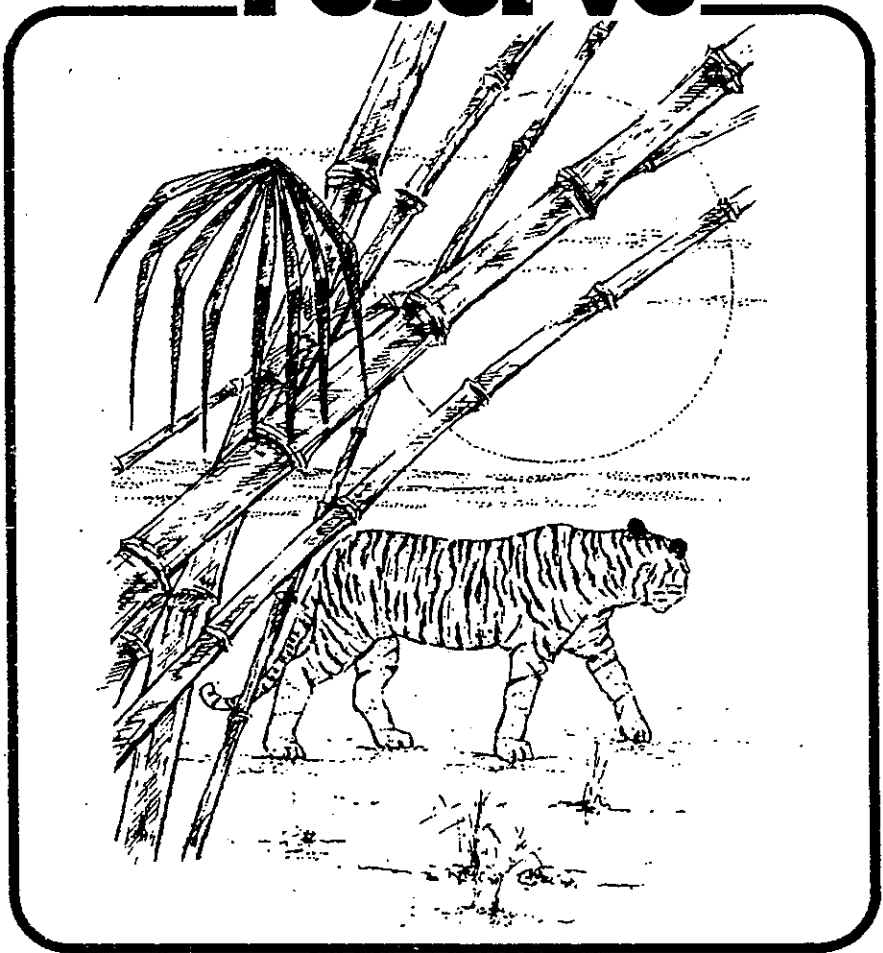


the javan tiger
and the
meru-betiri
reserve



a plan for management



**The Javan Tiger and the Meru-Betiri Reserve
A Plan for Management**

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**The beauty and genius of a work of art
may be reconceived . . . a vanished harmony
may yet inspire the composer;**

**but when the last individual of a race
of living things has breathed its last,
another heaven and earth must pass
'ere such a one can be again.**

William Beebe

THE JAVAN TIGER AND THE MERU-BETIRI RESERVE

A Plan for Management

From: Direktorat Jenderal Kehutanan
Direktorat Perlindungan dan Pengawetan Alam
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These proposals express the views of the consultant,
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SYNOPSIS

The Javan tiger (Panthera tigris sondaica) is in imminent danger of extinction. There are no specimens in zoological gardens. The known wild population is no more than four or five individuals, all of which are living in the Meru-Betiri complex, a mountainous forest on the south coast of East Java. The best chance of preserving the Javan tiger in the wild lies in:

- a. Developing public awareness and sympathy for its plight;
- b. Strict protection from any further killing;
- c. Careful management of the Meru-Betiri Reserve, with provision for the tiger's needs as a primary management goal.

