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# NATURAL RESOURCES MANAGEMENT PROJECT

BAPPENAS – Ministry of Forestry
Assisted by
USAID

# Twenty Five Year Master Management Plan for the BUKIT BAKA – BUKIT RAYA NATIONAL PARK

Volume 1

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# PREFACE

Management of the Bukit Baka-Bukit Raya National Park is guided by three management documents produced at one (Operational Plan), five (Development Plan), and 25 (Master Plan) year intervals.

The 25 Year Master Plan is a flexible and general guideline as to how the National Park and its resources should be managed for natural resource base conservation and the benefit of society for a period of 25 years. The plan offers guidelines and management prescriptions, and it identifies program priorities and organizational structures needed to attain the Park's goals and objectives. It also directs the development of institutions and facilities needed to support the management and potential use of national park resources.

The five year Development Plan's purpose is to advance management prescriptions stated in the 25 year Master Plan working framework. The Development Plan describes general mid-term management objectives and activities to accomplish projected long-term national park goals and objectives. The five year plan prescribes objectives, scope of activities, time frames, implementing entities, and management prescriptions for the various Sub-Programs within the national park's functional program: The Environmental Management and Human Development Program.

Annual Operational Plans describe specific short-term activities to be accomplished on a yearly basis, according to the Indonesian fiscal year, and as prescribed by the national park 25 Year Master Plan. These plans are produced annually to define objectives and identify activities, management conditions, and budgets to manage individual Sub-Program components. Management decisions for annual plans are guided by the Park's nature conservation and local community socioeconomic development short-term goals.

This document is the 25 year Master Management Plan for the Bukit Baka-Bukit Raya National Park. The plan describes the Park's vision and goals and objectives to attain that vision. This Master Plan is gives a general framework as to how the Park should be managed to protect its natrural resources and promote environmental conservation in the Bukit Baka and Bukit Raya region of West and Central Kalimantan.

The Master Management Plan is a flexible document which allows for changes in policy, environment, and socioeconomic conditions in the national park region. This plan should be examined periodically by the Park's advisory council, in coordination with the provincial government and taking into account their provincial plans. Revisions should be reflected in the working components of the Park's annual operational plans.

SITUATION MAP

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# 1. HISTORICAL BACKGROUND

## 1.1 Legislation

Indonesia's natural resources management policy combines cultural and socioeconomic development with environmental conservation needs. As such, Indonesia's 1945 Basic Constitution, article 33, states that lands and waters and their natural riches are to be managed and used by the government to promote the people's welfare.

Indonesia's Act 5 of 1990 concerning the Conservation of Living Natural Resources and Their Ecosystems consolidates constitutional mandates of nature conservation and resource base utilization and provides a legal basis for the enactment of the Bukit Baka-Bukit Raya National Park. Under this law, a conservation area's main function is to preserve plant and animal diversity and to provide sustainable utilization of living resources and their ecosystems. National parks, then, are conservation areas in which native ecosystems are managed through a zoning system to facilitate research, science, education, breeding enhancement, recreation, and tourism activities.

On February 26th, 1992 (Keputusan Menteri Kehutanan: 281/Kpts-II/92) the Cagar Alam Bukit Baka (70,500 ha), West Kalimantan, and Cagar Alam Bukit Raya (110,590 ha), Central Kalimantan, were combined to form the Bukit Baka-Bukit Raya National Park. A large protected area capable of sustaining zones for different purposes resulted from the union of these two protected areas. The zoning system includes a Core Zone, a Utilization Zone, and others (Article 32)(Wilderness, Traditional-Use and Rehabilitation) depending on the Park's particular needs for nature conservation.

A number of other regulations and legislation relate to the establishment and regulation of activities in national parks and forests:

- Minister of Agriculture Decree No. 681/Kpts/Um/8/1991 which sets criteria for natural forests;
- Minister of Forestry Decree No. 687/Kpts-II/1989 which sets the framework for exploitation of forests, national parks and terrestrial and marine reserves;
- Minister of Forestry Decree No. 688/Kpts-II/1989 which sets criteria for requesting permission for commercial exploitation of national parks and forests and marine reserves;
- Minister of Forestry Decree No. 441/Kpts-II/1990 sets provisions for setting fees and collecting dues in forests, national parks, forest and marine reserves;
- The Department of Forestry Legal Bureau's publication regarding Government Regulation No. 28/1985, concerning the protection of forest areas and regulations for the enforcement of such regulations, which sets forth a series of regulations related to protected forest areas.

Additionally, since 1991, a committee comprising BAPPENAS, the Department of Home Affairs' Division for Provincial Administration and Regional Autonomy and a number of other agencies and institutions have been cooperatively seeking mutual ground for management coordination in the Kerinci Seblat National Park which

straddles four provinces in Sumatera. This initiative has resulted in a draft manual for coordinating measures to tackle management problems in this park. The draft manual could serve as the basis for a set of general regulations which would provide guidelines for the management and coordination of national parks located in more than one provincial administrative region like the Bukit Baka-Bukit Raya National Park.

The arrangement of this management plan follows regulation no. 59/Kpts/DJ-VI/1993 `Guidelines of National Park Management Plan Arrangement (Pedoman Penyusunan Rencana Pengelolaan Taman Nasional)' issued on May 24, 1993 by the Director-General of Forest Protection and Nature Conservation (Dirjen PHPA).

## 2.1 Regional Plans

Integrated area planning has been progressing since 1991 in the two provinces of West and Central Kalimantan. In West Kalimantan, Governor's Decrees No. 030/91 and No. 503/1992 provide the framework for provincial integrated area planning and stipulate the formation of a regional steering committee supported by eight provincial level working groups. Table 1 shows the areas covered by working groups, which have representatives from all sectoral agencies and are coordinated by the Deputy Head of the Regional Development Planning Board (BAPPEDA Tk. 1 Kalbar).

Table 1Areas Covered by Working Groups

| | |
|---|---|
| Kawasan Lindung | Protected areas |
| Kawasan Budidaya | Cultivated areas |
| Kawasan Peraturan dan Perundang | Law and legislation |
| Kawasan Permukiman | Settlement areas |
| Kawasan Prasarana | Infrastructure |
| Kawasan Khusus | Special aspects |
| Kawasan Transportasi | Transportation |
| Kawasan Keuangan Daerah | Regional finances |

The working groups have produced a number of publications relating to regional spatial planning in West Kalimantan to the year 2005 at provincial level (tingkat I) and kabupaten (tingkat II) levels of government. In Central Kalimantan, production of these documents is still in progress. The publications are important documents given Government Regulation No. 23/1992 which requires delegation of prescribed government functions to district level administrations by 1994.

As the decree establishing the national park was released only in late February 1992, the Park is not specifically mentioned in any Priority Development Area in either Province's Integrated Area Plans. In these plans, the areas of the Park are referred to as nature reserves.

Administratively, the Bukit Baka part of the park falls in Kabupaten Sintang and borders Kecamatan Nanga Ella. It also subsumes the southern parts of Kecamatan Menukung, Serawai and Ambalau which border the contiguous parts of Bukit Raya. The Bukit Raya part of the park is located along the western boundary of Central Kalimantan in the northern part of Kabupaten Kotawaringan Timur and subsumes parts of Kecamatan Marikit, Katingan Hulu and Senaman Mantikei.

As yet, no sectoral plans appear directly to affect the integrity of the national park itself. There are however, infrastructural developments which should be taken into account. Most important is the route of the Trans-Kalimantan highway, the exact route of which has not yet been fixed.

Other road routes will also be important to management planning in the national park. The provincial infrastructures of West and Central Kalimantan are being systematically upgraded. One current project is the ongoing upgrading by the Kabupaten Sintang administration of the existing forestry concession logging road



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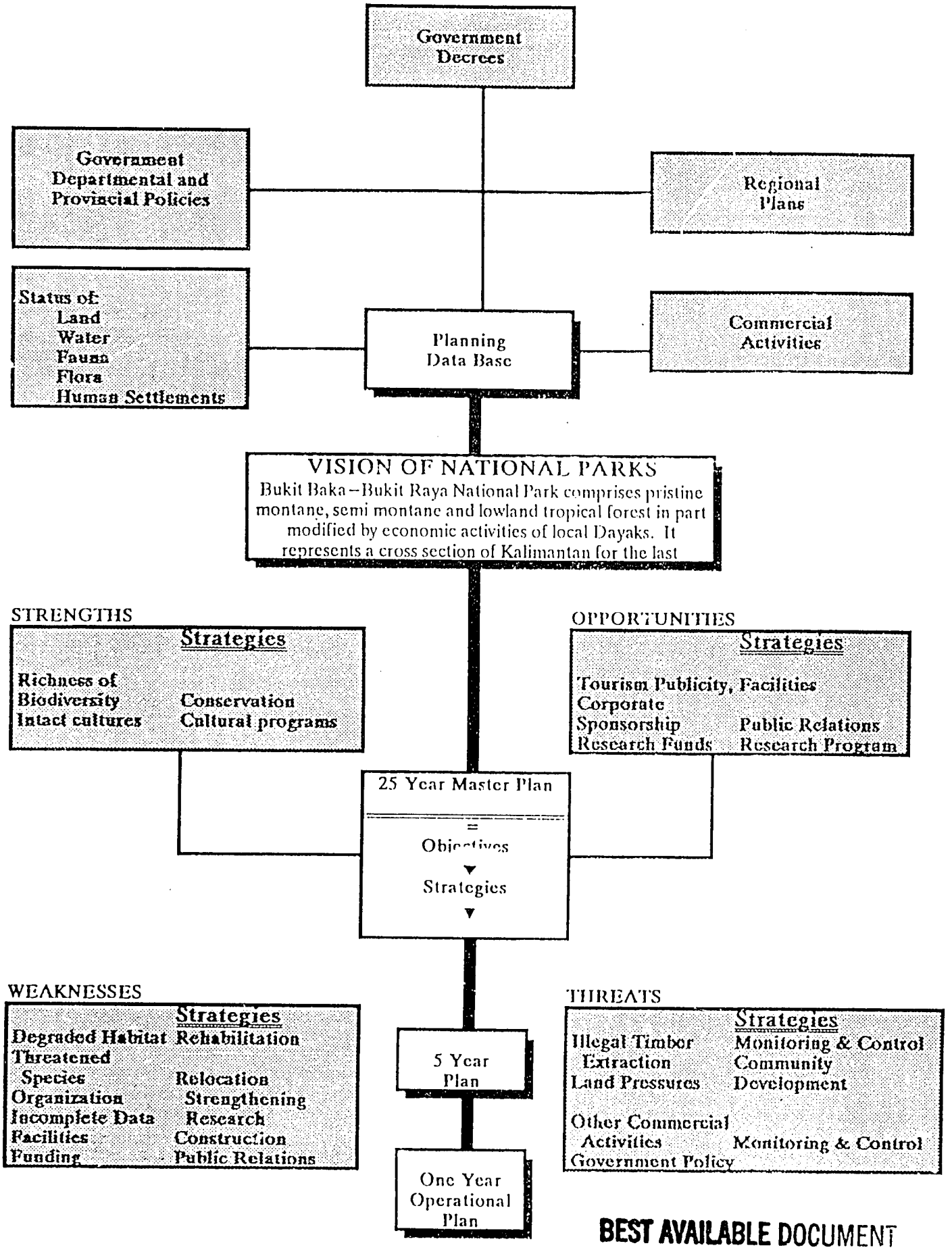
which passes close to the northwest border of the park and continues south over the provincial border into Kabupaten Kotawaringin Timur.

In Central Kalimantan, work is progressing on a road from Tumbang Samba to Tumbang Hiran and Tumbang Senamang on the southern border of the national park. The southern boundaries of the park are so isolated from official development, however, that they are unlikely to be affected by any provincial or kabupaten level developments for some considerable time.

Other government departments have small scale plans for upgrading of the facilities in settlements close to or within the borders of the park. For example, the Department of Health in Kabupaten Sintang plans to upgrade health clinics (Puskesmas) in the kecamatan of Menukung, Serawai and Ambalau. Initiatives such as these are small scale and will not result in any physical change. They will, however, have important impacts for the communities living in proximity of the Park and, when systematic community development programs begin to take place systematically, should be carefully integrated into them. Programs like Puskesmas are particularly important if they are to result in better family planning practices and a reduction in the present rate of population increase.

It should be noted that there is a possibility that mineral surveys may be carried out within the national park. Minor gold deposits are known to exist within the park and there is already small scale exploitation just outside the boundaries. There are reports from Dayak groups of mineral surveys already having taken place. Additionally, on 5 June 1993, Pertamina, Canadian Occidental Petroleum and PanCanadian Petroleum signed an agreement for oil and gas exploration in a 200,000 ha. block in Sintang. The implications of this exploration concession for the park are not yet known.

**Figure 1 Master Management Plan Process**

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## 2. THIS MANAGEMENT PLAN

This management plan is being developed as part of a framework which sets out to address the long term, medium term and short term requirements of park management. The long term perspective seeks to establish a vision for the Bukit Baka-Bukit Raya National Park for the next 25 years and a set of management principles to support that vision. The 25 year plan establishes an overall framework from which development and management priorities will be derived for medium term (i.e. 5 year) and operational (i.e. annual) planning as illustrated in figure 1. Following the offcial Pedoman Penyusunan Rencana Pengelolaan Taman Nasional, the previous chapter examined government legislation, policies and plans at national and provincial levels as they affect planning for the national park. Chapter 3 briefly discusses the commercial activities in and around the park and also briefly describes the major features and attributes of the Park. From this basic data base, this chapter develops a vision for the National Park and chapter 4 develops the vision into a set of goals. The beginning of Chapter 6 develops a set of objectives from these goals. Chapter 5 discusses major threats to the Park and various constraints which might inhibit its effective development. All of these are addressed in Chapter 6 which also develops strategies to secure and maintain the important assets of the Park and to develop opportunities like tourism and fund raising.

This plan seeks to be a readable and informative document about the park. Its main purpose is to set a framework from which informed and consistent policies, priorities and management decisions can be made. The plan is also designed to be used as an overall guide by staff working in the national park. Suitably illustrated, it should also serve as an informative booklet for visitors to the park and others interested in the park and its management.

The 25 year management plan therefore seeks to:

- ⊠ develop an overall vision or theme for the park which will serve as a basis for the development of goals and strategic directions for the management of the park;
- ⊠ establish broad principles which will guide management in making decisions regarding the management of the park;
- ⊠ develop broad strategic directions for the management of the park.

In particular, the plan focuses on developing management objectives to address the six following important management issues:

- ⊠ a zoning scheme to accommodate conflicting interests;
- ⊠ threatened habitat, flora and fauna conservation;
- ⊠ relationship between timber concessionaires operating close to the boundaries of the park and park management so that the activities of the former contribute to the objectives of the park;
- ⊠ providing a desirable level of economic activity and quality of life to those communities settled in land abutting or within the park so that their activities do not conflict with the objectives of the park;

- access for research, tourism and recreation;
- threats to the park's integrity like fire, disease and illicit activities.

Volume 2 of this plan presents more detailed information about phenomena in the Park and in large part comprises a set of base data about the park.

Planning is an ongoing process and this plan should be regularly reviewed in light of the monitoring information which will systematically be collected as part of the ongoing management of the park. This plan provides for the monitoring and control of a number of key indicators which, if their movement is negative, should result in the review of that part of this plan which directly addresses them. It is particularly important to review this plan in its early years as improved data becomes available for planning purposes. For example, there is a paucity of data about species' populations in the park and hence their current vulnerability. This plan should also be reviewed whenever there is some significant change which affects the management of the park. The most obvious are legislative changes and changes to regional plans directly affecting the park. Exploration activities would also represent such a change.

As this plan is based only on a partial understanding of the richness and complexity of the park, amendments may become necessary due to:

- availability of additional information;
- feedback from experience of implementing parts of this management plan;
- issues materialising not adequately addressed in this plan;
- new policies and concerns.

Changes in the plan will require the approval of the Director of National Parks in consultation with the Director of the Sub-Balai Bukit Baka-Bukit Raya National Park.

## 2.1 Vision

The development of inland Kalimantan in the last millennia has been one of large areas of tropical forest surrounding small pockets of human agricultural and economic activity on land cut out from that forest. The human activities also included movement into the forest to utilise its products. In many respects, Bukit Baka-Bukit Raya National Park represents a typical cross section of this history with pockets of human settlement located on the fringes of the Park and accessing the Park for some of its products.

As the Dayak communities are permanent features of the national park landscape and their activities to some extent have undoubtedly modified the natural history of the forest, it is important to incorporate them into the overall theme for the Park. As a theme to publicize the Park for tourism and visitors, inclusion of a human component to illustrate how the island of Kalimantan has developed would have great value. The vision or theme of the park therefore is:

> Bukit Baka-Bukit Raya National Park comprises pristine montane, semi-montane and lowland tropical forest modified in part by the economic activities of local Dayaks. It represents a cross section of Kalimantan for the last millennium and has great potential visitor appeal.

The theme has six important components:

- conserving the pristine forest areas for posterity and, where practicable, reintroducing species made extinct by the activities of humans;
- allowing the forest to regenerate in areas altered by the economic activities of humans but no longr used by them;
- conserving historical human artefacts located within the boundaries of the national park;
- stabilising the agricultural, hunting and gathering activities of local communities while conserving but not freezing the development of human adaptations in the Kalimantan rainforest and allowing for the conservation of flora and fauna operating across the boundaries of pristine and utilised areas;
- encouraging the continuing development of traditional cultural activities of local Dayaks to supplement the visitor appeal of the park.
- natural and cultural attributes with great potential for lesure and tourist activities.

