individual circumstances. The size of the area depends upon the habitat requirement or other characteristics of the species. Often, they will not require vast areas but relatively

small ones consisting of nesting areas, marshes or lakes to carry out management objectives. Normally the area will not be of outstanding scenic, recreational or overall ecological importance.

The area may consist entirely of public lands or may include private lands but with land use practises restricted or controlled.

3. Objectives

Management objectives are to insure the continued existence of wildlife species, populations and habitat and to provide for scientific, educational and recreational uses when not in conflict with the primary objective.

4. Areas

(See Map) Ikuruwa Basin, Upper Canje River, Upper Mahaica, Mahaicony and Abary Rivers, Shell beach.

X SUMMARY OF PRIORITIES FOR ACTION

1) First Priority Actions

a) Administrative

- i) Reorganize the present inadequate organizational structures containing **elements pertaining to** conservation with the aim, of incorporating all

responsibilities for conservation of natural areas, wildlife, environmental quality aspects, environmental legislation and wildland management, under one single organization with adequate status, funds and personnel.

- ii) Revise the entire law system that related to wildland resources and conservation with the view of establishing a complete, comprehensive legislation dealing with the natural environment, conservation and wildlife.
- iii) Initiate a concentrated training programme for Government employees, professional and technical levels, and for others involved in natural resource management and decision making to cover a large spectrum of subjects related to natural resources conservation and management.

b) Area Management

- i) Initiate the process towards the establishment of a Wildlife Sanctuary and Biological Reserve in the Shell Beach area on the Northwest coast primarily for the protection of turtles in the first instance.

This should be done in coordination with the governmental organizations that is planning the exploitation of the shell resource. The work should be initiated with a detailed survey of the beach area to determine the most suitable site (highest concentration of turtle use) and to identify areas where eventual shell exploitation can occur in controlled form without heavy deterioration of the environment. The possibility of a turtle hatchery programme should be looked into.

- ii) Initiate detailed site surveys and establish two Biosphere Reserves: One in conjunction and cooperation with the Great Falls Forestry Project on Upper Demoraron and the second in the Kwapau-Mazaruni Triangle. These could be excellent research and conservation projects but care should be taken not to overdo the educational facilities developments in view of the existence of much more accessible and better environmental educational sites (for example Karuni Creek).
- iii) Initiate a survey of the Northeast area of the country (East and West Berbice District, East Demerara District) to identify suitable site (s) for wildlife sanctuaries that will protect manatees,

giant otters, hoatzin and other endangered species.

The Ikuruwa basin looks promising. The second phase would be to establish and implement this reserve.

iv) Implement and manage Kaieteur Falls National Park.

This National Park should also be considerably extended in size to incorporate a fairly self sustained ecosystem and all features of scenic interest (i.e. the lower valley to its end).

Proper management and protection should be given to Kaieteur National Park so that it serves as a pilot and demonstration area.

2) Second Priority Actions

a) Administrative

i) Environmental impact statement and analysis should be incorporated as a prerequisite for approval of any large or middle sized development project in the country.

ii) A comprehensive environmental education programme should be developed and incorporated into all general school and university curriculum.

iii) A complete inventory and study of potential conservation units and sites in the country should be undertaken.

Based on this, legal action should be taken to establish this network of conservation unit, independent of whether the areas are presently threatened or not.

The establishment of such "legal" network of areas facilitates regional and national planning in all regards.

iv) An adequate wildlife protection law enforcement programme should be developed and implemented.

b) Area management

i) Full implementation of the Shell Beach Biological Reserve and Wildlife Sanctuary, and one or two Wildlife sanctuaries in the Northeast part of the country should be ensured to guarantee the survival of endangered species like manatees, hoatzins, giant otters, giant armadillos, etc.

ii) Orinduik National Park should be established and protected with an adequate example of the surrounding savannah.

- iii) The area between Kumarow Falls and Macreba Falls on the Kumpung River (Upper Mazaruni) should be evaluated and if appropriate, it should be declared and implemented as a national park.
- iv) A Biological Reserve on the Rupununi River to protect the endangered Arapaima and other fauna and samples of the surrounding dry savannahs appears to be necessary. Further studies are however needed.

3) Third Priority Actions

a) Administrative

- i) A long term technical training programme for personnel working or who are programmed to work in natural resources on aspects related to conservation wildlife and wildland management, should be developed.
- ii) A research programme for the National University to investigate various aspects related to conservation ecosystems management, wildlife, ecology, etc., should be initiated.

b) Area management

- i) If priorities have not changed by then, the following areas should be protected and implemented if facilities are called for. This will in time probably be more than a decade into the future.

- Savannah reserve in the Ituni-Wiruni area.
- Karanambo Swamp and savannah reserve
- Swamp forest reserve in the Northwest District
- Lowland rain forest reserve in the Northwest District
- Roraima Mts. National Park
- Kanuku Mts. multiple use reserves
- Ayangaik National Monument
- Ayanganna Mts. National Park or Multiple Use Reserve
- Wildlife Sanctuary on Berbice River (Giant otter)

4) Fourth Priority Actions

Implementation of all suggested National Monuments and other areas of interest. This will in time probably be decades from today.

Examples:

Phillipai Cave

Great Falls, Demerara

Great Falls Essequibo

Maipuri Falls

Amaila Falls

Christmas rapids

Ataraipu Mountain