These three factors are equally important and interdependent.

This report summarizes information available on the socio-economic and ecological conditions in the Meru-Betiri area and presents a detailed five-year Management Plan for the Javan tiger and the Meru-Betiri Reserve.

MANAGEMENT PRESCRIPTIONS IN BRIEF

Goals of Management

Manage the Meru-Betiri Reserve in a way that its essential character and value remain intact - that the natural fauna, flora, and scenic features of the area are conserved. Promote regulated use of natural resources of the Reserve for educational, aesthetic, recreational and scientific purposes in such a manner that the natural character of the area will be preserved.

Management Plan

Manage the Reserve according to the work/operations plan (management plan), commencing in 1977.

Legal Status and Boundaries

Upgrade the legal status of the Reserve from Suaka Margasatwa (game reserve) to Cagar Alam (nature reserve); extend the borders to include:

- The production and protection forests north of Gn. Betiri and south of the Kali Sanen where Javan tigers sometimes range
- The offshore islets
- A 500 m zone extending from the shore into the sea.

Authority and Administration

Overall authority will be vested in P.F.A.; the Section Chief is responsible for supervision and planning; a Manager will be responsible for management operations and administration of the Reserve.

Staff Organization, Duties and Training

Total staff for the Reserve includes the Manager, 32 basic level, eleven mid-level, and eight advanced level personnel who are to be organized in five divisions:

- Management and Protection
- Administration and Service
- Research
- Interpretation and Public Relations
- Settlements

All staff are to be given permanent government appointments. The Manager will be assisted in implementation and development of certain

programmes by special teams from the Central Office of P.P.A.

Training of basic-level personnel is the responsibility of the senior Reserve staff; the Manager, advanced and medium-level personnel are to attend special training sessions conducted by the Central Office. All senior staff are to periodically visit other working reserves as part of their training.

Protection and Control of Exploitation

To maintain the ecological integrity of Meru-Betiri and to provide the degree of security needed to protect the last Javan tigers, P.P.A. must:

- Embark on an upgrading programme to systematically phase out exploitation from all areas of the Reserve within the period of the plan;
- Control the movement of people in the Reserve through the use of checkpoints and an active patrol system;
- Acquire control of the plantation enclaves, close down their operations and turn these into wildlife management areas;
- Prevent any further expansion of cultivated areas, effect control of all inholdings and move the people now living there from the Reserve;
- Establish and enforce a 20 km no-hunting zone around the Reserve.

Sea Turtle Conservation

The turtle conservation project must be brought under the full control of P.P.A. All nesting beaches are to be completely protected. The collection of eggs must be stopped.

Wildlife Management

Manage the "feeding grounds" at Nanggalan, Pringtali, and Sukamade Barat and the plantation enclaves as habitat for large ungulates. No additional feeding grounds are to be cleared. Re-introduce rusa (Cervus timorensis) and banteng (Bos javanicus) to Sukamade Barat, and rusa to Nanggalan and Kali Sanen.

Research

Two research programmes should be undertaken:

- Management-oriented basic studies to be conducted by the Reserve

staff under the direction of the Resident Ecologist. These will consist mainly of completing lists of the natural resources of the Reserve and monitoring population trends of certain animals and plants;

- Detailed studies on selected topics, conducted in cooperation with Universities, visiting scientists, and government agencies. These will consist of special projects of importance to the future management of the Reserve. Other research will be encouraged if it does not interfere with ongoing programmes and is in keeping with the management goals.

All research in the Reserve is to be coordinated through the sub-directorate of Planning, P.P.A. and the Reserve Ecologist.

Education and Visitor Use

A programme of education and interpretation to explain the history, purpose and value of the Reserve and the significance of its unique flora and fauna will be initiated; facilities to assist visitors in enjoying the amenities of the Reserve are required, but these must be in keeping with the primary goal of conservation.