## 3. GENERAL SITUATION - VALUES

The Bukit Baka-Bukit Raya National Park straddles the borders of West and Centı Kalimantan. These provinces are two of the four Indonesian provinces in the gre island of Kalimantan (known as Borneo in English speaking countries) which al includes the two Malaysian states of Sarawak and Sabah and the independe kingdom of Brunei.

The evolution of Kalimantan was greatly transformed during the Pleistocene ice ag when it, together with Java and Sumatera, joined mainland south east Asia to fo: Sundaland. From being isolated from the flora and fauna of mainland Asi Kalimantan became wide open to successive migrations of animals and flora whi has enormously enriched the diversity of plant and animal life there. Being slight oval in shape has meant that its central parts are far away from and, until fair recently, largely inaccessible from the coast. For many centuries, this distance h probably limited access to the central areas and helped to preserve the inla forests.

### 3.1 Outside the Area

Located between 112° 15' and 112° 60' East Latitude and 0° 30' and 0° 65' Sou Longitude, the Park lies just below the equator.

Air transportation is readily accessible from Jakarta to Pontianak, the capital ci of West Kalimantan, and Palangka Raya, the capital city of Central Kalimanta: Both cities are connected to Jakarta by daily commercial flights. Pontianak also h flights to Singapore and Kuching, in Sarawak. There is also a commercial air li from Pontianak to Nanga Pinoh.

A good paved road connects Pontianak and Sintang and the trip by car may be do: in about six hours. From Sintang, there is a dirt road which runs to Nanga Pin and Nanga Nuak, but it is impassable when wet.

Projections of a Trans-Kalimantan Highway are still unclear, but it is likely that tl present logging road on the western side of the national park will connect to th highway, possibly running from Tumbang Senamang, Tumbang Samba, ar Kasonang in Central Kalimantan to either Nanga Nuak and Nanga Pino or Kota Bar in West Kalimantan. This road would provide easy access to the western part of tl national park from both Pontianak and Palangka Raya.

A well maintained logging road exists from Nanga Nuak to Belaban Ella. The ro reaches into Central Kalimantan, about 120 km from Nanga Nuak, branching several local villages, including Tumbang Kaburai, Riam Batang, and Tanjung Pa (Map, Appendix 9). The national park's north and southern borders and oth West and Central Kalimantan villages may be reached by foot from several acce points in this road.

Transport and communication once in the vicinity of the park is predominant riverine. For example, Nanga Jelundung, which is the nearest local settlement Bukit Raya, requires a speed boat journey from Nanga Pinoh to Nanga Serawai an thence a longboat to the village. In Central Kalimantan, the journey is longe requiring an hour's drive from Palangkaraya to Kasongan and thence a 5 hour spee boat journey to Tumbang Samba and from there, another speed boat journey Tumbang Heran and thence by inboard powered longboat to Sebaung.

The Park is located in an area rich in timber resources. Five forest concessions share boundaries with the national park: P.T. Kurnia Kapuas Plywood and P.T. Delapan Delapan in West Kalimantan, P.T. Sari Bumi Kusuma across the border in both provinces and P.T. Handayani, and Dwima Jaya in Central Kalimantan. In both West and Central Kalimantan several Hutan Lindung border the park and the Cagar Alam Bukit Baka is separated from the park by the Kurnia Kapuas Plywood concession (Map, Appedix 1). It is likely that a Hutan Tanam Industri site will be developed within the Sari Bumi Kusuma concession during 1994-1995.

Apart from timber harvesting by local concessionaires, the other main industry of the area is subsistence farming by local communities. Local agricultural systems are principally based on the bush/fallow cycle of swidden agriculture in which fields are cleared, burnt and farmed for one year before reverting to bush and remaining fallow until the bush is sufficiently mature to warrant farming again, usually after about 10 years. Such are the population pressures in the area now that the bush/fallow cycle has been reduced to about five years in many places and there are reports that in some places it is even less. Such a cycle is non-sustainable with alang alang grass taking over the swiddens and the soil becoming too degraded to farm.

Rubber gardens are common near the Melawi River and the tree crop is becoming increasingly important for communities living closer to the national park. In Central Kalimantan, rattan is the preferred estate crop. Both crops are dependent on the availability of markets which is why one predominates over the other in each province. In Kalimantan Barat, the market for rattan is relatively undeveloped and in Central Kalimantan, especially along the Katingan River, there is little demand by traders for rubber.

A major problem for communities living in proximity of the Park is their distance from markets. Consequently, products tend to be sold at discounted prices and purchases bought expensively to allow for the costs of transport to and from a major centre.

As the infrastructure of both provinces is improved, these costs will reduce, but they will always be a significant factor in economic planning for the area. Consequently, any economic plans for local communities should focus on high added value items preferably of a non-bulky kind.

A significant new economic development close to the borders of the Park has been small scale gold mining using sludge pumps (Map, Appendix 12). Mercury is used to separate the gold and then flushed into the river which, in time, will seriously affect the quality of water in rivers. No studies have been made of these activities; so their profitability is unknown. Sludge pumps and mercury, however, are readily available in major centres.

### 3.2 Within the Area

Bukit Baka-Bukit Raya National Park covers an area of 181,090 ha in the central mountainous Schwaner Range. It possesses significant representations of undisturbed primary lowland dipterocarp forests, hill dipterocarp forests, limestone forests and montane forests formations (Map, Appendix 6).

The national park encompasses an area wide enough to assure sustainable water catchments of major tributaries to the Katingan river in Central Kalimantan and the Melawi river which drains into the Kapuas river in West Kalimantan (Map, Appendix 4). With its array of altitudinal gradients, including several mountainous peaks

above 1.500 meters and Kalimantan's second highest peak, Bukit Raya, the national park protects a variety of habitats with high levels of biological diversity (Map, Appendix 2).

The germoplasm potential of the national park is enhanced by high levels of biotic endemism. The park constitutes an important and largely unexplored plant and animal genetic reservoir. There are habitats for several Bornean biota which undoubtedly will include species still unknown to science. A wide range of animal and reptile life is also found there including flying snakes, lemurs and squirrels, two of the world's great apes, the orangutan and the gibbon and rich and diverse bird, butterfly and other insect populations. The rivers also provide habitats for a wide range of fish and crustacean species as well as otters, turtles and tortoises.

The genetic potential storage of the national park makes it a valuable reservoir for conservation which could be very important for the longterm survival of a broad range of tropical forest species. Effective management of the national park will ensure the conservation of a rich and important Indonesian natural heritage. It will also help protect a significant portion of Kalimantan's biological wealth and contribute to the social and economic development of the region. In addition, the scenic beauty and diverse biota of the national park, complemented by local Dayak cultures will make the park into an important tourism resource.

### 3.2.1 Topography

Encompassing the highest parts of the Schwaner Mountain Range, the national park presents a broken mountainous topography, with altitudes ranging from 150 meters above sea level in southern lowland forest areas to the 2,278 meters summit of Bukit Raya. The park is dominated by the Schwaner massif and its steep East-West running mountain ridges. Other than Bukit Raya, mountain tops above 1.400 m include: Bukit Malebanbun (1.850 m), Bukit Asing (1.750 m), Bukit Panjing (1.620 m), Bukit Baka (1.617 m), Bukit Lusung (1.600), and Bukit Panjake (1.450 m).

Sheer mountains covered with pristine forests and steeply dissected river valleys dominate the park's central and northern latitudes (300 m to 2.278 m), while moderately to steeply dissected topography predominates along its southern confines (150 m to 300 m) (Map, Appendix 2).

### 3.2.2 Geology and Geomorphology

Geological structures of the national park consist of younger, probably mid-Tertiary, volcanic rocks (Raya Porphyrytes) which vary in composition from diabase porphyrite to andasite and occasionally quartz porphyrites. The Schwaner mountain range is believed to consist almost entirely of a quartz diorite plutonic massif (Map, Appendix 3).

As a predominantly mountainous region, the park's environmental characteristics change with altitudinal gradients. Temperatures decrease and precipitation increases at higher elevations. Physical indications of this phenomena are reflected in the region's sequence of soils: Ferrasols--Cambisol--Acrisol--Gleysol--Histosol (Map, Appendix 5).

The soils of hilly to mountainous landscapes appear less strongly weathered than those of the rolling landscapes at lower altitudes. Due to high regional rainfall, however, all soils appear strongly leeched. Soil rejuvenation is common and occurs by erosion processes on steeply sloping areas.

The nutritional component of regional soils range from low to very low. Cambisols, Acrisols, and Gleysols have a slightly higher cation exchange capacity (CEC) and nutrient content than Ferasols and Histosols, due to less intensive weathering and rejuvenation conditions. The nutrient content of the Histosols is extremely low. Soils below 1.500 m elevation are generally over 1.5 m deep and present high rooting volumes. Above 1.500 m, however, soil depth is often less than 1 meter, usually poorly drained, and with a high ground water that limits root growth.

The dark soil colour in upland hills is confined to the upper few centimetres containing organic matter. The thickness of this horizon increases with elevation. Poor drainage conditions, relatively low temperatures, and slow decomposition result in organic matter accumulations to depths of 70 cm.

The subsurface horizons of uplands and hill landscapes are uniformly yellowish-red coloured, indicating well drained conditions. Yellowish soils have relatively high iron mineral goethite content and reddish soils have relatively high haematite content. Subsoil profiles at 2,000 m is greyish-brown with mottling, indicating poorly drained conditions with ground water tables near the surface for most part to the year.

The subsurface horizons of soils up to 1,200 m elevation are moderately to strongly developed with sub-angular block structures, a condition that indicates high water permeability, biological activity, and water retention capacity with favourable conditions for root penetration.

The subsurface horizon of soils above 1,200 m elevations are moderately fine to medium developed with angular block structures, a condition that indicates lower water permeability and biological activity. The high water table during most of the year in these altitudes presents severe limitations for root penetration of most plant species.

### 3.2.3 Climate

Climate recording stations are yet to be developed in the Bukit Baka and Bukit Raya region. Accurate short and long term data, consequently, is not available. The mean temperature in the Indo-Malayan archipelago, however, is about 26.3°C at sea level. Given that the regional average temperature decreases by approximately 0.6°C for every 100 meters of elevation, it is estimated that the average temperature in the national park ranges from about 12°C to 25°C (Map, Appendix 8).

Seven year (1984-1991) annual rainfall records for Nanga Pinoh, located north-west of the national park indicate average yearly precipitation of 3,423 mm, with yearly total rainfall fluctuations between 2,935 mm and 4,071 mm. October to May are the highest rainfall months with an average of 23 rainy days per month. 73% of the annual precipitation occurs during this period. Table 2 summarises monthly rainfall patterns for 1992. Precipitation patterns in the park will differ from those of Nanga Pinoh given the different altitudes and different weather patterns on either side of the Schwaner Range.

Table 2 Rainfall Data from Nanga Pinoh

| Month | No. of Rainy Days | Average Rainfall |
|---|---|---|
| January | 24 | 400 |
| February | 20 | 248 |
| March | 23 | 394 |
| April | 23 | 352 |
| May | 22 | 357 |
| June | 15 | 162 |
| July | 15 | 216 |
| August | 14 | 155 |
| September | 16 | 198 |
| October | 24 | 323 |
| November | 23 | 396 |
| December | 24 | 323 |

3.2.4 Rivers and Catchments

The Bukit Baka-Bukit Raya National Park protects the headwaters of a major watershed divide with its 110,590 ha in Central Kalimantan and 70,500 ha in West Kalimantan. The Park protects the complete system of headwaters of the Katingan river which is a major river artery in Central Kalimantan and a significant portion of the Melawi river, West Kalimantan (Map, Appendix 4).

Major tributaries of the Melawi River rising in the national park include the Ella Hulu, Muntatai, Mendung, Serunai, Tukungai, Menkutui, Tunduk, and Tekungai. The Binban, Tahe, Hiran, Mantikei and Samba rise on the Bukit Raya side of the divide and drain into the Katingan River. Except in their uppermost reaches, these rivers are navigable by inboard or outboard powered longboats and smaller craft throughout the year. They provide arteries for movement within the national park and are the main means for travel between local villages. These rivers become less navigable during dry months when rapids, shingles and silt banks require larger craft to be dragged over the obstacles or, in extreme cases, to be unloaded and reloaded to enable the safe crossing of a more dangerous obstacle like a rapid. As one moves closer to the sources; so they become less accessible to any form of river craft.

3.2.5 Flora

Lowland vegetation in the national park, up to about 400 m, is typical dipterocarp lowland rainforest and contains about 30% of the species' population of the dipterocarp family. They also are the largest members of the dipterocarp family. Size is a function of altitude and it gradually decreases as elevation increases.

Given the topography of the park, forest types include hill dipterocarp forests, submontane forests, montane forests, riperine forest types and heath sub-alpine or moss forests (Map, Appendix 6). Characteristic ericoid vegetation in sub-alpine areas includes species of Rhododendron, Vaccinium, Leptospermum, Xanthomyrtus, Myrica and members of the Rubiacaea family such as Hedyotis sp., Randia sp. and Urophyllum sp. Moss forests are commonly found above 1.600 m.

The national park also contains singular species of botanical interest. The palm flora includes abundant species of rattan, many of them of economic importance and

constituting a potential reservoir for genetic material. The largest flower in the world, Rafflesia has been found at about 400 m and the region is believed to hold an important distribution of pitcher plants (Nephenthes). A recent Dutch expedition to Bukit Raya (1982-1983) described several new plant species and there is every likelihood that th number will increase as thorough research programs are implemented.

### 3.2.6 Fauna

The National Park's pristine forest types provide valuable habitats for an array of animal species. The Park's variety of altitudinal gradients offer habitats which harbor rare and endangered species given in table 3 below. As increasing information becomes available about the Park's populations of fauna, so this table will require to be updated and particular conservation programs established for all threatened and endangered species. Provision also should be made for re-establishing species which have become extinct in the Park (Map, Appendix 7).

Table 3 Threatened Fauna in the National Park

| Common Name | Scientific Name | Distribution (see map references) |
|---|---|---|
| Extinct | | |
| Rhinoceros | Dicerorhinus susmatrensis | |
| Tembadau | Bos javanicus | |
| Endangered | | |
| Orangutan | Pongo pygmaeus | |
| Marbled cat | Felis marmorata | |
| Colugo | Cynocephalus variegatus | |
| Slow loris | Nycticebus coucang | |
| Western Tarsier | Tarsius bancanus | |
| Hairy nosed otter | Lutra sumatrana | |
| Smooth otter | Lutra perspicillata | |
| Wrinkled hornbill | Rhyticeros corrugatus | |
| Helmeted hornbill | Rhinoplax vigil | |
| Barred eagle owl | Bubo sumatrana | |
| Great argus | Argusianus argus | |
| Bulwer's pheasant | Lophura bulweri | |
| Vulnerable | | |
| Sun bear | Helarctos malayanus | |
| Bornean gibbon | Hylobates muelleri | |
| Agile gibbon | Hylobates agilis | |
| Red leaf monkey | Presbytis rubicunda | |
| Pangolin | Manis javanica | |
| Rhinoceros hornbill | Buceros rhinoceros | |
| Blyth's Hawk Eagle | Spizaetus alboniger | |
| Black eagle | Ictinaetus malayensis | |
| Black breasted triller | Chlamydochaera jefferyi | |
| Crested fireback | Lophura ignita | |
| Rare | | |
| Grey leaf monkey | Presbytis hosei | |
| Crested serpent eagle | Spilornis cheela | |

The Park probably has a reasonably full complement of Bornean mammal species at reasonably high densities within the forests. The most frequently encountered species are given in table 4 below. Agile gibbons and grey or red leaf monkeys are found regularly, mostly throughout the lowland mixed forests up to about 1.000 m. Bearded pigs and barking deer appear to be the most common and widespread ungulate species in the region, with a high incidence of the former during the fruiting of dipterocarp trees. Barking deer tracks are readily seen throughout the year. The bird life is also very rich but must await detailed surveys to establish populations and habitats. The Asian two-horned rhinoceros is said to have roamed the region and local people still believe there is a possibility of a few scattered individuals living in remote areas of the Park. The dugong is also remembered in upriver areas of the Katingan in Central Kalimantan.



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Table 4 Common Fauna

| Common Name | Scientific Name | Distribution (see map references) |
|---|---|---|
| Bearded pig | Sus barbatus | |
| Lesser mouse deer | Tragulus javanicus | |
| Sambar deer | Cervus unicolor | |
| Barking deer | Muntiacus muntjak | |
| Moonrat | Echinosorex gymnurus | |
| Prevost's squirrel | Nannosciurus melanotis | |
| Common porcupine | Hystrix brachyura | |
| Malay civet | Vierra tangalunga | |
| Banded lisang | Prionodon lisang | |
| Small-toothed palm civet | Arctogalidia trivirgata | |
| Mongoose | Herpestes sp. | |
| Tufted ground squirrel | Rheithrosciurus macrotis | |
| Greater nectar bat | Eonycteris major | |
| Lesser fish eagle | Ichthyophage nana | |
| Crested wood partridge | Rollulus rouloul | |
| Emerald dove | Chalcophaps indica | |
| Whiskered tree swift | Hemiprocne comata | |
| Stork kingfisher | Pelargopsis capensis | |
| Common kingfisher | Alcedo atthis | |
| White crested hornbill | Berenicornis comatus | |
| Wreathed hornbill | Rhyticerus undulatus | |
| Bushy crested hornbill | Anorrhinus galeritus | |
| Great black woodpecker | Drycopus javensis | |
| Olive backed woodpecker | Dinopium rafflesi | |
| Grey wagtail | Motacilla cinerea | |
| White-crowned forktail | Enicurus leschenaulti | |
| Chestnut-capped | Garrulax mitratus | |
| laughingthrush | Pomatorhinus montanus | |
| Chestnut-backed babbler | Cynoptila cyanomelana | |
| Blue and white flycatcher | Ficedula westermanni | |
| Little pied flycatcher | Terpsiphone paradisi | |
| Asian paradise flycatcher | Sitta frontalis | |
| Velvet-fronted nuthatch | Dicrurus paradiseus | |
| Greater raquet-tailed drongo | Gracula religiosa | |
| Hill myna | Irena puella | |
| Asian fairy bluebird | Cyornis concreta | |
| White tailed flycatcher | Hemipus picatus | |
| Bar winged flycatcher-shrike | Centropus cinensis | |
| Common coucal | Corvus enca | |
| Slender billed crow | Dricurus aeneus | |
| Bronzed drongo | Oriolus chinensis | |
| Black naped oriole | Ketupa ketupu | |
| Buffy fish owl | Caloperdix oculea | |
| Ferruginous wood partridge | | |

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### 3.2.7 Local Communities

Exact location of settlements in relationship to park boundaries is uncertain and can only be substantiated from aerial photographs (Map, Appendix 10). Settlement details are given in table 5. The populations are generally characterised by:

- fairly uninhibited growth with annual increases of between 4 and 5 percent;
- high fertility;
- an early start to families with reports that girls often marry before menstruation;
- high dependency and mother/infant ratios;
- few women over the age of 50.

Birth control is practised in Central Kalimantan, with some villages reporting a 70% acceptance. Use of pills, however, appears occasional. In West Kalimantan, the birth control program has not reached villages in proximity to the park. Consequently, as yet, the birth control program has only had a marginal impact on a rapidly accelerating population.

Table 5 Settlement Populations

| Desa | Dusun | Group | Sub-Group | 1993 Population | Projected 2018 Population at current rate of increase |
|---|---|---|---|---|---|
| **Within the Park** | | | | | |
| **Kalimantan Tengah** | | | | | |
| Kiham Batang | Kiham Batang | Ot Danum | Ransa' | 105 | 356 |
| Tabulus | Tabulus | Ot Danum | Dohoi | | |
| Sebaung | Sebaung | Ot Danum | Dohoi | 99 | 335 |
| **Outside the Park** | | | | | |
| **Kalimantan Barat** | | | | | |
| | Nanga Siyai | Ot Danum | Limbai | 250 | 847 |
| | Belaban Ela | Ot Danum | Limbai | ▼ | ▼ |
| Nanga Siyai | Belaban Dalam | Ot Danum | Limbai | 544 | 1,842 |
| | Sungkup | Ot Danum | Limbai | ▲ | ▲ |
| | Nanga Juoi | Ot Danum | Ransa' | 378 | 1,280 |
| **Kalimantan Tengah** | | | | | |
| Malawan | Malawan | Ot Danum | Dohoi | 144 | 488 |
| Tumbang Kaburai | Tumbang Kaburai | Ot Danum | Ot Danum | 126 | 427 |
| | | | Total | (1,646) | (5,575) |

With the population, during the period of this management plan, projected to increase by 339% at current natural rates of interest, a program of birth control to minimise population pressures on land is a very high priority of the park's objectives.

Settlements now typically consist of single house dwellings. In West Kalimantan, they have replaced the traditional longhouse. In Central Kalimantan, few of the old vaulted, individual dwellings on high poles remain in villages close to the park. In West Kalimantan, several longhouses still exist, the largest being at Nanga Siyai. The longhouse at Nanga Siyai is a renovation of an original 75 apartment longhouse which burnt down in 1956. The present longhouse is a smaller 15 apartment dwelling built of ironwood. It remains an important part of local Dayak cultural heritage.

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Dayak culture is relatively intact in communities in and close to the park, particularly in Central Kalimantan. The kaharingan religion is still strong in Central Kalimantan. The major festivals are still held. The traditional political system has been transformed and the quality of local leadership has been a major casualty. Serious illness is still treated by local dukun following traditional measures of purging the patient of the evil invading spirit and despatching it in symbolic boats to the sources of all evil lodged in the murky waters of the underworld. Death itself is accompanied by masked dancers representing the guides to take the departed soul to its last resting place. Carving of figures (patung) and musical instruments is still practised by the men. Rattan weaving is strong among the women, though most of the rich patterns for which the Ot Danum were justly famous have now been forgotten. Orchestras, music, song and dance are still all very strong with the best music featuring flutes (suling), guitars (kecapi) and bowed rebab. Both men and women sing. While the dress is drably western, the artistic culture remains strong and would undoubtedly be attractive in performance and for sale to tourists on a break in their journeys either to or in the national park.

Local communities of the Bukit Baka and Bukit Raya region possess a profound knowledge of the use of many forest products, including medicinal species, edible fruits, nuts, tubers, vegetables and materials for construction of homes and utilitarian artefacts. This knowledge is an important attribute of the biodiversity of the forest and this management plan seeks to conserve it together with the natural phenomena on which it is based.

### 3.2.8 Recreation and Tourism

Neither West nor Central Kalimantan are major tourist destinations in Indonesia. These provinces appeal to the intrepid younger tourist with little money to spend rather than the luxury end of the tourist market. Provincial tourism infrastructures are rudimentary in both provinces with Pontianak and Palangka Raya possessing a few middle range hotels but there being few elsewhere. Pontianak also has a port which can accommodate passenger ships and smaller cruise liners. Access to the park is difficult and certainly uncomfortable. The park itself currently possesses no accommodation facilities; so tourists are obliged to stay overnight in Dayak villages or construct overnight shelters in the park.

Provincial tourism offices (Dinas Pariwisata) exist in both Pontianak and Palangka Raya. In Pontianak, there is a formal interagency group responsible for coordinating nature tourism activities in the region (KKPOWA). The group is formed by representatives from the Department of Forestry, Department of Tourism, Regional Planning Board, Department of Agriculture and the Environment and the Governor's office.

## 4. GOALS OF THE PARK

Bukit Baka-Bukit Raya contains significant and diverse vegetation communities at different altitudes of a richness which one would expect to find in a relatively untouched tropical rainforest in Kalimantan. It contains a major part of a significant mountain range in the island of Kalimantan, a number of remote river systems and some outstanding scenery. It possesses a significant forest wilderness and some essentially unmodified catchments. Ensuring the conservation of these outstanding natural values on which many of the other activities of the Park such as research and tourism depend, is the fundamental aim of the management of the Park.

As a remnant of the natural history of Kalimantan and, in particular, the interaction of human populations and the tropical rainforest, the Park provides a good example of the modifications of the rainforest by humans and their adaptations to it. It also provides a natural backdrop to the ideas and inspirations which has given rise to a highly developed set of religious beliefs as exhibited by the local Hindu Kaharingan religion and a rich set of cultural artefacts which give expression to many of these religious ideas.

The primary goal of the Park is to:

> protect and maintain a natural and self-sustaining tropical rainforest expanse which will enable each ecosystem and its constituent biotic elements to continue to adapt to the demands of the environment.

An important secondary goal recognises the fact of long term Dayak activities within the Park and the fact that they also constitute a reservoir of knowledge about the Park and the resources within it. They also provide a crucial human resource which will contribute to the attainment of the primary goal. The secondary goal, therefore, is to:

> provide local communities with the opportunity to continue to pursue traditional methods of enjoying the benefits of the local rainforest and rivers flowing through it so that their cultures will continue to develop with reference to the rainforest. Part of that development will be an understanding of the value of sustaining that resource.

Consequently, their land use would be contained to current boundaries and some activities would be restricted where they conflict with the primary goal of the Park.

A third goal recognises that the Park does not enjoy some pristine isolation from the economic activities occurring round its borders. Some of these, for example present threats to the integrity of the park like uncontrolled grazing, the introduction of exotic and aggressive species which might invade the park and poor land use practices leading to the domination of alang alang grass and the increased danger of forest fires. The tertiary goal of the Park, therefore, is to:

> promote ecologically viable land use practices in areas adjacent to the park and to assist in the development of socioeconomic opportunities for local communities so that they are able to enjoy a sustainable quality of life which does not threaten the integrity of the Park.

Finally and importantly if the Park is to have continuing relevance to an increasingly environmentally conscious and better educated local and international community, it should:

enhance the Park as a place for visitors to enjoy an undisturbed rainforest and other natural features and to gain the opportunity of appreciating the Dayak achievement of interpreting the rainforest for their own adaptation.

This plan, consequently, seeks to establish an appropriate balance between the four goals of the Park and, in particular, its primary goal of conserving the area's very important natural values while planning for the future probability that it will become a major attraction for visitors who should be given every opportunity to experience and enjoy the Park's natural beauty and other values.

## 5. THREATS AND CONSTRAINTS

A major objective of management planning and, consequently, of this management plan, is to identify potential threats to the entity and prepare contingency plans to address those threats. Values like conservation tend to be the values of the wealthy who have the education to appreciate their purpose and the quality of leisure to enjoy their product. The Bukit Baka-Bukit Raya National Park is located in a remote area where residents in general are poorly educated and their daily activities are dedicated to securing sufficient subsistence to survive. For any human being, immediate survival will always outrank values like conservation as a priority.

The integrity of any national park is also greatly dependent on the will of a government to maintain its borders. Economic pressure groups like timber lobbies and mining interests are often vocal in their advocacy for their activities to be encompassed within parts of a national park. Bukit Baka-Bukit Raya National Park secures a valuable timber resource and there is every likelihood that their might be mineral deposits within its confines. While a principal objective of management of the national park is to implement Government policy, it still has within its powers to publicise the park such that its value as a national asset is recognized throughout the nation and therefore that value should not be compromised by more immediate economic pressures.

Human Encroachment
The major threat to the Park's integrity is human encroachment which can take many forms. It includes:

- cutting down the forest for swidden purposes and then converting the swiddens to estate crops. This threat is exacerbated by the current rapid population increase being experienced by Dayak communities living in the vicinity of the Park. It is also contributed to by immigrant workers working for timber concessionaires who open up farms to supplement their income from the timber company and often stay after leaving the timber company to farm the land they have opened up (Map, Appendix 12);

- scouring the forest for valuable forest products. These once included the rhinoceros which has been hunted to extinction. It also includes products like gaharu which is already scarce, ironwood which is becoming scarce close to human settlements and valuable or attractive products like orchids;

- overfishing rivers and in particular using explosives or poisons to enhance catches;

- trapping valuable birds and rare animals for sale to live animal markets (Map, Appendix 12);

- profligate harvesting of mature trees for some minor benefit like bark to clad farm hut walls or fruit on a tree too dangerous to climb.

Illega Logging
A second serious threat is illegal commercial timber logging. The Kutai National Park presents an object lesson of how quickly an area can be illegally logged once roads are built close to a national park and portable sawmills become readily available (Map, Appendix 12). The illegal loggers also can constitute a serious hazard to the safety of Park officials endeavouring to do their jobs.

Illegal harvesting can also be done innocently and less innocently by timber concessionaires. Where boundaries are imprecise, it is not difficult to stray outside a concession area. Where production schedules have to be met, it can be tempting to take easily available timber from outside a concession area rather than access difficult terrain to obtain the timber (Map, Appendix 12).

Gold Mining
Gold mining is an immediate threat in both the Bukit Baka and Bukit Raya areas of the national park, particularly to the quality of the water there. The practice of using sludge pumps and mercury to separate the gold is now common in both the Katingan river and tributaries of the Melawi. Local communities pan for gold within the boundaries of the Park; so clearly there is gold in the Park and rivers which are amenable to being prospected with the use of sludge pumps. A major find within the national park would be likely to result in a gold rush of the kind and magnitude that has happened in Kalimantan Timur. As with illegal timber harvesters, determined gold prospectors can also present a serious hazard to the safety of anyone trying to prevent them from prospecting (Map, Appendix 12).

Fire
Fire represents a major threat during the dry season and especially during a long unseasonal drought as occurred in 1982 in Kalimantan Timur. Fires are an ever present hazard (Map, Appendix 12). Local communities use fire to clear ladang of vegetation along alang grasslands to encourage growth for cattle. For those communities already farming within the boundaries of the Park, such fires constitute an immediate hazard to surrounding vegetation. For those farming in the vicinity of the park, the fires can spread to ground level detritus and, if not controlled, spread deep into the forest as happened in Kalimantan Timur in 1982.

Exotic Species
Introduction of exotic fauna and flora have the potential to be a serious threat to any national park. Already, ponds created by roads constructed by timber concessionaires are being harvested for exotic fish like tilapea. Domestic animals like dog, cat and goat could become feral and invade the park. Many timber concessionaires are reafforesting with exotic species like acacia which could spread into the national park (Map, Appendix 12).

There are also a number of potential constraints to the Park developing effectively which are partly within the Park's control. They, therefore, should be addressed by this management plan.

Finance
Firstly and most importantly, sufficient finance is crucial for Park management to execute its responsibilities. In its formative years, Park management will be dependent on the Government either to provide or to arrange for funding. The availability of funding will be dependent on the priority that the Government gives to national park management. The Park has the additional difficulty of being located in two provinces and the consequent likelihood that any provincial sources of funding would be tied to expenditure budgets in that particular province.

While the Bukit Baka-Bukit Raya National Park is in its infancy, it will need a relatively high level of funding to establish itself. Facilities need to be built; staff need to be recruited and trained; the park's boundaries need to be surveyed and marked; programs need to be established and the basic research to survey the park's flora and fauna needs to be conducted. In this establishment phase, the Park

will find it more difficult to raise funds outside its government budget because it will not have had time to publicise itself for the purposes of raising outside funds.

Inexperienced Park Management
The national park service is still relatively undeveloped. It does not necessarily attract experienced personnel. The relative isolation of national parks tends to be less attractive to an ambitious and talented pegawai pemerintah than working in a central location where their capabilities will be recognised and rewarded with promotions.

In the case of Bukit Baka-Bukit Raya National Park, the management and workforce have to be built up from scratch. Good staff have to be recruited and trained, management systems and processes established and the values of the Park inculcated into staff. The learning curve will have to be high and, in the early years, allowances will have to be made for a number of mistakes as experienced is gained.

Absence of Provincial NGOs with Good Track Record in Community Development
Associated with this constraint is the absence of any organisations in West and Central Kalimantan with a good track record in remote community development. A major threat to the Park is human encroachment which is a direct function of population growth, ineffective land use technologies and a deteriorating land base. The economic development of local communities must be a very high priority of management planning for the Park in the early years so that the economic base of local communities is stabilised and they no longer require an increasing land base to meet their subsistence needs.That can only be done by effective community development programs which are probably best implemented with the assistance of NGOs.

Poor Information Base
An important constraint to management planning is the lack of an accurate data base to assist in planning. This management plan has, out of necessity, been based on a very incomplete set of data because surveys of the Park's various habitats and populations of species of flora and fauna have not been made. What species are threatened within the park is simply not known. Consequently, specific priorities and plans to address critical areas of concern cannot be made based on good evidence. The absence of such information also inhibits the ability of the Park to seek outside funds to assist it to address critical areas of concern.

Degraded Land
A related constraint is that some significant areas of the Park have been seriously degraded (Map, Appendix 11). Again surveys of these areas need to be conducted and specific programs established to rehabilitate them. This constraint is also related to the lack of information about threatened species because any rehabilitation program might most effectively be designed to concentrate on rehabilitating habitats for threatened species as a very high priority. The extent of degraded areas also has significant funding and cost implications for the Park.

## 6. MANAGEMENT AND MANAGEMENT POLICY

Bukit Baka-Bukit Raya National Park is planned to be a diverse resource with a number of potentially conflicting demands placed on it if they are not managed effectively. A key part of management policy flows from national legislation requiring the Park to be divided into a number of different activity zones. These zones are key mechanisms for interpreting which management objectives have particular priority in a particular area.

### 6.1 Objectives

The principal management objectives for the Park are given in table 6 below.