The Reserve staff, in cooperation with interested Universities, will provide an extension programme to encourage an understanding of the value and function of the Reserve and to assist in teaching sound conservation principles. The value and survival needs of the Javan tiger are to be emphasized in this programme.

Public Relations

The Reserve staff has the responsibility of integrating the existence of a viable nature reserve into the lives of local people through education and demonstration of conservation principles that will enhance their lives. A four-point programme is outlined in the plan.

Estate Management

All building construction and other developments within the Reserve boundaries are to be kept to the minimum necessary for management purposes; the design of all facilities will be in harmony with the natural surroundings. The location and construction schedule for all accommodation and facilities is detailed in the management plan.

All trails and roads, except those needed for control purposes, are to be closed; no new trails, except those absolutely necessary for the protection of the Reserve, are to be built.

Transport and Equipment

The Manager is to have a four-wheel drive vehicle; other senior staff and some mid-level staff will be provided with motorcycles. All other staff will be issued bicycles. A launch will be needed to patrol the coast.

The staff must be provided with adequate field equipment. No additional firearms will be required.

If the provisions of the Management Plan are met, Meru-Betiri Reserve will meet all criteria for inclusion in the United Nations List of National Parks and Equivalent Reserves.

INTRODUCTION

MERU-BETIRI AND THE PRESERVATION OF THE JAVAN TIGER

Through the 1800s and early 1900s, Java's largest carnivore, the tiger, was bountied, hunted and killed until, by the beginning of the Second World War, it survived only in a few scattered forest-clad mountain areas and in a few nature reserves (Fig. 1).

Even before the Second World War, there was considerable international concern about the survival prospects of the Javan tiger (2); after the War there was little chance for the situation to improve (3). By the mid-1960s, it was apparent that even in many of the remotest regions of the island the tiger had not survived; it could no longer be found in the most famous and well-protected nature reserve in all of Indonesia, Ujung Kulon, an area set aside specifically for the conservation of the Javan tiger and Javan rhinoceros (Rhinoceros sondaicus) (4). With good reason, many conservationists thought that yet one more irreplaceable animal form was lost forever (5).

There have been continuing scattered reports of tigers living in some of Java's wilder regions - reports of a large cat seen at night in the headlights of a car or a large cat track seen on an isolated beach or beside a mountain stream. Subsequent examinations have shown the animal to be a leopard (Panthera pardus) (5, 6). In the late 1960s, however, there were particularly persistent reports of tigers still living in the Gunung (Mount) Betiri area, a rugged mountain complex on Java's south coast, 60 km southwest of the town of Banyuwangi.

In 1961 a Danish hunter killed a tiger and a melanistic leopard in these mountains; knowledgeable observers insisted a few tigers could still be found living there.

Dr. R. van der Veen, a botanist long familiar with East Java, visited the area in 1971 and reported that a population of tigers probably did exist (7). Later that year the eminent naturalist, A. Hoogerwerf, surveyed the region and established with certainty that there was a small population of tigers (8). If there was to be any chance of preserving the Javan tiger, this is where it would be (9-11).

The survival of the Javan tiger in the wild is dependent upon strict protection and the preservation of its habitat. When the presence of a small population was established with certainty, nature conservation authorities moved quickly. The blocks of protection forests, known collectively as Meru-Betiri, were declared Suaka Margasatwa (game reserve) by decree of the Minister of Agriculture in June 1972. To

assist the government of Indonesia in protecting the last Javan tigers, the World Wildlife Fund and the International Union for Conservation of Nature and Natural Resources began providing financial support for the Meru-Betiri Reserve, through WWF/IUCN Project No. 1015 in 1973 (12).