Table 6 Principal Management Objectives towards Achieving the Park's Goals

| Objectives Defined by: | Objectives |
|---|---|
| Primary Goal | ⊠ allow natural environmental processes to continue with the minimum of disturbance;<br>⊠ protect and conserve the natural environment and landscape, including water catchments, rivers and streams;<br>⊠ protect, maintain and, where possible, enhance wilderness values;<br>⊠ develop particular programs to protect significant flora, fauna and landforms;<br>⊠ manage and rehabilitate damaged habitats;<br>⊠ take positive action to reintroduce extinct natural species which formerly were resident in the Park;<br>⊠ develop data base by providing for and encouraging scientific research that is compatible with the goals of the Park;<br>⊠ take adequate precautions to prevent the loss of any part of the Park from fire;<br>⊠ take necessary steps to prevent any threat to the Park's integrity from illegal activities such as timber extraction and mining;<br>⊠ control and, where possible, eradicate exotic plants, animals and diseases; |



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| | |
|---|---|
| Secondary Goal | ⊠ establish and maintain a partnership with local Dayak communities in the management of the Park and in achieving the Park's primary goal;<br>⊠ conserve and protect sites and areas of cultural and historical significance;<br>⊠ accommodate traditional hunting and gathering practices so long as they do not conflict with the primary goal of the Park; |
| Tertiary Goal | ⊠ promote the wellbeing of local Dayak communities;<br>⊠ assist in the development of sustainable land use practices on the part of local communities;<br>⊠ minimise the impact of adjacent land uses upon Park values and recreation opportunities; |
| Promotional Goal | ⊠ provide a range of opportunities for appropriate recreational use, tourism and enjoyment of the Park;<br>⊠ promote the Park as a valuable world resource as a basis for fund raising activities;<br>⊠ promote an appreciation and understanding of the natural and cultural values of the Park; |
| Other objectives not related to specific goals | ⊠ establish an appropriate funding base to finance the Park's activities;<br>⊠ co-operate with National, Provincial and local authorities and residents of surrounding areas to enhance the Park's ability to make its planning and management consonant with their objectives. |

6.2 Strategies

The principal strategy for managing the Park is a series of zones to enable an effective approach to be developed to resolve conflicts between objectives such as the conflicts between local community land use, recreation activities and conservation (Map, Appendix 11). The zoning system in the Park, therefore, has been developed to:

- ⊠ identify which management objectives have priority within the Park;
- ⊠ provide a broad guide to the way in which the Park will be managed;
- ⊠ indicate the appropriate types and levels of use throughout the Park;
- ⊠ provide the basis for assessing the suitability of future management proposals.



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The most important strategies are summed up in table 7 below and are discussed in detail under different sections of this chapter.

Table 7 Summary of Major Strategies

| Strategy | Major Purpose |
|---|---|
| Zoning (6.2.1) | Enabling conservation through different intensities of park use |
| Economic development of local communities (6.2.5) | Reducing land pressures on the Park |
| Education (6.2.8.2) | Changing behaviours through understanding |
| Planning (6.2.8) | Enhancing financial security |
| Public relations (6.2.8.1) | Maintaining high profile |
| Publicity (6.2.8.1) | Securing visitor interest |
| Developing infrastructure (6.2.4.2) | Enhancing conservation management |
| Committed staff (6.2.9) | Enhancing conservation management and visitor appeal |

6.2.1 Zones

Six zones have been established as shown in table 8. Where possible, zone boundaries are defined by topographic features to make them more readily identifiable in the field. As better information becomes available, so the zones will be altered. Such alterations will be most important to protect the habitats of threatened species or to conserve some localised vegetation community. Given the undeveloped nature of the Park's facilities, most will have to be delineated by signs.

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Table 8 National Park Zones

| Zone | Major Purpose | Area | Percentage of Park | Map References |
|---|---|---|---|---|
| | | Ha. | % | |
| Core | Allow only natural change to occur. | | | |
| Wilderness | Conservation: limited recreation. | | N/A | |
| Utilisation | Recreation: conservation | | | |
| Rehabilitation | Rehabilitation | | | |
| Traditional Use | Traditional economic activities and conservation | | | |
| Collaboration-Buffer | Management of neighbouring land and conservation | | | |

As the zoning system is designed to serve as a basis for deciding between competing objectives, table 9 summarises the activities permitted in each zone.

The zoning system establishes a hierarchy of importance for conservation activities. The hierarchy should therefore be used as a fundamental tool in all planning, particularly with reference to ease of access. Consequently, roads for management purposes should be designed so that they do not provide anyone with easy access into core zones. Maps of the management road system should be restricted to Park personnel so that they do not provide references for visitors. The network of roads and other fire suppression facilities should also be designed for effective control and containment to prevent wildfires from moving into more restricted and therefore more important zone.

6.2.1.1 Criteria

The zoning scheme has been determined in light of an area's conservation significance (i.e. flora, fauna, geological, geomorphological and catchment values), wilderness areas, landscape quality, recreation values, land capabilities, access, degree of modification by the actions of humans and adjacent land use. The present zoning scheme is somewhat arbitrary given the lack of base data and reliable maps. It should be regularly reviewed as better information becomes available. A high priority for management will be to focus the collection of that information in the first five year's of the Park's operations.

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Table 9 Distribution of Activities across Zones

| Activity | Core Zone | Wilderness Zone | Utilisation Zone | Rehabilitation Zone | Traditional Use Zone |
|---|---|---|---|---|---|
| Conservation | Undisturbed area | Large undisturbed area which may include specific features of high conservation value | Some local areas of high conservation value | Range of conservation values | Some localised areas of conservation value |
| Rehabilitation | Not appropriate | Appropriate for rare or threatened species | Appropriate | Purpose of the zone | Appropriate |
| Habitat manipulation | Not appropriate | Appropriate for rare and threatened species | Appropriate | Appropriate | Appropriate |
| Fauna management | Appropriate for extinct species | Appropriate for threatened species | Appropriate for threatened species | Appropriate with overpopulation | Appropriate |
| Recreation facilities | Not permitted | Inappropriate except in exceptional circumstances to protect specific conservation values | Provision of recreation facilities appropriate | Not appropriate other than of a temporary kind to house workers | Provision for major overnight accommodation and recreation facilities |
| Recreation activities | Not permitted | On foot recreation with permits | All activities appropriate. Camping confined to camping sites. | Not permitted | All activities appropriate |
| Vehicle and boat access | Not permitted | essential management vehicles and non-motorised boats | Vehicles confined to roads. Power boats prohibited | Essential management vehicles only. Non-motorised boats can pass through on rivers | Vehicles confined to roads. All activities appropriate |
| Traditional hunting | Not permitted | Not permitted except in pursuit of wounded prey | Permitted | Not permitted | Permitted |
| Traditional foraging | Not permitted | Not permitted | Permitted | Not permitted | Permitted |
| Fire suppression activities | Except in exceptional circumstances, carried out in adjacent zones | Adjacent zones preferred or using methods which minimise disturbance | Appropriate | Using methods which minimise disturbance | Appropriate |
| Fire suppression methods | Eventually, aerial suppression preferred | Eventually, aerial suppression preferred | Hand crews and eventually aerial suppression preferred, but where necessary, mechanical suppression used | Eventually aerial suppression preferred | Mechanical suppression |

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Criteria for the determination of each zone are given in table 10 below.

Table 10 Characteristics of Zones

| Zone | Characteristics |
|---|---|
| Core | All park areas which are rich in species diversity, contain endemic species, or support endangered or rare species and fragile habitats. |
| Wilderness | All undisturbed park areas which contain threatened species and habitats and are capable of supporting scientific research and low impact tourism. |
| Utilisation | Park areas which can be managed to achieve the dual objectives of conservation while providing for a wide range of recreation activities and which can also support infrastructures for park administration. |
| Traditional Use | Settlement areas of local communities and the areas they currently require to meet their subsistence and economic needs. |
| Rehabilitation | All degraded habitats in the Park. |
| Collaboration/Buffer | Mixed use areas adjacent to the park which exert direct human and biological influence on park protected ecosystems. |

6.2.1.2 Zoning

There is a hierarchy of zones to enhance conservation strategies.

Core Zone

Principal Management Objective:

Keep all human interference to an essential minimum and ensure that as far as can be practicable, the only changes result from natural processes other than the possible reintroduction of extinct animals.

The Core Zone is a strict conservation area inside the national park. It is a biological sanctuary for fauna and flora to be reserved in perpetuity for scientific reference and study. It consists of undisturbed areas, valuable in biological diversity and species richness. The zone should contain representations of all



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national park habitats and ecosystems. It must also include fragile areas with high conservation priority and habitats of threatened, rare, or endangered species.

The core zone will be in the interior, east-central part of the park and include limestone hills and mountain tops with ericoid vegetation. All watershed catchments should be included in either the core zone or the wilderness zone to protect them from disturbance (Map, Appendix 26).

In accordance with the principal management objective, public usage or access to this zone is not permitted. Development within this area is restricted to maintaining already established foot tracks. These tracks are only to be used for patrolling and biological surveys required for management purposes.

Management actions in this zone will be confined to:

- ⊠ undertaking comprehensive surveys of flora and fauna in each core zone and establishing an ongoing monitoring program;
- ⊠ preparing management statements for each zone as soon as they are declared and surveys have been conducted of their importance;
- ⊠ prohibiting access except for required and essential management purposes;
- ⊠ effectively managing land bordering the zone to avoid interference with the zone;
- ⊠ closing selected tracks in these areas to discourage access;
- ⊠ encouraging appropriate research through PHPA and the Indonesian Institute of Science (Lembaga Ilmu Penelitian Indonesia--LIPI).

Wilderness Zone

Principal Management Objective

Conserve the unmodified state of these areas but also provide limited opportunities for small groups to enjoy the solitude of these areas.

The Wilderness Zone comprises remote and undisturbed areas of the Park (Map, Appendix 11). Recreational activities permitted in this zone include trekking under supervision of park guides and will require permits.

No business ventures or commercial activities will be permitted within this zone. Similarly, no motorised or mechanical transport will be permitted either on land or rivers other than for essential management purposes. Infrastructure development will be restricted to what is absolutely essential for the responsible management of the zone.

Essential management actions in this area will include:

- ⊠ fire suppression;
- ⊠ pest plant and animal control programs;
- ⊠ track and trail maintenance to the standards detailed in the plan;

- enforcement where there is a clear breach of the regulations such as unauthorised access by vehicles;
- monitoring of hazards such as pest plants and feral animals;
- approved research;
- monitoring of impact of visitor numbers in wilderness areas with particilar reference to camping sites;
- search and rescue.

Utilisation Zone

Principal Management Objective

Achieve the dual objectives of conserving the natural environment while providing for recreation and administration requirements.

Areas within this zone will be set aside for intensive recreational use consistent with the park's management goals and objectives.

Recreational areas should be located in sections of the national park with high visitor appeal (beautiful landscapes, rivers for bathing, forests with interpretation trails) and capable of supporting a fairly continuous flow of people (Map, Appendix 11). Physical facilities will be confined to campsites and trails will be maintained to confine visitors along corridors to limit their impact. A system of trails will be developed which can be used by people of different ages, different levels of fitness and different interests. As visitor interest increases, watch towers will be constructed to assist viewing of wildlife in the canopy.

An area within the Utilisation Zone will be allocated for the national park headquarters and support buildings (Map, Appendix 11). This area will also accommodate visitor centres, camping sites, service areas and other facilities such as drink and souvenir stands. Where licenses are franchised to private interests, the design of facilities must be approved by Park management and must follow the Park's building codes. No exotic plant species will be permitted in the headquarters' area and no chemicals or other potentially harmful products will be used to maintain the grounds.

Traditional Use Zone

Principal Management Objective

Assist local communities to develop sustainable agricultural practices on their current land base.

Traditional Use Zones include local settlements already established in the Park and land currently required for subsistence and other agricultural activities (Map, Appendix 9, 11). Common activities such as agroforestry, animal husbandry, home gardening, and harvesting of forest products are permitted within these areas. These communities have long enjoyed the amenity of the local rainforest and should be allowed to continue to do so so long as their activities do not conflict with the principal goal and objectives of the Park. The management objective of these zones is to assist the communities to change their agricultural practices so that they can

be managed on a more sustainable and less land hungry basis and to seek other economic pursuits either as partners in the development of the national park with park management or in areas which do not conflict with the principal goal of the Park.

The traditional use zones will not be expanded which will discourage immigration into the communities. The communities living in these areas will be given exclusive rights to continue traditional pursuits like hunting with spear or blowpipe and fishing with casting net or hook and line. Arrangements should be made to give members of the communities some authority to report people abusing their own exclusive rights.

Essential management action in this zone will be directed at:

- stabilising land use;
- introducing sustainable dry land agricultural technologies and practices;
- improving swidden technologies and seed to increase yields and reduce swidden sizes;
- developing sawah cultivation on land which can readily be converted to wet rice farming;
- developing other economic pursuits, possibly in conjunction with timber concessionaires to make the communities less dependent on food crops;
- encouraging social forestry in particularly fragile areas like riparian banks.

Rehabilitation Zone

Principal Management Objective.

Rehabilitate degraded land within the Park's borders or threatening the Park.

The Rehabilitation Zone will comprise degraded areas (Map, Appendix 9, 11, 12). It is a contingency zone to manage areas which have experienced some major catastrophe like a serious fire. It also will relate to areas of traditional use zones which have been over exploited and have reverted to alang alang Imperata cylindrica grasslands. In these areas, management practices such as habitat manipulation, reforestation, and reintroduction of indigenous species take place. Manipulation of degraded forest ecosystems should be limited to natural revegetation and protection until pre-disturbed natural conditions are reached. These areas will ultimately be reclassified according to their ecological functions and biological significance. Reafforestation activities are inappropriate to this zone.

Rehabilitation of alang alang grasslands should use Assisted Natural Regeneration techniques. Reafforestation activities within grassland areas should promote the use of local species whose ecological niche fits the area.

Collaboration-Buffer Zones

Principal Management Objective

Ensure that areas immediately surrounding the Park do not threaten the integrity of the Park.

Collaboration-Buffer Zones link the national park to adjacent land uses (Map, Appendix 9, 11). Currently these land uses are:

- forest extraction;
- swidden agriculture;
- smallholder livestock management;
- forest gazetted for different purposes.

The zones protect the Park from encroachments which threaten its conservation goals. As with the traditional use zone, much of the Park's efforts will be directed to stabilising local agricultural practices so that they become sustainable on present land bases. A second major priority will be to rehabilitate alang alang grasslands which present a serious fire hazard along the borders of the Park.

Boundaries of the national park should be clearly designated. A buffer of valuable fruiting trees like durian and illipe nut would present a clear indication of the boundary as well as being a valuable asset which is likely to be looked after.

Well managed Collaboration-Buffer Zones produce a number of benefits contributing to the effective management of the Park. They:

- expand suitable habitats for animal species with large territories;
- lessen frictions between nature conservation areas and adjacent incompatible land use systems by providing buffer belts for compatible activities;
- help improve the welfare of communities around the national park by providing ecologically viable alternatives to help meet their cultural, social, and economic needs;
- effectively manage local population pressures on land by providing practical socioeconomic alternatives.

6.2.1.3 Zone Boundaries

Establishing zone boundaries is a high level priority. They await good aerial photographs, the completion of reasonably accurate maps of the national park and surveys of the flora and fauna of the Park.

Core Zone

Delineation of core zones are critically dependent on surveys to determine areas of particular flora and fauna importance. Until they have occurred, core zones cannot be determined.

Wilderness Zone
The Wilderness Zone is dependent on reliable aerial photographs and maps. It is likely to encompass the major mountains in the Schwaner Range.

Utilization Zone
A potential site for recreation areas and for locating national park headquarters is on the park's north-west side in the Ella Hulu river watershed. Boundaries for this zone are likely to include watershed mountain ridges.

A tourism corridor to Bukit Raya exists between the village of Nanga Jelundung, in West Kalimantan, and the mountain peak (Map, Appendix 11). This corridor runs along the Serawai river headwaters and transects fragile and biologically rich areas which are likely to be included in the Core Zone. A small use-area could be established at the end of the corridor and peak of Bukit Raya. Boundaries for these areas have not been traced.

Traditional Use Zone
The villages of Malawan/Sebaung and Tumbang Tabulus in Central Kalimantan both appear to have lands within the Park's boundaries (Map, Appendix 11). Other villages might also have, but confirmation must await detailed aerial photographs and maps. Boundaries will be drawn around the area modified for agricultural purposes and an additional shallow buffer zone will also be included in the traditional use zone to allow for extraction of timber for local use and to protect the unchanged parts of the Park from reasonably intensive human activities.

Rehabilitation Zone
Degraded areas exist mainly in the north-western and south-eastern parts of the Park (Map, Appendix 11). Their status would have first to be established because some of them might be more appropriately classified as traditional use zones. They also need to be surveyed before boundaries are established and management programs designed to upgrade them.

Collaboration-Buffer Zones
These zones are located on the periphery of the national park and comprise:

- protected forests (hutan lindung and cagar alam);
- concession forests (hutan produksi);
- local agricultural lands.

Boundaries for these areas depend on habitat and species diversity surveys, on land use systems and on the current state of the land. For example, alang alang grasslands near the Park would be included because of the danger they represent as a fire hazard.

6.2.2 Conservation of Carrying Capacity of Ecosystem
Conservation of the ecosystem is the central task of park management given that the primary goal of the Park is to protect and maintain a natural and self-sustaining tropical rainforest. Land and water resources must be conserved to sustain the natural flora and fauna dependent on them.

First, one of the major weaknesses of the Park, that is incomplete data about the Park's ecosystems, requires to be addressed. In the early years of this 25 year plan, there will be a high priority to survey the Park's land and water systems and

its biological inventory. The biological inventory will need to be updated regularly through the period of this plan and would be done by the Park's own staff, assuming the resources are available. The Park will require outside help to prepare the initial inventories, given the extent of the task and the early stage of the Park's organisational development. Two kinds of inventory, therefore, will be conducted:

- complex ones which will require the services of experienced professionals or scholars and would usually be undertaken by foreign or Indonesian researchers. The surveys should be used as an opportunity to train Park staff in survey techniques and in conducting biological inventories. They might also be used as an opportunity to train educated local people in such techniques so that a pool of local labour is established which might be called upon by Park management to assist in their own surveys. The surveys would also be an opportunity to inculcate conservation values to some of the better educated residents in local communities;

- regular ones which will be conducted by Park staff. A major focus of these surveys will be the status of rare, threatened, and endangered species.

6.2.2.1 Land

The Park contains a variety of geological and geomorphological features and ongoing processes which are important for an understanding of the composition, origin and dynamics of the landscape of the region. Waterfalls, limestone hills and caves and heavily dissected country present major opportunities for interpretation. Sites of major interest need to be surveyed, mapped and recorded. Research into these features and processes needs to be encouraged as a low priority.

Management action towards those areas of significance should be focused on:

- preserving the scenic and other values of these sites;

- interpreting the geological and geomorphological features of the area through on site information and publications;

- preventing fossicking and removal of stones, fossils and other specimens except in the case of approved research.

6.2.2.a Soil Conservation

The topography of the park of highly dissected country, heavy rainfall precipitation and fast flowing streams and rivers will result in serious erosion of any land which has lost its forest cover. In the Park, the most seriously threatened land is along river banks where swiddens have been cut or localised timber extraction activities have occurred. These strips will be classified as rehabilitation zones and a high priority of Park management will be to establish appropriate rehabilitation programs concentrating on enrichment planting of local riparian species. Monitoring programs of all river banks in the traditional use zones will be important to ensure that the integrity of river banks is conserved.

6.2.2.b Habitat Restoration and Management

The park zoning scheme reflects the necessary requirements for habitat restoration and management. Rehabilitation zones are established for the specific purpose of restoring native habitats and the core, wilderness and utilisation zones are designed to manage habitats in line with good conservation practices. A major

aspect of habitat management will be the monitoring of visitor impacts on habitat in the utilisation and wilderness zones.

A crucial focus for habitat restoration and management will be in the traditional use zones where the bush/fallow cycle has become too shallow and the swidden lands show evidence of either being or becoming seriously degraded. Programs will be developed of enrichment planting of local perennial species which communities are unlikely to fell because of their valuable produce such as illipe nut, durian, manggo and other fruit trees.

A second focus of habitat management are important habitats for particular activities of some animals like mating or nesting. In some cases, like for example, bat caves management action will be limited to restricting or prohibiting access by visitors. In other cases, specific programs will be developed for a threatened or rare species to ensure that habitats for essential activities are absolutely protected.

6.2.2.2 Hydrology - Water Resources and Catchment Areas

The Melawai and Katingan catchment areas are essential elements of the Park (Map, Appendix 4). These catchments have the potential to be used as reference catchments against which to measure the condition of disturbed catchments elsewhere and especially of the Melawai and Katingan rivers below the Park boundaries. The catchments provide a habitat for a diverse population of fish, reptiles and threatened mammal species like the otter. Additionally, each of these catchments provide opportunities for leisure activities both in the context of adventure on the fast flowing streams and for the uncrowded enjoyment of some of Kalimantan's unspoilt rivers.

The catchments contain elements of high intrinsic value to the Park, including:

- recreation potential for canoeing and rafting;
- scenic landscapes;
- flora and fauna values;
- sites of geological and geomorphological significance;
- cultural heritage sites of local Dayaks.

Appropriate management of river catchments is linked to the management of vegetation cover particularly along the banks and the protection of the soils in the catchment area to prevent run off. Infrastructure developments such as the building of camp sites and bridges across rivers, have the potential to reduce water quality. The construction of roads and bridges also have the potential of introducing noxious weeds into areas of the Park. Human settlements within the Park, particularly with regard the treatment or disposal of human waste also can have serious negative impacts on water quality. Other human activities also need to be managed carefully, particularly with regard to sustainable fishing by local communities and gold panning.

Management requirements for conserving rivers, catchments and water quality relate to other areas of park management and, consequently, are addressed in the following sections of this plan:

- fire control (6.2.3.1);
- rehabilitation of degraded areas ((6.2.1.2);
- management of local hunting and gathering activities (6.2.5.2);
- road and bridge construction (6.2.7.1);
- settlement management (6.2.5);
- infrastructure development (6.2.4.2);
- recreation activities (6.2.4.2).

6.2.2.3 Flora and Fauna

Effective flora and fauna management is absolutely linked to effective habitat management. Conservation depends on maintaining suitable habitats to support genetically viable populations of species. The Park Zoning Scheme, supported by individual programs to conserve threatened or vulnerable localised species, will reflect conservation requirements.

Initially, flora and fauna management of the Park is constrained by the lack of existing information. Given the richness of the biodiversity of a tropical rainforest, that information will need a major program to collect and will be some time in coming, particularly information on flora. Management of the collection of this data, in the early years of this plan will have to balance the need to obtain sufficient data so that initial zoning can be completed and the need for sufficiently detailed data to understand the complex interactions of particular ecological niches of the rainforest. Data collection strategies should also focus on giving priority to addressing areas or species known to be under threat. This might direct initial surveys and research to biologically less interesting areas of the park but ones which it is crucial for management to develop appropriate plans to minimize or control the threat. The program will also require substantial funds which might be more readily obtained from sources outside government. The early years require quick accurate surveys and reports. Consequently, the research is not particularly appropriate for students studying for higher degrees.

Management action should be directed to:

- designing and implementing research and survey programs to produce basic data of fauna;
- producing a comprehensive description of Park flora and their ecosystems;
- mapping flora communities;
- identifying reference groups of vegetation communities to be included in core zones;

- giving priority conservation efforts to endemic species which are sole taxonomical representives and to keystone species, top predators, important seed dispersing species and pollinating species;
- incorporating new locations of rare or threatened species into core zones or protected areas;
- surveying proposed development sites, tracks and trails and other infrastructure for significant species of flora. Areas where significant species are found or are already known to occur will not be disturbed;
- managing threatened and vulnerable fauna species as per table 11;
- undertaking fauna surveys, concentrating on locating threatened species and developing specific management actions for protecting them;
- undertaking feral predator control;
- prohibiting the release of exotic fish anywhere in the general vicinity of the park and particularly within the collaboration/buffer zone;
- effectively managing the habitat on the periphery of the park for animals which live on the fringes or operate across wide areas like eagles and owls;
- conducting local and regional awareness programs on species protection for local communities, timber concessionaires, and visitors;

Table 11 Management of Threatened Fauna Species

| Species | Status | Habitat Requirements | Management Actions |
|---|---|---|---|
| Rhinoceros (Dicerorhinus susmatrensis) | E | Wet lowland primary forest up to about 800 metres and riparian vegetation. Requires extensive range. | Survey potential habitat. Relocate breeding pairs. |
| Tembadau (Bos javanicus) | E | | |
| Orangutan (Pongo pygmaeus) | D | Pristine rainforest with fig trees forming major part of diet. Requires extensive habitat. | Maintain core zone and wilderness areas. Selective planting of fig and other fruit trees in rehabilitation zones. |
| Clouded leopard (Neofelis nebulosa) | D | | |
| Marbled cat (Felis marmorata) | D | | |
| Colugo (Cynocephalus variegatus) | D | | |



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| | | | |
|---|---|---|---|
| Slow loris (Nycticebus coucang) | D | | |
| Western Tarsier (Tarsius bancanus) | D | | |
| Hairy nosed otter (Lutra sumatrana) | D | | |
| Smooth otter (Lutra perspicillata) | D | | |
| Oriental otter (Aonyx cinerea) | D | | |
| Wrinkled hornbill (Rhyticeros corrugatus) | D | | |
| Helmeted hornbill (Rhinoplax vigil) | D | | |
| Barred eagle owl (Bubo sumatrana) | D | | |
| Great argus (Argusianus argus) | D | | |
| Bulwer's pheasant (Lophura bulweri) | D | | |
| Sun bear (Helarctos malayanus) | V | | |
| Bornean gibbon (Hylobates muelleri) | V | Primary forest under enclosed canopies. Localised small territories. Breeding pairs. | Protect core and wilderness zones. |
| Agile gibbon (Hylobates agilis) | V | Primary forest under enclosed canopies. Localised small territories. Breeding pairs. | Protect core and wilderness zones. |
| Red leaf monkey (Presbytis rubicunda) | V | Primary and mature secondary forest and access to riparian ecosystems. Wide range. | Maintain core and wilderness zones. Some selective plantings of food trees in degraded riparian areas. |
| Pangolin (Manis javanica) | V | | |
| Rhinoceros hornbill (Buceros rhinoceros) | V | | |



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| | | | |
|---|---|---|---|
| Blyth's Hawk Eagle (Spizaetus alboniger) | V | | |
| Black eagle (Ictinaetus malayensis) | V | | |
| Black breasted triller (Chlamydochaera jefferyi) | V | | |
| Crested fireback (Lophura ignita) | V | | |
| Grey leaf monkey (Presbytis hosei) | R | Primary and mature secondary forest and access to riparian ecosystems. Wide range. | Maintain core and wilderness zones. Some selective plantings of food trees in degraded riparian areas. |
| Crested serpent eagle (Spilornis cheela) | R | | |

| | |
|---|---|
| CODE: | |
| Extinct | E |
| Endangered | D |
| Vulnerable | V |
| Rare | R |

6.2.2.3a Populations and Distribution

Flora and fauna populations and distribution need to be ascertained throughout the Park (Map, Appendix 6,7). The major objective of the fauna and flora research program are to establish populations and distribution with the major priority any threatened or rare species. Once populations and distribution have been determined, individual programs must be developed to manage any critical or endangered populations. The effectiveness of each program should be monitored appropriately.

One major threat to flora and fauna populations are the activities of humans (Map, Appendix 12). A list of important species which require protection should be developed as a high priority for early management action. The list should be refined as better information becomes available. The list would include flora like ironwoods and any threatened animal species. Rules might also be required to protect young fish of certain species, requiring them to be returned to the river if caught. To be effective, these requirements should be supported by educational programs directed at local communities with hunting rights and eventually they would form part of the overall educational and information package which would be made available to visitors at interpretation centres.

6.2.2.3b Species Relocation

Species relocation refers to two situations:

- the trapping of certain species not under threat in the park for relocation to other parts of Kalimantan;



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- the reintroduction of extinct species to the park.

Principal Management Objective

Reintroduce wherever practicable extinct natural species which formerly were resident in the Park

The Park and surrounding areas have only a limited number of natural predators. Consequently, there is a danger that certain species might increase to a non-homeostasis situation. In such cases, seasonal harvesting will be required and, for those animals endangered in other national parks or cagar alam in Kalimantan, a program of trapping will be introduced to assist other parks build up their populations to safe numbers.

If opportunities arise, management action should be addressed to relocating species known to have been native to the park which have become extinct. A careful program should be designed to interview local communities about such species. It will be important to conduct the program as a high priority because it should be targeted at old men whose knowledge of native wildlife in the Park has a considerable time depth. Three species of fauna which need to be confirmed are the rhinoceros, wild cattle and dugong. In the case of wild cattle, a program should be initiated as a very high priority as there are still a few wild cattle in areas of Kalimantan outside national parks and protected areas. Given the lack of protection, they must be regarded as very vulnerable.

As a low priority, captive breeding of wildlife such as bearded pig, sambar deer, barking deer and butterflies should be promoted to local people as a potential economic activity. Planting of wild species of economic value such as rattan and illipe nut should also be promoted.

6.2.2.3c Species Rehabilitation
Species rehabilitation programs will be established for all threatened species within the park. These programs must await good information about Park biodata. As such information becomes available; so individual programs will be developed to address any threatened species. Some of these programs will be linked closely with species rehabilitation zones such as those along riparian belts where certain species of flora might be threatened.

Management action should be directed to:

- identifying all threatened species and collecting and refining available information regarding the species;
- developing research plans for priority species and encouraging national or international institutions to participate in the program;
- conducting research on limiting factors for priority species sustainability;
- developing individual management plans which include such factors as capturing and harvesting methods, seasonal population distributions, extractive measures, and locations;
- designing and implementing a monitoring system to monitor change as a basis for management action;

- as the information collection programs are completed and park management is placed more on a care and maintenance basis, establishing a wildlife research and rehabilitation centre.

An enrichment program of species of value to local communities should also be developed to ensure that populations of these species meet local needs. Such species would include edible palms and ferns, sago, species used for firewood, medicinal purposes and boat building, rattan and fruit.

6.2.3 Prevention and Suppression of Hazards

Until very recently, there were few external threats to the integrity of the national park due to its isolation from the acts of humans. Since the extensive forest fires in Eastern Kalimantan, one can no longer be sanguine about the low risk of fire. With human settlements and activity surrounding the park other risks must be planned for. Invasion by exotic species is now a very real risk and is likely to increase in time as human activity increases (Map, Appendix 11). Goats are already husbanded close to the park and they have the potential to be very destructive if they become feral. Allowed to roam free on the fringes of the park, they also have the ability to retard the natural process of regeneration of the rain forest. The presence of fish ponds has resulted in exotic species of fish getting nearer to the rivers running into the park. Settled agriculture techniques can result in the introduction of new flora species like cover crops, some of which have the potential are posing a very serious threat to the park. It is therefore very important to develop programs to head off these threats, preferably as far away from the borders of the park as possible. A major priority of the prevention program is to develop education programs for government workers, especially in the agricultural extension field and in BAPPEDA and for the members of local communities so that they become aware of the hazards and modify their plans and behaviours accordingly. For prevention purposes, Park management should liaise regularly with local officers of government departments in the agricultural sector so that they become aware of any plans to introduce new crops, livestock or agricultural management methods into any of the local communities and are able to advice the departmental officers if there are any risks.

Principal management objective

Prevent the invasion of any potential hazard into the park.

The prevention and suppression program will always be a high priority program of Park management. Where outbreaks occur, especially of fire, this program should have priority over all others and all the resources required to suppress the outbreak should immediately be assigned to the program.

6.2.3.1 Forest Fires

The major threat from fire comes from the activities of local communities farming swiddens or grazing alang alang grasslands on the boundaries of the Park. Once the Park is opened for visitors, they might constitute a secondary threat if they become careless in the use of fire.

So long as alang alang grasslands remain close to the Park, there is a strong case for a program of active burning in the collaboration/buffer zones. Such burning should be managed with the communities in whose territories the grasslands are to avoid damage to their livestock or to members of these communities unaware of the timetable of the program.

Equally importantly, a program should be established to introduce effective fire management techniques to all the communities living in the vicinity of the Park. On the basis that uncontrolled or badly managed fires represent a hazard to every landowner in a community, to be fully effective, such techniques should be bound into each community's adat rules so that they become the required practice of everyone in the community.

The operations of timber concessions close to the Park also present a potential fire hazard as the fallen timber which is not harvested provides good fuel for wildfires. Park management will require an effective fuel reduction program where the detritus from timber activities represent a potential fire threat to the Park.

For fire suppression, the zoning system represents a hierarchy with each successive level being more important to prevent fire from entering into it. Consequently, the prime target for fire suppression given that the greatest danger emanates from activities outside the Park, is in the collaboration/buffer zones and the traditional use zones. Once the fire has passed beyond these boundaries into utilization zones, facilities should be established to prevent it from reaching the wilderness zone and, subsequently, massive efforts should be made to prevent any fire from reaching a core zone because of its inaccessibility and its importance as a unique reference area.

Fire suppression activities require good preparation and planning. Their sophistication will increase with the development of the infrastructure of the Park and the availability of better access to good fire fighting methods. Eventually, helicopters will constitute the most effective defence against wildfires. Organisationally, it is very important that a senior officer of the Park be made Officer-in-charge of fire suppression operations. In a fire emergency, this officer would take control of all staff necessary to fight a fire.

Table 12 Development and Management of Helipads

| Location | Zone | Priority | Action |
|---|---|---|---|
| | | | |

Suppression measures also have a downside. They have the potential to degrade habitats, to impair wilderness and landscape values, cause soil erosion and facilitate the spread of other hazards such as noxious weeds. Sensitive design and construction of necessary facilities therefore are necessary with a major emphasis on immediate rehabilitation of land disturbed in the construction process.

Suppression planning involves the construction of access roads, control lines and, eventually, helipads which will enable personnel to be rapidly deployed to remote sites and also to service helicopters for fire bombing work and reconnaissance work. Helipads should therefore be located close to a water source. The alternative

degradation as well as producing an area of still water in which mosquitoes and other vectors might breed. Table 12 sets out the priorities for the development and management of helipads.

Table 13 sets out a set of management actions to minimize the risk of fire and to fight it effectively should it break out.

6.2.3.2 Pests, Plagues and Diseases

There is little information about the threats from introduced species of fauna and flora in the park and about the incidence of disease. Research workers should be required to investigate the incidence of introduced species and disease in the areas in which they work and a data base built up of such incidence. As threats are identified; so a program to eradicate it should be established and implemented as quickly as practicable.