The legal establishment of the Meru-Betiri Reserve and the provision of financial support for its maintenance were the first steps in providing protection for the tiger and its habitat. In the last four years, a number of surveys have been made to determine the tiger's status and to establish management priorities (13-18). These surveys have provided useful observations on the tiger's status and important information on the other fauna and flora of the Reserve. The report by Bartels and van der Veen (17), for example, identified the value of Meru-Betiri as one of the last remaining lowland rain forests in Java, with such rare plants as *Rafflesia zollingeriana* and *Balanophora fungosa*. Special emphasis has been given to the need for protecting the sea turtle nesting beach in the Reserve. Since the establishment of Meru-Betiri as Suaka Margasatwa, a small guard force has been established, some staff accommodation constructed and four habitat management projects initiated.

Yet for all this, neither the future of the Javan tiger, nor the future of the Reserve, was secure. The principal problems so far identified were:

- No reproduction had been reported in the tiger population since 1971 when an older female was shot at Sukamade Plantation;
- Protection of the area was far from adequate;
- The ecological integrity of the Reserve was seriously disrupted by the two large plantation enclaves that cover the lower reaches of the major river valleys, appropriating the most suitable habitat for the tiger and its prey (16).

At the request of P.P.A. Director Ir. Priyono, the authors conducted a survey of the Meru-Betiri complex from June to September, 1976 to assess the survival needs of the tiger and to identify the physical and biological features and processes that have implications for future management.

THE MANAGEMENT PLAN

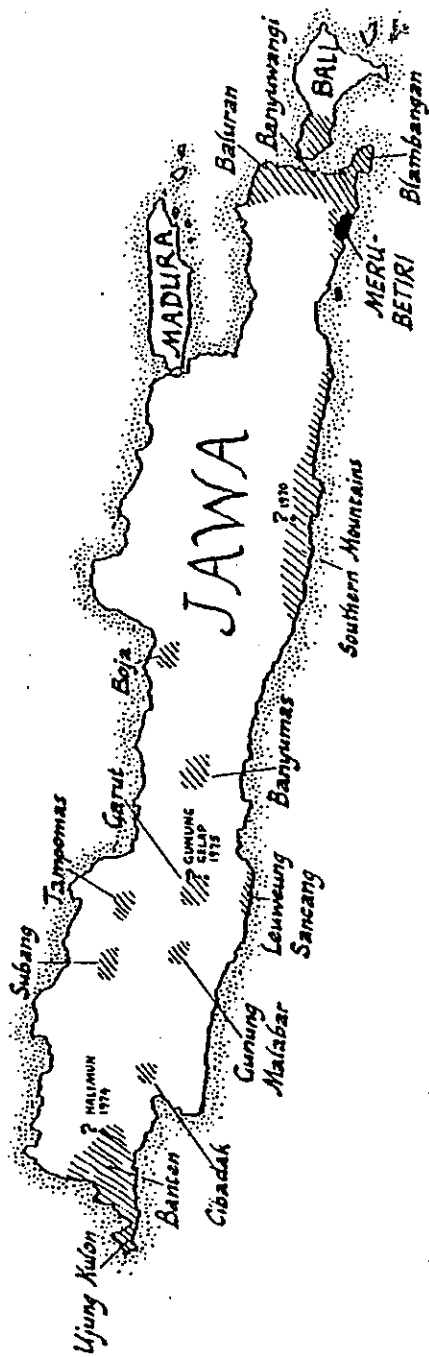
We found Meru-Betiri to be a magnificent area, and we also found that the programme for the management of the Reserve had reached an important juncture. In our judgement, Meru-Betiri can become a fine reserve if appropriate management action is taken, and taken soon. If action is not taken, the Javan tiger will surely disappear and the chance to conserve an extensive selection of Java's natural vegetation types,

Figure 1 The Reduced Range of the Javan Tiger

One hundred and fifty years ago the tiger ranged over most of the island of Java, and was considered a nuisance in some populated areas. By 1940 it was found only in the most remote mountain and forested areas (after Treep, 9).