Two threats can be identified and measures must be taken to control them:

- breeding of goats which, if allowed to forage into the park could cause serious environmental damage. If sufficient numbers became feral and established in the park, they would be very difficult to eradicate. A program should be established to discourage local settlers from keeping goats. For those that insist on doing so, an education program should be established to ensure that they keep their goats tethered and bring fodder to them. Currently, the number of goats in local communities is small. There is consequently an opportunity to purchase them all for a small outlay. It would have to be understood, however, that the Park would not represent a future market for goats;

- rabies which first infected dogs in local communities in Central Kalimantan in 1991 is a serious threat to Park wildlife. The Park should actively encourage the local programs of inoculating domestic animals against rabies and should monitor captured Park wildlife to determine whether or not it has already entered the fauna population of

Table 13 Management Actions Required for the Effective Management of Fires

- Establish effective fire management practices and programs with local communities;

- Establish clear boundaries between the park and traditional use and collaboration/buffer zones by constructing a 5 metre wide control line and planting a 20 metre deep buffer area with fruiting trees of value to local communities. The buffer area should be kept free of weeds and undergrowth;

- Establish effective programs to control incidence of fuel left on the ground after wood extraction activities and minimise fire risks at all camping sites by:

  - establishing and adhering to fire protection regulations in the design of all camping sites and picnic areas;
  - banning open fires in all camp sites and providing appropriate refuse bins in all sites and keeping them cleared;
  - keep picnic and camping sites cleared of weeds and other tinder and maintain patrols to ensure that visitors adhere to fire regulations;

- Develop an education program on the hazards of fire in the national park for display in the Visitor Information Centre and in particular for local communities;

- Undertake increased patrols of areas of high public use during drought;

- Control all wildfires as an immediate and principal management priority. Control should concentrate on the most effective measures with the least potential for environmental damage. Preference should therefore be given to:

  - use of hand tools and aerial suppression;
  - development of a system of helipads to enhance fire suppression capacity;
  - design of road and track system to serve also as fire control lines;

- Prepare a fire suppression plan and map which should include:

  - road and track standards;
  - location of helipads and all water sources;
  - travelling times to key points from all centres and emergency plans to prevent fires from entering into core zones;
  - forward plans for the construction and development of new control lines and helipads;
  - preferred suppression methods and emergency procedures to deal with the outbreak of fire;
  - a training program to ensure all Park staff are well trained in all fire suppression methods, including an annual retraining program and regular practices for mobilising for fire suppression activities;

- Establish local fire fighting forces in local communities to supply additional resources in the outbreak of serious fires. These forces should be trained and should have regular practices, particularly during the traditional burning of swiddens in June to August and when alang alang grasslands are fired;

- Monitor the impacts of fire on flora and fauna, erosion, stream sedimentation and the onset of weeds, especially where controlled burning occurs and Keep detailed records of all planned and unplanned fires which occur in the Park and incorporate this information into the Park database.

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An active program to discourage the use of invasive species in local communities and by staff of timber concessionaires should be developed backed up by education programs demonstrating the dangers targeted at timber contractors' staff and local communities. These programs should also be run in Visitor Centres so that visitors are aware of the dangers of introduced species to the integrity of the park.

The appearance of exotic species should carefully be monitored in the Park's monitoring and control programs. Park staff, consequently, should be trained to recognize the most likely pests or their traces so that reports can be made if they appear and appropriate management action taken.

Disease control should always employ environmentally friendly methods. Any proposed biological agent to eradicate some disease should first be approved by the Director General of Forest Protection and Nature Conservation.

Particular care should be taken in the construction of roads, tracks and other facilities to ensure that tracks and verges do not become infested with weeds.

6.2.3.3 Erosion

Erosion is a natural environmental process and, over millions of years, has been a dominant force in shaping the landforms of the Park. Accelerated or unnatural erosion, however, represents a threat to the Park and particularly to its water sources. The major threats occur in traditional use and collaboration/buffer zones where the farming activities of local communities have reduced the forest cover sufficiently to increase the danger of erosion. They have also felled much of the tree cover along riparian belts and, towards the borders of the Park, river bank erosion is already well established. Management actions to address these problems have been described in section 6.2.2.1b on habitat restoration and management.

A second potential source of erosion is in the construction of roads and tracks. Roads and tracks, consequently should be designed and routed where they will minimize the danger of erosion. Cuttings should be avoided except on the scenic drive road, where the escarpments should be engineered to minimize the danger of erosion and weed intrusion. The construction of adequate drainage along all roads is very important and run offs should be carefully designed so as not to concentrate water flows. Erosion control would be enhanced by restricting vehicular access to all unsealed roads and tracks during the wet season and periods of heavy rain.

6.2.3.4 Other Threats

There are a number of other threats to the Park's integrity. Some of them can be addressed locally. Others need to be anticipated in management planning and appropriate programs designed to minimize their likelihood.

A potentially serious threat to any Park's integrity is legislative, regulatory or policy changes at the centre. Such changes could result in different levels of protection being accorded a park, access being given to commercial interests, changes to the Park's border and, most importantly, changes to the Park's budget and the priority the Park enjoys in overall government programs. Park management, consequently, must establish a presence and an ability to influence the centre so that it remains sympathetic to the Park's needs and objectives. Much of the influence will be consequent on the quality of the Park's management and its capacity to establish and maintain the Park as a centre of excellence so that it is recognized by the scientific community as a resource of great value and importance. This threat can be addressed by an effective public relations program which is discussed in section 6.2.8.

Illegal Extractive Activities
Such activities would comprise illegal timber operations. To be able to counter this potential, roads or tracks need to be built which circumvent the park boundaries so that any new access points or usage can be monitored effectively. Regular patrols of the Park's boundaries should be carried out and all roads leading into the park should be regularly examined for evidence of undue activity (Map, Apendix 12). Local communities should also be encouraged to report such activities as part of their partnership with Park authorities. The success of these activities is crucially dependent on the ability of the police to prosecute offenders and the deterrent value of subsequent penalties.

Other Extractive Activities
The use of sludge pumps and mercury to prospect for gold would result in serious damage being done to water quality and riverine wildlife. All mechanised mining activities should be prohibited which would include visitors using mine detectors to search for gold deposits (Map, Appendix 12).

Parasites
Parasites invade host flora and are an important life form in the tropical rainforest. They weaken the host plant by diverting the flow of water and mineral nutrients thus impeding the plant's growth and, in extremis, they will eventually kill it. They are very much part of the natural process of regeneration and growth in the tropical rainforest. It is possible, however, that there are some threatened species which will need to be protected from parasite invasions. In such cases, programs should be developed to protect the plants from parasites and might include such control approaches as injecting trunks with appropriate herbicides.

Poaching
Hunting, fishing and foraging is strictly restricted to members of local communities. It is also restricted to utilisation zones and within their own traditional use zones (Map, Apendix 12). Trapping of live animals is prohibited. Local communities should be encouraged to form part of the Park's control measures to prevent such activities. Visitors to the park will be supervised as much as is realistically possible and will be monitored because access into the park will only be available from certain points. Local communities will provide guides to visitors wanting to enter the wilderness zone or traverse the park and will be able to discourage any prohibited activity. Local communities and patrols should be constantly alert to people trying to enter the park for illicit purposes. As rivers currently are the most probable means of entering into the park, posts should be established on any river which does not flow past the settlement of a local community.

6.2.4 Utilisation
There is little tourism to the park and no facilities to accommodate it. Short term prospects for the park to be a major tourist destination are poor. The numerous natural and cultural features of the Park together with its basic richness in flora and fauna provide a good solid basis for developing programs to encourage tourism. Its many unique features are special attributes which have great appeal in a very competitive tourist market. Obviously, the reintroduction of major mammals like the rhinoceros would increase the potential. The tourist market, however, requires very careful development. Where funds are restricted, there is always a great temptation to target the poorer end of the market which would result in greater numbers of tourists requiring less comfortable facilities. Their numbers might result in serious pressures on aspects of park management and, consequently, their benefit costs would not be great. The luxury end of the tourist market would

result in fewer environmental pressures but would also require expensiv infrastructure development. An important factor to take into account whe considering the development of tourism are the opportunities it presents for th economic development of local communities where volume might be important.

As with all other sectors of park management, information about tourism potential is insufficient. Any plans for tourism and the consequent investment in facilities should be made in light of good information about potential and market. Consequently, a high priority in the development of a tourism program is to conduct a market survey of both short and long term potential.

Development of tourism facilities should be a high priority in the Park's development because, in addition to the income it would bring to the Park, it would also help to raise the profile of the Park to an international audience. Such a profile would facilitate the Park's ability to raise finance for programs from sources outside central and provincial governments. It would also find it easier to manage threats to its integrity like illegal logging because such activities would give rise to both national and international concern.

Principal Management Objective

Provide a range of opportunities in remote and natural settings which will enable visitors to experience the Park's richness without threatening the principal Park values.

Management for tourism will preserve the remote and undeveloped character of much of the Park while providing good access to some areas of rich biodiversity and, in particular, to species unique to Kalimantan, which will enable visitors to enjoy and appreciate an undisturbed rainforest as well as some of the spectacular scenery of the park.

This plan recognizes the major developments that are likely to occur in the next twenty five years in relation to access to the park and its becoming a local amenity certainly for Pontianak as road access is improved and car and motor ownership becomes common. Reflecting the Park zoning scheme, opportunities for intensive recreation use will decrease as one moves from points accessible by road to more remote areas of the Park (Map, Appendix 1,11,). Particular locations distant from roads like upriver sites for launching canoes or rafts will be provided with low key facilities consonant with the remote and undeveloped nature of the Park. The planning for such locations must await more accurate mapping of the Park and surveys of features outside the core areas of the Park which have potential for recreation.

6.2.4.1 Object Management/Cultural Sites

There will be a number of object and cultural sites within the Park which will need to be mapped and catalogued. Programs will then need to be developed to conserve them. Old sites of Dayak settlements, graveyards and mortuary monuments will be found within the boundaries of the Park and suitably conserved will become additional sites of visitor interest (Map, Appendix 10). There is a high priority to address this area, because old Dayak burial sites with their carved ossuaries and statues are very attractive targets for illicit suppliers to the global artefact market. Important objects which, if left unsupervised might be stolen, should be housed in visitor centres or local museums constructed in local communities and replicas located in the cultural site. A research program should be initiated to catalogue each site from information derived from local Dayak groups.

Table 14 gives the location of Dayak sites which require management action to conserve their heritage value. The table should be kept updated as more information becomes available. Care should be taken not to divulge the location of sites where objects might be at risk from thieves. Maintenance of sites away from villages should be included in the annual work plans of Park management.

Table 14 Management of Dayak Cultural Sites

| Location | Heritage Interest | Map Reference | Management Action |
|---|---|---|---|
| Nanga Siyai<br>Nanga Jelundung | Longhouse | | ⊠ Assist and advise in repair and renovation using local materials |
| Nanga Siyai<br>Nanga Juoi<br>Malawan<br>Kiham Batang | Ossuaries<br>Shrines<br>Patung | | ⊠ Where rotting treat with appropriate anti rot agent.<br>⊠ Renovate where appropriate |
| Below Sebaung Tua | Ossuary<br>Patung | | ⊠ Produce a copy of the original. Remove original to safekeeping in HQ and replace with copy.<br>⊠ Keep site cleared of undergrowth. |

6.2.4.2 Development of Facilities and Activities

The Park headquarters will be located at an easily accessible location on the boundary where most day visitors would be expected to come (Map, Appendix 11). In time, subsidiary centres should be constructed on other boundaries to accommodate visitors arriving from different directions. The headquarters will inlcude an office, maintenance shops, stores, garages, radio room, housing for NP employees, power lines, powerstations, watersupplies, and jetties.

The headquarters' complex should also include a Visitor Centre.

Objective of Visitor Centre

Provide visitors with information about the Park's natural history, its fauna and flora and of Dayak adaptations and culture in and around the Park.

The Centre should aim to become a small natural history museum focusing on the Park and the human cultures which have flourished in the area.

Basic facilities will be provided in the Park consistent with maintaining its remote and natural character. As part of the theme of the Park is the interaction between Dayaks and the Kalimantan forest, most facilities for tourism will be located within easy access of Dayak villages which will:

- ⊠ enable tourists to participate in Dayak cultural activities, principally in the evening;



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- provide tourists with easy access to Dayak guides for excursions into the Park;

- give Dayak communities an opportunity to manage tourist facilities as one of their economic or commercial enterprises.

Dayak communities will require to be trained to act as guides for parties of tourists. That training would not include foreign language training as tourists would be expected to avail themselves of official interpreters prior to visiting the Park. In time, Dayak communities will acquire sufficient foreign language skills to be able to act as guides without the support of interpreters.

Table 15 lists the most appropriate Dayak settlements for tourist development and also gives the attributes of each settlement.

Table 15 Appropriate Locations for Tourist Accommodation

| Settlement | Attributes |
|---|---|
| Kalimantan Barat | |
| Nanga Siyai | Longhouse<br>Ossuaries<br>Handicrafts |
| Belaban Ela | |
| Belaban Dalam | |
| Sungkup | |
| Nanga Judi | Ossuaries<br>Shrines |
| Nanga Jelundong | Longhouse |
| Kalimantan Tengah | |
| Kiham Batang | Old ossuaries<br>Shrines<br>Vibrant music/dancing<br>Kaharingan religion |
| Tabulus | |
| Malawan/Sebaung | Extant traditional dwellings in settlement and swiddens<br>Old ossuaries<br>Shrines<br>Vibrant music/dancing<br>Kaharingan religion |
| Tumbang Kaburai | Handicrafts |

If the Park is to target the quality end of the tourist market, overnight facilities must be comfortable while remaining simple. Preferably, they should be a development of traditional Dayak dwellings, upgraded to accommodate basic modern conveniences. Building materials should be in local timbers to reflect traditional Dayak forms.

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Areas within the Park will be set aside for simple structures modelled on Dayak swidden huts to accommodate tourists exploring within the Park's boundaries. The huts will be serviced and maintained by the Dayak communities managing a particular trek or trail. The huts should be located close to a water source and would be serviced for waste disposal.

Day Visitors
Proximity to local towns and the scenic and other attractions of the park will draw day visitors to the park. Day visitors should be encouraged to enter the park through its headquarters which will provide information and recreational facilities designed to meet the needs of such visitors.

Camping Sites
Managed camping sites will be provided along trails to major points of interest like Bukit Baka and Bukit Raya and to accommodate any visitors wanting to traverse the Park. All camping grounds will be serviced for waste disposal and visitors will be charged for the amenity. Cooking should be confined to kerosene or gas stoves which will be available for rent at entry points to the Park. Table 16 sets out minimum standards for camping sites within the Park.

Table 16 Minimum Standards for Camping Sites and Picnic Areas

- a maximum of 5 camping sites and 10 picnic units per hectare;
- A picnic unit will include a table with benches, cooking area and disposable containers;
- One latrine located for each group of 5 camping sites or 10 picnic units;
- One trash bin located for each camping site or set of 5 picnic units;
- One rain shelter provided for every 5 picnic units.

Activities
Eventually, recreation activities might include trekking, camping, canoeing and rafting, pony trekking, mountain bike riding, rock climbing, nature studies and leisure driving. Some recreational activities like hunting and fishing are prohibited other than by Dayaks for their own subsistence purposes. Dayak guides would not be allowed to fish or hunt while out with a tourist group because this would conflict with the aim of tourism which is to enjoy a living forest. Some recreation activities, if allowed to take place unmanaged, could conflict with important aspects of park management. Hence, each kind of activity is limited to particular zones as shown in table 17.

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Table 17 Recreation Activities in Management Zones

| Recreation Activity | Core Zone | Wilderness Zone | Utilisation Zone | Rehabilitation Zone | Traditional Use Zone | Collaboration Buffer Zone |
|---|---|---|---|---|---|---|
| Trekking | No | Yes | Yes | No | Yes | Yes |
| Camping | No | Yes | Yes | No | No | Yes |
| Canoeing/Rafting | No | Yes | Yes | Yes | Yes | Yes |
| Pony Trekking | No | Yes | Yes | No | Yes | Yes |
| Mountain Bike Riding | No | No | Yes | No | Yes | Yes |
| Rock Climbing | No | Yes | Yes | No | Yes | Yes |
| Nature Studies | No | Yes | Yes | No | Yes | Yes |
| Leisure Driving | No | No | Yes | No | No | No |

Trekking can be expected to be a major tourist and visitor activity in the park. Trekking within the locality of a settlement will be assisted by well marked trails. Other trekking, especially any to major sites like Bukit Baka and Bukit Raya and those traversing the Park should only be made with guides. Trails will need to be provided for trekking activities and could be constructed to accommodate mountain bike riding as well. Table 18 provides guidelines for developing and managing trails.



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Table 18 Guidelines for Managing and Developing Trekking and Cycling Trails

- Survey the designated area; list notable natural features (e.g. viewpoints, vegetation, geology, and waterfalls; mark on a sketch map; and, arrange trail route;
- Avoid steep hillsides (selecting slopes below 17%) and waterlogged areas; avoid setting the trail vertically on a slope; install water bars and drains to drain water off and not down the trail; and, if needed raise the trail on a wooden walkway or stepping stones;
- Clear proposed trail of obstacles; cut overhanging vegetation to two meters height; do not cut large trees and do not clear to bare soil; and, fill depressions with rocks or soil.
- Build the trail with curves; avoid straight stretches; and, avoid designs which encourage visitors to take short cuts;
- At rest stops provide simple benches;
- At stream crossings or deep gorges build bridges. Steps may be cut into rock. A fallen tree may be used for passage if safe;
- At trail entrances place signs with basic information, directional signs, and interpretation plaques. Also place information signs at trail junctions;
- Establish a maintenance schedule and work schedule for patrolling and collection of litter;
- Monitor the use and condition of all trails.

Pony trekking might become a popular way for visitors to cover greater areas of the Park and be more likely to see wildlife. The detraction of pony trekking is that horses significantly increase trampling and grazing impacts in the Park. Ponies might also come into conflict with other user groups like mountain bike riders. To limit such conflicts, pony trails will be developed when pony trekking becomes a more definite potential activity. A maximum of 20 ponies per trek would be required to minimise environmental impacts. Camping by pony trekkers would not be permitted because of the impacts of grazing. Pony trekking, especially in its early years, must be closely monitored. If it leads to unacceptable environmental impacts, the permit system and the numbers allowed on any trek should be reviewed.

Canoeing and rafting will enable visitors to enjoy the many streams and rivers which run from the Bukit Baka-Bukit Raya watershed. The main aims of managing canoeing and rafting activities will be to:



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- protect each river's natural setting;
- enable visitors to experience the solitude of navigating down a remote river through a tropical rainforest.

To achieve these ends, permits will be required for river users and will be priced to limit the numbers of canoeists and rafters in the Park at any one time. Prices of the permits would vary in line with the popularity of a particular season or day. Monitoring of river use will be conducted to determine how effectively the permit system operates both in terms of environmental impact and visitor enjoyment.

As the economies of Kalimantan improve, car and motor bike ownership increases and more and improved roads are constructed, the demand for vehicle access routes into the Park will increase. Timber roads will certainly be constructed into the K@#$ concession and they might initially serve as a basis for constructing a scenic road around the periphery of the Park. Any decision about scenic drives within the Park must await more detailed information about the topography and ecosystems in the Park.

As the Park's facilities are developed; so commercial tourist operators will want to arrange tours to the Park for those people who prefer to enjoy the experience, equipment and organisational aspects of commercial operators. Commercial tours will be subject to the same controls and conditions as other visitors. All commercial operators, consequently, will be required to overnight in the tourist accommodation sites located close to Dayak settlements or close to the Park headquarters. As large groups have the potential to have negative environmental impacts because of their size, limits will be placed on the numbers of any party visiting certain more fragile areas of the Park and into particular zones. All tour operators will be required to provide specific information about each tour they manage to assist in the monitoring of group tourist activities. Prior to the renewal of permits for tour operators, reviews will be made of their activities and any found to be in conflict with the permit conditions or the objectives of the Park will be refused new permits.

### 6.2.5 Local Communities

Park planning must take into account traditional activities of local Dayak communities which are situated either inside the boundaries of the park, or are situated just outside the boundaries but either have already established swidden farms within the boundaries or regularly visit the park for hunting, gathering and other activities (Map, Appendix 9,12). An important objective of this management plan is that a partnership between park management and these communities will be in the best interests of the long term management of the park and can provide substantial mutual benefits.

Principal Management Objective

Assist local communities to obtain a satisfactory quality of life which will allow them to enjoy the amenity of the part and contribute to its conservation.

Major objectives of the Park in relation to local communities are:

- stabilise population growth to reduce pressures on land;
- develop alternative sources of income to reduce pressures on land;

- improve rice subsistence yields to reduce pressures on land;
- give the communities certain exclusive rights in the park (like hunting bearded pig in the traditional way by using blowpipes or dogs and spears; or fishing using hook and line or casting net) to encourage their participation in promoting the park's values;
- protect each community's cultural heritage to increase the park's appeal as a tourist destination;
- encourage cultural activities to augment the park's appeal as a multi-faceted tourist destination;
- give communities responsibility for certain aspects of the park's conservation to develop the notion of partnership between park and people and enhance the park's conservation programs;
- convince local communities of the importance of the Park's values.

6.2.5.1 Development of Agricultural Activities

Subsistence cultivation of rice remains the central feature of local Dayak economic acctivity. Its importance in their way of life cannot be exaggerated. Religious ceremonies focus on the growing of rice. Ritual paraphernalia, which are believed to enhance the spiritual environment in which the rice grows, are kept by households and handed down through generations. Rice itself has a sacred aspect. Each household possesses a sacred core of rice seed on which the religious ceremonies are focused and which are usually sown first. The rice itself is believed to possess a spirit and much of the religious ceremonies are to ensure that the rice spirits are looked after appropriately and, therefore will fruit abundantly.

Swiddens are cut each year either from reasonably mature secondary regrowth or from primary forest. Rice and vegetable catch crops are sown in the swiddens. On average, households obtain about 6 months' supply of subsistence from their swiddens. Yields are very low compared with the most successful swidden farmers elsewhere.

Traditionally secondary regrowth would be at least 8 years' old before being farmed and it would be farmed for one year before being allowed to revert back to regrowth. Primary forest would be farmed at least twice before reverting to regrowth. The felling of primary forest usually gave a household exclusive rights to that land. More recently, the introduction of estate crops has resulted in households planting swiddens with, usually, rubber in West Kalimantan and rattan in Central Kalimantan and thereby establishing ownership of the resulting crop. These areas are rarely cleared for swiddens again. Rattan, which is harvested only once every eight years has resulted in increased demands for land to ensure an annual crop.

The relatively recent acquisition of chainsaws has resulted in a preference for clearing swiddens from primary forest where it is available so that subsequent weeding is minimised. To compensate for lower expected yields from cleared primary forest, larger swiddens are also being cleared (on average about double in size) which is also leading to increased demands for land.

Currently, in some of the communities, local timber concessionaires have established bina desa programs with the objective of introducing sloping

agricultural land technologies and, where appropriate land is available, sawah cultivation. The programs are enjoying mixed success.

Principal Management Objective

Stabilise land requirements through improved, sustainable agricultural practices.

Fruit is not cultivated systematically. Large fruit trees like durian and rambutan are planted around farm huts close to swiddens. There is little planting of fruit trees close to settlements largely because of the activities of domestic pigs which roam around settlements in search of food. Consequently, the Dayak diet is frequently fruitless and sickness tends to increase outside the annual fruit season.

Traditionally, two domestic animals were husbanded principally for ritual purposes. Both pig and poultry are required for major religious ceremonies and the latter for minor ones. More recently, cattle, goat (only in West Kalimantan) and duck have augmented this stock. Generally, larger livestock are either tethered or penned and fodder is carried to them. Fodder, like lucerne bushes, is not yet planted. Goat, if allowed to roam free and become feral, constitute a major threat to the national park.

Increasing populations, deteriorating rice yields and requirements for additional land for estate crops are producing and will continue to produce serious pressures on available land. To stabilise pressures on land, a very high priority of the park's programs will be to:

- enhance yields by improving seed and technology;
- introduce alternative economic pursuits to encourage households to reduce their dependency on agriculture.

Conservation of areas under cultivation is also an important objective of the park management plan. Enrichment planting exercises, particularly in riparian belts which are beginning to become seriously eroded, should retain indigenous trees to minimize changes in microclimate and ecosystem composition. Trees can provide shelter for other crops, reduce soil erosion, and enrich soil fertility. In addition, trees provide additional corridor habitats for wild animals. Emphasis should be given to trees which provide an economic return like illipe nut and therefore are more likely to be conserved for that return.

Elsewhere in seriously degraded areas and particularly those converted to imperata grass, programs will be developed to rehabilitate them to increase the area of land available for agricultural production. The establishment of secondary forests on grasslands may be possible through accelerated natural regeneration activities. Secondary forests help restore soil fertility to these degraded grasslands and make them suitable for tree crops such as rubber, tengkawang, and fruit trees. All such programs should be conducted under the direction of the local community to ensure that tehy are consistent with land and other ownership patterns.

6.2.5.2 Development of Other Economic Activities

The major non-agricultural activity of communities living in and near the national park is felling ironwood for roof shingles and house posts. Supplies of mature ironwood trees are in serious decline within easy reach of settlements. Unless there

are good alternative sources of income, ironwood trees within the national park might represent a tempting alternative source of supply.

Other secondary economic activities include the collecting of gaharu (which is in serious decline as supplies are now almost exhausted), gold panning (an activity conducted almost wholly by women), collecting wild rattan for sale and handicrafts. Mechanised gold production represents a potential threat to the rivers passing through the park as downriver from the park, there are a number of sludge pumps in action which use mercury to separate the gold and then flush it into the river. The remoteness of settlements from markets has meant that there is no commercial hunting and fishing.

Timber concessionaires have provided few work opportunities for local communities.

Principal Management Objective

Assist local communities develop commercial activities to reduce their dependency on agriculture.

Development of alternative economic activities to reduce local communities' dependency on agriculture is a high priority of the park's management plan. Opportunities include running tourism facilities, reafforestation, butterfly and rare orchid production, developing rattan production enterprises and handicrafts. All these enterprises could be developed through a partnership between the national park, local timber concessionaires and local communities.

6.2.5.3 Strengthening Local Organisations

Currently, traditional political structures in communities in and near the park are in decline. LKMDs are not operational. Leadership, which is absolutely critical to economic and community development often falls short of the quality which is required. If communities are to obtain the quality of life they desire and are to develop programs so that their economic activities are in harmony with the objectives of the park, good leadership and good management will be in high demand. A major challenge for any community development program will be effectively to co-ordinate and manage inputs from a number of different sources including the government, national park management and timber concessionaires. Some kind of professional assistance will probably be required which might most effectively be provided by an organisation like an NGO which is not directly involved in park planning and management but is sympathetic to its objectives.

Principal Management Objective

Enable each community to manage its affairs effectively without outside assistance and in particular to plan and manage its own future economic developments in a secure and independent manner.

As communities will have to develop economic activities outside agriculture which will require the community to act like a corporate body, the establishment of some kind of corporate umbrella under which a community can operate needs to be developed.

To assist in the development of local communities, funds will be required to:

- provide funds for an NGO to establish itself so that it is able to help communities strengthen their own capacity to develop economic projects should they want to avail themselves of such a facility;

- provide resource material for an NGO to use in the design and teaching of community development training courses;

- assist the NGO to strengthen its internal management to ensure that the demands of the project will not overstretch its capacity to deliver its existing and the proposed additional programs. In this regard, the timber concessionaires might be able to provide some assistance. For example, NGO management and community leadership could participate in internal management courses run by timber concessionaires.

6.2.6 Research and Development

National park research activities should entail short and long-term studies to understand specific ecological processes and biological interrelationships within and adjacent to the national park. Such research will provide information on how to manage the park's biophysical resources according to its goals and objectives. Research activites will be allowed on all zones outside the national park Core Zone and, in exceptional circumstances, in that zone (Map, Appendix 11). Researchers will follow research protocols established by the National Park Management Board, LIPI and Ministry of Forestry.

Principal Management Objective of Research Program

Develop an understanding of the Park's history, ecosystems, flora and fauna as a necessary precondition of effective management planning.

All research projects will be required to advise on indicators which will enable Park management to develop a monitoring program to monitor the health of the Park's ecosystems. Wherever appropriate, research will be conducted with members of the Park's establishment so that Park management develops an increasing capacity to conduct its own research. Copies of all research material and specimens must be submitted to the Park to be included in its resource library. Specimens will be used to enhance its natural history displays in the Visitors' Centre.

Applied research into land use systems, natural regeneration of alang alang grasslands, cultivation and propagation techniques of selected species, agroforestry and intensive dryland agriculture will be encouraged.

The Park should develop a program to attract research funds and scientists to research priority issues of concern to Park management. It should investigate the potential to associate itself with respected national and international research schools and institutes with a view to developing research programs into tropical forest management with them. As an aid to these programs, the Park should commit funds to constructing and managing facilities which would meed the accommodation needs of researchers when not in the field.

6.2.6.1 Natural Resources and Ecosystem

As an aid to developing long term management strategies to maintain protected and unprotected habitats, research projects are required to study the patterns and processes of local ecosystems. They would include studies of:

- biological ecosystem interactions, including temporal and spatial ecosystem processes, to understand requirements to maintain the ecological integrity of localities;
- distress levels and the qualitative and quantitative effects of geographical disturbance on biological systems to understand local ecosystem ecological thresholds.

6.2.6.2 Utilisation

As an aid to developing short and medium term management strategies to manage the interaction between local communities and land within the Park and of timber concessionaires along the boundaries of the Park (Map, Appendix 1), research projects should be initiated to:

- gather information on local ethnobiology to help determine potential pharmacological uses of local plant species;
- understand local community interactions with the environment with particular reference to the extent of their hunting and foraging activities to determine the sustainability of these practices. In the case of fishing, investigate means of increasing fish populations by selective planting of fruiting trees along degraded river banks;
- develop means to improve the sustainability of local agricultural practices;
- develop an understanding of the ideal conditions for the regrowth of economically valuable timber species in collaboration/buffer zones.

6.2.6.3 Management

Research into effective management practices will enable Park management to constantly evaluate the appropriateness and effectiveness of its current practices. To enhance such research, Park management practices will be carefully documented so that their effectiveness can readily be ascertained. Most of this research will be encompassed in the Park's monitoring and control programs. There will be occasional requirements for outside expert assistance where a broad base of experience would be valuable. Areas such as fire management, pest and disease control and rehabilitation management might require external assistance whenever there are concerns about current management practices.

6.2.6.4 Breeding

Principal Management Objective

Propagate local native species to assist in rehabilitation programs in degraded areas and for threatened species.

A nursery should be established to propagate local species in rehabilitation zones and to enhance the utility of the collaboration/buffer zones. Local species should also be propagated for planting on the fringes of the traditional use zone to act as a buffer between this modified zone and the natural forest which borders it.

As information becomes available about the propagation of other species, breeding programs should be developed to propagate threatened species.

The nursery should under no account direct any of its operations to commercial activities as they would be likely to divert the nursery from its objective.

6.2.7 Communications

Park management needs reliable forms of communication, particularly for emergencies like the outbreak of fires and to support patrols should they encounter difficulties. They are also necessary for Park management to be able to communicate any required changes to schedules to ranger outposts. A communication headquarters would also assist tourist bookings in local community guest houses.

Communication links must be reliable and will require a communications control room in headquarters. Resourcing the control room will become a priority once Park management is sufficiently resourced to begin to carry out patrols and start the necessary work to get its programs implemented.

Short wave radio repeater stations might have to be built on high points in the park. They should be designed to minimize environmental damage and any visual disturbance to the visual beauty of the park.

6.2.7.1 Roads

Currently there are no roads within the Park. Roads, tracks and trails will be required to provide access for recreation and management activities such as patrolling, fire protection, servicing of facilities and research (Map, Appendix 1,10).

Principal Management Objective

Develop a system of environmentally friendly roads and tracks to enable management to carry out its duties effectively and to enhance the visitor appeal of the Park.

Design of roads will have to take into account all conservation issues where they are to be located, their purpose, expected seasonal usage, soil types and terrain and the maintenance effort in terms of Park funding and resourcing which will be required. Any planned road should be subject to extensive assessment and approvals. Some roads might be designed only to be open during certain seasons of the year. Maintenance of all roads and tracks will be an important management objective and an integral component in providing visitor access to particular recreational attractions while minimizing the environmental impacts of the roads. It

will therefore be critically important not to embark on an ambitious construction program unless the required funds for subsequent maintenance have been secured.

A network of roads is required for Park management purposes including:

- servicing of facilities;
- enforcement activities;
- fire protection;
- research and surveys;
- introduced plant and animal control;
- rehabilitation and threatened species management activities;
- search and rescue;

Table 19 below establishes principles for the development and management of a road and track system in the Park.

Table 19 Management Principles for the Construction of Roads

- An access system consistent with the conservation objectives of the Park which provides for the range of recreational and leisure activities in the Park should be established;

- Design of roads must be to minimize environmental impact. Accordingly, wherever practicable, they should follow ridge lines and minimize cuttings. Drainage and effective run off should be important criteria in road and track design. River crossings should be minimized and all bridges designed with great care to minimize environmental impacts and ground around bridge structures should immediately be rehabilitated. All planned roads should be stringently assessed for their environmental impact;

- Costs of maintaining any planned new road should be conservatively estimated. No new road should be constructed until maintenance funds are secured;

- A tourist road should be considered for access to one look out peak within the utilization zone; Bukit Bemunga (1170 m), Bukit Banut (1250 m) or Bukit Tenuwantuah (1080 m) on the north-western portion of the park and within the Ella Hulu watershed are the most appropriate alternatives;

- An adequate system of tracks will be maintained for management purposes. The system must include one track which circumvents the borders of the so that the Park can be patrolled to prevent access for illegal purposes like timber extraction;

- Some roads and tracks will be subject to closures to minimize impacts on road surfaces and conservation values, especially during periods of sustained rain;

- Only tracks required for essential management purposes will be retained in wilderness areas.

6.2.7.2 Airstrips

Several small airstrips already exist in the vicinity of the Park (Map, Appendix 1). They could be further developed to accommodate tourism and for emergencies. They would, however, be a low priority. Low flights over the wilderness and core zones should be discouraged while noise levels discourage local wildlife.

6.2.7.3 Tracks and Trails

A system of trails used by local people to harvest forest products and travel between villages traverses the Park. Local trails cause minimal environmental disturbance and are barely observable by an untrained eye. These local routes provide a good network of trekking trails within the park and should be developed for harder use and maintained (Map, Appendix 10). They should also be clearly signposted so that visitors in utilization zones are able to venture into the park with little fear of getting lost.



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Any persons wanting to trek into wilderness zones would be required to employ someone from a local community to act as a guide. The guides will be able to enrich the treks by providing insights on animal and plant species, culture and the history of the area. Providing guides will also reduce the likelihood of visitors becoming lost and the consequent costly search and rescue operations which would have to be mounted.

6.2.8 Public Affairs, Education and Interpretation

Public affairs and public relations are both very important aspects of the Park's management programs. They focus on establishing and maintaining the quality of support the Park requires to be able to resist threats from lobby groups interested in exploiting the natural resources of the Park, to be able to maintain a presence in central government so the Park enjoys an effective voice in its own continuation and resourcing and to enjoin local communities in an effective partnership with the Park to achieve its goals. Public affairs will also prepare the publicity necessary to promote the Park as a place of visitor interest and attract tourist funds to the Park and its environs. The education and interpretation programs enrich visitor enjoyment of the Park and its values and develop and maintain an appropriate level of environmental awareness and appreciation on the part of members of local communities. For the latter, the environmental values of the Park would be associated with the economic value of the Park as a source of work and commercial opportunity.