By 1970, the only known population was in the Gunung Betiri complex on the eastern south coast. This is an isolated region of the Southern Mountains, protected in the past from extensive habitat alteration by its precipitous and dissected topography. While the last Javan tigers have managed to survive in this rugged area, it is not prime tiger habitat. Careful planning and management are required to ensure that the tiger's ecological needs are met in the future.

TEMPAT HIDUP HARIMAU LORENG TERACHIR
THE TIGER'S DECLINE



Distribution of the tiger ca. 1940

Distribution of the tiger ca. 1970

Unconfirmed reports ? Laporan, belum tentu

a range of vegetation extending from the sea to 1200 m will be lost.

The management programme for Meru-Betiri, or any reserve or national park, will not succeed in the long-run if policy and programmes are formulated on a day-to-day ad hoc basis. Accordingly, the Director General of Forestry is requiring that every designated reserve and park in Indonesia be managed according to a work/operations or management plan. The management plan provides guidelines for the conservation and development of the Reserve over a number of years; it is the control document which guides the preparation of more detailed plans as they are needed.

We have prepared the Meru-Betiri management plan in two parts (19):

The first identifies the Reserve's values, its resources, its relationship to surrounding areas, and the human needs that can be met in keeping with conservation principles;

The second part is a management document which details management goals and guidelines and provides a plan for the protection, interpretation, use, and administration of the Reserve.

Emphasized throughout the plan are the conservation measures necessary if there is to be any possibility for preserving the last remaining Javan tigers.

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Figure 2 The Landscape of East Java:

- a. Lines of commerce and forest areas
 (including teak plantations);
- b. Underlying geology, Sukamade Beach to Raung
 Volcano (after van Bemmelen, 20);
- c. The intensity of the dry season (after
 van Steenis, 27).

The Gunung Betiri complex is a distinct physiographic region. The older geological formations underlying this region contrast with the young volcanic complexes that dominate the East Javan scene. The dry southeast winds (June - September) give off rain as the air masses rise over the volcanoes and higher ridges. Pockets of rain forest occur in these wetter areas in a region that is otherwise dominated by monsoon vegetation. The higher areas in the Meku-Betiri Reserve are blanketed with rain forest. The lower areas are transitional forest.

Unfortunately, and to the detriment of the tiger, the critical wildlife habitat in the major river valleys of the Reserve has been converted to plantations of coffee and rubber.

THE MERU-BETIRI RESERVE

NATURAL FEATURES AND PROCESSES

THE SETTING

Travelling southeast from Banyuwangi, you drive along canals and pass by small towns. The land is flat, a mosaic of paddy fields dotted with palms and scattered clumps of bamboo. This is a countryside where man has completely altered the natural vegetation in order to produce food and fibre for his needs. Travelling further, the mountains surrounding Gn. Betiri loom in the distance, at first just a dusty green in the haze; closer, the details begin to emerge on the steep slopes. There is good forest with great emergent trees; the forest and the mountains stand in vivid contrast to the flat, densely populated agricultural land you are travelling through.

The Meru-Betiri Reserve is an area of about 50,000 ha lying on the south coast of East Java (Fig. 2a). Its extent is reflected by its name: from Meru Bay to the top of Gn. Betiri (1223 m). This is a remote region and access is limited. During World War II the Japanese attempted to build a road along this coast, but fortunately for its natural features, they failed. From Jember through Ambulu, it takes more than one hour to reach the plantation enclave of Bandialit, a distance of 30 km. The Sukamade plantation enclave in the east is three to four hours' drive from Banyuwangi by turning off the Banyuwangi-Jember highway either at Genteng (70 km) or Glenmore (100 km). The northeast corner of the Reserve can be reached from the plantation Malangasri, about one hour's drive from Glenmore. For the most part, the roads are unimproved. Travel by jeep or truck is recommended. There is a telephone line from the Sukamade estate to Banyuwangi.