6.2.8.1 Public Affairs and Public Relations

Public relations of the Park is very important to its future. Consequently, the Head of the Park should take a direct interest in the effectiveness of the program. To a large extent, he will be the public representative of and spokesman for the Park and therefore will represent the public face of the Park.

Principal Management Objective

Use the full range of media, publicity and information outlets to establish and maintain the reputation of the Park as a resource of national and international importance and standing to be protected for the enjoyment of future generations.

A good public relations program will establish public and the central government's perception of the Park as a very important national asset to be funded so that it is conserved in perpetuity for future generations of Indonesians. It will also establish the Park's importance to the international community as an important world resource and an important contributor towards the continued preservation of the world's genetic stock. The major purposes of establishing such a reputation for the Park is to:

- secure continuing funds from Central and Provincial Governments to finance the Park's management programs;
- enhance the ability of the Park to raise funds from corporate donors to finance important development programs;
- establish the Park as an important area for research so that research funds are attracted to the Park's research programs;
- head off threats from lobby groups interested in gaining access to the Park's natural resources;

- maintain an influential presence in the Centre to ensure that the Park's values are taken into account when the Government contemplates legislative and policy changes.

Public relations has a very important second purpose which is to maintain the Park's relationship with local communities at an effective level so that these communities continue to value the partnership with the Park and the conservation values that this relationship entails.

The public relations program should also be directed at timber companies operating in the vicinity of the park to encourage them to approach their operations in an environmentally appropriate and sustainable way and not to disturb the wildlife which operate across the borders of the Park into their concessions.

Park management should establish and maintain open working relationships with regional development authorities, scientific institutions, and other government and non-government institutions relevant to the development of national park program components.

6.2.8.2 Education and Interpretation

Education and interpretation has two target audiences:

- local communities to educate them in conservation values and principles;

- visitors to enrich their experience when visiting the Park and to develop their understanding of the importance of conservation values and principles.

A high priority for the early years of the Park's educational activities is to develop an awareness on the part of local communities of the importance of conservation values and sustainable agricultural activities to their own future livelihood and quality of life. The program should focus on developing educational kits for use in local schools and might well seek funding from external or international sources to develop these programs. Effective results are more likely to be achieved by hiring in outside expertise rather than trying to develop such expertise within the Park's own organisation because of the importance of the programs to be immediately effective. The external assistance should include as one of its objectives the training of Park management staff in techniques for developing educational kits and information packages. This program should be very carefully monitored to determine how well the values of the Park are being absorbed and how the values and behaviours of local communities are changing as a consequence of the program. Initially, a simple survey should be made of current attitudes of local communities so that the information can be targeted most effectively.

For visitors, a good set of information and educational material will help to foster an understanding and appreciation of Park features and values, influence visitors to behave appropriately in the park and consequently, reduce management problems and contribute to their broader understanding of the environment and the importance of protecting and conserving it.

The theme of the education and interpretation programs should be the basic vision of the Park. Consequently, the material will seek to inform and interpret the diverse rainforest ecology and environments in the Park and the interaction between human activities and culture and the Park and the way they have modified the rainforest.

One component of the Park's education program should be targeted at provincial schools or the scouts' (kepramukaan), possibly as vacation programs. This component would develop organised activities for school parties including talks, guided walks, film and slide shows, environmental games and some adventure activities. Children of local communities could be included in these activities as guides and exponents, which would have the additional benefit of encouraging their attachment to the Park and its values.

The information and education program should also be integrated into Park ranger activities. Contact with rangers on routine patrols could be a source of valuable information for visitors and will be encouraged by Park management at every opportunity. During periods of high visitor activity, rangers would make themselves available between certain times at popular destination points to point out some of the more important features of these places.

Principal Management Objective

Develop interpretation and educational kits and packages to explain the important features of the Park and, thereby, communicate the important values the Park is conserving and develop an understanding of the history of interactions between tropical rainforest and the communities which seek to modify it for their own survival.

Table 20 gives some of the themes which might be developed.

Table 20 Educational and Interpretive Themes

- The tropical rainforest at different elevations;
- Importance of conservation of the tropical rainforest;
- Biodiversity of the tropical rainforest;
- Geology and geomorphology of the Park;
- Wildlife;
- Birds of the Park;
- Insects and their contribution to the rainforest;
- Human adaptation and modification of the rainforest;
- Dayak culture and the rainforest;

Park management should also develop a range of publicity and educational material both for use by visitors to the Park and for distribution to media and important supporters of the Park as part of the public relations program. Table 21 summarises the kind of information which requires to be developed.

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Table 21 Publicity and Information Material

- A set of slides and photographs which will be used to illustrate talks and presentations about the Park and would be available to authors needing illustrations for their publications;
- A broad information package about the Park and its principal features;
- Publicity packages and posters for distribution to commercial tour operators and visitors' centres to ensure that they present accurate information about the Park and its amenities;
- Information brochures about:
  - Park values and the significance of all sites of cultural interest;
  - Why the Park was established and what it has set out to achieve;
  - Regulations on domestic animals and the introduction of exotic flora in the Park;
  - Regulations regarding visitor usage like litter control, fire control and appropriate environmental behaviour;
  - Potential hazards in the Park and how to deal with them;
  - Required precautions on pony treks;
  - Required precautions on river journeys together with maps of the routes;
- Press releases when required;
- Readable booklets on important species in the Park, most appropriately produced as a biproduct of a research project;
- Illustrated booklet on the flora and fauna of the Park;
- Maps showing roads, trekking trails, locations of local communities for overnighting, camping and picnic sites and routes for river journeys;

Signs are an important part of visitor information in the Park. The design and intensity of signs will reflect the zoning scheme of the Park. Consequently, there will be no signs in core zones, unobtrusive and occasional signs in wilderness zones, and clear but sympathetic signs in utilisation and traditional use zones.



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6.2.9 Institutional Development

To enhance the Park's integration into the regions in which it lies and to give local and regional representatives an ability to influence the directions the Park should take, a Bukit Baka-Bukit Raya Management Council should be established with membership as given in table 22.

Table 22 Membership of the Bukit Baka-Bukit Raya Council

- Department of the Interior - Chairman of the Council
- PHPA Bogor - Deputy Chairman
- Balai KSDA - Central Kalimantan, West Kalimantan
- Bukit Baka and Bukit Raya regional desa
- Kantor Bupati - Kota Waringin Timur, Sintang
- Kecamatan - All neighbouring Camat and representative Kepala Daerah:
  - Marikit
  - Katingan Hulu
  - Senamang Mantikei
  - Nanga Ella Hilir
  - Menukung
  - Serawai
  - Ambalau
- Department of Forestry, Tanjung Pura University
- Department of Forestry, University of Palangka Raya

The main functions of the Council is to offer advice to Park management and to act as a conduit to ensure that Park management plans and implementation programs are consonant with regional and local district plans and do not conflict with the directions local communities want to take.

The Council should meet at least twice a year. It should meet at the end of the year to advice on Park management and programs during that year. It should also meet half way through the year when forward plans are well advanced to offer advice on these plans.

The council should also be the forum to advise Park management about the utilisation of any discretionary funding the Park might receive such as endowments or gifts and grants to carry out certain activities. Such gifts and endowments



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should be held in trust and would require the signatures of the Chairman or Deputy Chairman of the Council and the Head of the Park to be accessed. As the Council only meets twice a year, approval to spend up to a certain amount should be given by the Council. If further approvals are required, a sub-committee should be identified who would meet in an emergency and determine whether or not to agree to additional expenditures.

The Council would be the final arbiter for all licenses to trade in the Park like running a restaurant near a visitor centre. It would also review the performance of the licensees and would have power to revoke licenses where performance fell short of the license agreement.

The Council should pay particular attention to the effectiveness of community development programs for local communities and the performance of NGOs or bina desa management of timber companies working in these communities.

The meeting which focuses on community development would be a good opportunity to bring all the local communities together to:

- attend presentations and demonstrations of the work of Park management and the effectiveness of the partnership between Park management and local communities;

- compete for prizes for cultural activities.

Committed and Knowledgeable Staff
The Park's organisation structure should always be consistent with its programs and priorities. In early years for example, greater emphasis will be given to facility and infrastructure development and the organisation chart should reflect this emphasis. In later years when the Park has established itself as a place to visit, greater emphasis will be given to facilitating visitor satisfaction. Whatever the stage in the Park's development, however, the organisation should always be flexible to respond to daily priorities in Park management. Attention should always be given to the advantages of having task forces address issue and problems rather than establishing a position which might not really require the full time attention of one officer. Planning would be an example of an area where a task force of personnel with diverse expertise could update medium and short term plans and develop annual budget proposals. Keeping this 25 year master plan under constant review should be the responsibility of the head of the Park. He or she should be required annually to report specifically on what aspects of this plan have been changed and other areas which are receiving close scrutiny.

Principal Management Onjective

Develop an effective organisation committed to making the Park work

The effectiveness of the Park's conservation activities and its appeal as a place to visit will only be as good as its staff. Consequently, it is critical that the Park recruits staff who are committed to conservation and who subscribe to important values which guide the performance of all staff. Table 23 sets out important work values which each member of staff should share.

Table 23 Work Values of Bukit Baka-Bukit Raya National Park Staff

- Work as a team
- Share one's knowledge with others
- Develop a good knowledge of the Park's biodiversity
- Seek to assist visitors to enhance their enjoyment of the Park
- Support the activities of local communities
- Rigorous in dealings with people abusing Park's values
- Specialise in at least one aspect of Park's conservation programs
- Flexible approach to work responsibilities so that appropriate responses are made to management requirements

Table 24 sets out a number of areas staff development programs for Park staff should concentrate on:

Table 24 Staff Development

- teamwork;
- rotating staff through a number of jobs and different situations so they can develop a good knowledge of the Park and its biodiversity;
- counterparting staff to research scientists and other experts so they can develop specific expertise in the conservation of particular species;
- negotiating skills so they can deal effectively with people breaking the Park's regulations;
- customer service skills so they deal effectively with visitors;
- community development skills to assist them in their dealings with the members of local communities;
- work planning and performance management;
- problem solving;
- decision making;
- presentation skills;

Systems

Good management information will become an increasingly useful tool for management purposes. Given the area of the Park and the difficulty of policing it appropriately, management will increasingly utilise satellite photography to monitor developments in the Park. A high priority of management should be to keep their systems up to date with developments in the market. The expense of buying a new system or



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improving an old should always be kept in context of the value the system will bring.

A good data base should be an early priority in the development of the Park's information systems. All research projects should be required to update the data base with material obtained in the research.

A system of indicators should be developed to enable Park management to monitor the effectiveness of their programs. The indicators should enable Park management to monitor:

- conservation of and changes to the Park's biodiversity;
- effectiveness of flora and fauna rehabilitation programs;
- experience of threatened species;
- water quality of catchments;
- economies of local communities;
- land pressures;
- effectiveness of managing external threats;
- visitor interest and appeal;
- effectiveness of fundraising efforts;
- value of the Park to the research community.

Discretionary Funds
Park management has the ability to raise funds from the issue of licenses and permits and from charging fees for visitors. Sales of its information material could be a further source of funds. Appeals might be another source of funds. The availability of such revenue to Park management for discretionary activities should be negotiated with the Park's major financier, the Indonesian Government. All proposals for the utilisation of the discretionary funds should be approved by the Council. Rules for the appropriate investment of such monies need to be agreed with the Council.

## 6.3 Monitoring and Evaluation

Monitoring and evaluation of the Park will occur at two levels:

- a biological or overall level which monitors the condition of the Park itself;
- a program level which monitors the effectiveness of the programs developed and implemented by Park management.

Insufficient is known about the Park's ecosystems to be able to identify critical species which provide good indicators about the health of a particular ecosystem. There would normally be a few critical species which can be used to monitor the health and therefore the effectiveness of the conservation programs of areas in the Park. Part of each research project, therefore, should be directed at identifying these indicators and they should be added to table 25 below.

Much of the monitoring at the overall level will be done by monitoring through GPS, through interpretation of satellite photographs and through routine patrols. The latter will be very important and require a good understanding on the part of rangers that their job is a very broad one indeed and not simply one of being a kind of watchman to ensure that the Park's regulations are observed in practice. Consequently, ranger posts will be established in strategic locations at biologically interesting sites as well as at entry points, critical boundaries, and areas of potential encroachment and poaching.

At the program level, the effectiveness of the Park's programs will be monitored. Programs therefore will include as part of their design target outputs to be achieved and the frequency with which they will be monitored. Visitor numbers, for example, will be monitored on a monthly basis while reintroduced animal species might be monitored on an annual basis with target populations being projected on a five year basis. Each annual plan will set annual targets for each program component. Outputs will be monitored rigorously by management against the targets and their annual report to Council will report on how well actual performance achieved the annual targets set for management.

Table 25 below summarises initial indicators which will be used to evaluate how well goals are being attained together with how they will be measured.

Table 25 Monitoring and Control Indicators

| Goal | Objectives | Indicators | How measured |
|---|---|---|---|
| protect and maintain a natural and self-sustaining tropical rainforest expanse which will enable each ecosystem and its constituent biotic elements to continue to adapt to the demands of the environment. | ⊠ allow natural environmental processes to continue with the minimum of disturbance; | Absence of unplanned human interference<br>Absence of fire<br>Absence of exotic pests<br>Species diversity | Observations from patrols<br>Fire reports<br>Observations from patrols/surveys<br>Plot surveys<br>Satellite imagery |
| | ⊠ protect and conserve the natural environment and landscape, including water catchments, rivers and streams; | Populations of critical species<br>Absence of unplanned human interference<br>Water quality<br>Erosion | Surveys<br>Observations from patrols<br>Measurements<br>Patrol reports |
| | ⊠ develop particular programs to protect significant flora, fauna and landforms; | Population increase | Surveys<br>Patrol reports |
| | ⊠ rehabilitate damaged habitats; | Species diversity | Plot surveys |
| | ⊠ reintroduce extinct natural species which formerly were resident in the Park; | Population increase | Surveys<br>Patrol reports |
| | ⊠ provide for and encourage scientific research that is compatible with the goals of the Park; | Annual value of research investment | Number of published papers<br>Contribution to information base |
| | ⊠ take adequate precautions to prevent the loss of any part of the Park from fire; | Absence of fire in critical zones<br>Area affected by fire | Patrol reports<br>Post fire assessments |
| | ⊠ take necessary steps to prevent any threat to the Park's integrity from illegal activities such as timber extraction and mining; | Incidents<br>Area affected<br>Water quality | Patrol reports<br>Assessments<br>Assessments |
| | ⊠ control and, where possible, eradicate exotic plants, animals and diseases; | Incidence of exotic flora<br>Effectiveness of eradication programs | Patrol reports/surveys<br>Surveys |

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| Goal | Objectives | Indicators | How measured |
|---|---|---|---|
| provide local communities with the opportunity to continue to pursue traditional methods of enjoying the benefits of the local rainforest and rivers flowing through it so that their cultures will continue to develop with reference to the rainforest. Part of that development will be an understanding of the value of sustaining that resource. | ⊠ establish and maintain a partnership with local Dayak communities in the management of the Park and in achieving the Park's primary goal; | Quality of relationship | Attitude surveys<br>Community participation in Park activities |
| | ⊠ conserve and protect sites and areas of cultural and historical significance; | Situation of sites | Annual inspections |
| | ⊠ accommodate traditional hunting and gathering practices so long as they do not conflict with the primary goal of the Park; | Community responses | Attitude surveys<br>Patrol reports |
| promote ecologically viable land use practices in areas adjacent to the park and to assist in the development of socioeconomic opportunities for local communities so that they are able to enjoy a sustainable quality of life which does not threaten the integrity of the Park. | ⊠ promote the wellbeing of local Dayak communities; | Wealth<br>Annual incomes<br>Leisure activities | Surveys<br>Attitude surveys<br>Attitude surveys |
| | ⊠ assist in the development of sustainable land use practices on the part of local communities; | Annual forest area cut<br>Weed invasion | Satellite photography<br>Satellite photography<br>Annual reports |
| | ⊠ minimise the impact of adjacent land uses upon Park values and recreation opportunities; | Quality of boundary buffer zones | Surveys<br>Satellite photography |
| enhance the Park's facility as a place for visitors to enjoy an undisturbed rainforest and other natural features and to gain the opportunity of appreciating the Dayak achievement of interpreting the rainforest for their own adaptation. | ⊠ provide a range of opportunities for appropriate recreational use, tourism and enjoyment of the Park; | Number of visitors | Data from entry points<br>Data from individual Park facilities<br>No. of complaints |
| | | Visitor experience<br>Visitor backgrounds | Visitor surveys<br>Visitor surveys |
| | ⊠ promote the Park as a valuable world resource as a basis for fund raising activities; | Value of endowments<br>Value of research funds<br>Foreign tourists | Donations received<br>Value of research projects<br>Visitor surveys |
| | ⊠ promote an appreciation and understanding of the natural and cultural values of the Park; | Value changes in target audiences<br>Behaviour changes in local communities | Surveys<br>Surveys |

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| Goal | Objectives | Indicators | How measured |
|---|---|---|---|
| Establish an effective organisational approach | ▪ establish an appropriate funding base to finance the Park's activities; | Adequacy of funding base | Achievement of funding targets |
| | ▪ co-operate with National, Provincial and local authorities and residents of surrounding areas to enhance the Park's ability to make its planning and management consonant with their objectives. | Quality of relationship | Participation of agencies and local communities<br>Attitude surveys<br>Number of complaints |

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