Several physiographic and geological considerations are pertinent to an understanding of the Meru-Betiri ecosystem and its historical development. The Reserve lies in a disjunct section of the Southern Mountains, a belt that extends all along Java's south coast. These mountains are the south flank of the Javan geanticline. The belt is severed in several places by wide valleys, which are depressions where the geanticline disappears below sea level. The Southern Mountains consist of volcanic deposits of the Miocene. Later in the Miocene, the ridge sank below sea level and was covered by a thick layer of limestone. Some time later a regression of the sea took place and the region remained slightly above sea level until the Pleistocene. The upper and middle Pleistocene was a time of great geological turmoil in Java. The arching up of the Javan geanticline elevated and tilted southward the belt which we see as the Southern Mountains today. The top of this geanticline sank in relation to its southern flank, forming a depression called the Solo Zone, covering the Miocene deposits with new material. Today, these young volcano complexes, some of which rise to more than 3000 m, are the dominant physiographic feature of the East Javan landscape (Fig. 2, 20).

The physiographic distinctness of the mountain complex of which Meru-Betiri is a part is reflected in present land-use and by the routing of railroads and highways. The main lines of commerce between Jember and Banyuwangi pass through the low-lying juncture between the Raung Volcano and this section of the Southern Mountains (Merawan, Fig. 2b). Agricultural development and settlements are concentrated on the floors of the wide, adjacent valleys. Forest areas, both natural and plantations of teak (*Tectona grandis*), are found on the steeper slopes (Fig. 2a).

Within the Betiri complex, the most suitable river ("kali") valleys, the Sanen, Curah Nongko, Bandialit, Sukamade and Karangtambak, were cleared and converted to plantations, primarily of coffee and rubber, by the Dutch early in this century. Since World War II parts of these areas have been used for growing rice (*Oryza sativa*), corn (*Zea mays*) and cassava (*Manihot utilisima*). On the eastern and western flanks of this complex, where slope and climate are conducive, the natural forest has been replaced with extensive plantations of teak. Many of these vegetation alterations are comparatively recent. It has only been since World War II that the natural connection between Meru-Betiri and the South Banyuwangi Wildlife Reserve (Blambangan) to the east has been severed (11).

The Meru-Betiri Reserve lies in the core of this isolated region of the Southern Mountains, protected in the past from extensive habitat alteration by the ruggedness of the topography; and it is only in this rugged area that the last Javan tigers have managed to survive.

THE LAND AND WATER

The superficial expression of the Meru-Betiri landscape is the result of dynamic natural processes. Climatic and mechanical processes over the ages have modified the underlying geological formations, which accounts for the current physiography, drainage system and distribution of soils. These, in turn, influence the distribution of plant associations which, in turn, influence the distribution of the wildlife species.

The landscape is precipitous and dissected (Fig. 3a; 23). In 16 km the elevation rises from sea level to 1223 m at the top of Gn. Betiri. From this highest point, a ridge extends east to Gn. Mandilis (843 m) and west to Gn. Tajen (1036 m). To the north, the land drops away to the Kali Sanen, which forms a magnificent canyon in the upper reaches. At the headwaters of the Sanen, Baru and Karangtambak, just north of Gn. Tajen, is a high rolling landscape at 500 to 800 m, known as Malangsari, most of which has now been converted into a plantation of coffee and cocoa. The western end of Gn. Mandilis

Figure 3 The Meru-Betiri Reserve 1976:

Protection and management of Meru-Betiri can only be achieved through an ecosystem approach, employing sound conservation principles. Some of the first steps in planning for the future management of the Reserve include:

- Assessing the natural features and processes of the region;**
- Determining physiographic and regional relationships;**
- Locating the threatening and disruptive influences that disrupt the completeness and integrity of the ecosystem;**
- Identifying where boundaries must be set to include the seasonal and life-cycle needs of the flora and fauna;**
- Establishing where careful guidance of the complex natural processes is required to sustain the extinction-prone species.**

This information is compared with the present management and protection programme to determine what further actions are required.

Figure 5

