UNITED REPUBLIC OF TANZANIA

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mahale

STUDY FOR THE PROPOSED MAHALE MOUNTAINS NATIONAL PARK

Final Report May 1980

JAPAN INTERNATIONAL COOPERATION AGENCY

Japanese Overseas Technical Aid ; 1979—'80
JAPAN INTERNATIONAL COOPERATION AGENCY
Social Development Cooperation Department

Study Team
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Preface

In response to the request of the Government of the United Republic of Tanzania, the Government of Japan decided to extend technical cooperation for the establishment of the Mahale National Park in Kigoma Region.

As part of its preparations, the Japan International Cooperation Agency (JICA), entrusted with its work by the Japanese Government, has sent four ecological experts to the Kasoge Chimpanzee Research Station in Mahale since 1975 to cooperate with the staff of the Wildlife Division of the Tanzania Ministry of Natural Resources and Tourism.

With the progress of such preparatory activities, the Tanzanian Government requested the Japanese Government for cooperation in formulating a master plan and implementation plan for the Park, and the JICA, in compliance with this request, sent a study team of seven experts, including two ecologists, to Tanzania in August, 1979. The team conferred with officials of the Ministry and the National Park Corporation, gathered a great deal of ecological data and information, and conducted a field survey. After return to Japan, the team made further studies and formulated the present report for submission to the Government of the United Republic of Tanzania.

It is a matter of great significance that Japanese science and technology are of use for the establishment of a national park of Tanzania which has a long tradition and international influence in the field of nature conservation. I hope this report will contribute not only to the strengthening of friendly relations between our two countries, but also to the conservation of nature of the world.

I would like to express my deep appreciation to the Government and the people concerned of the United Republic of Tanzania for their close cooperation extended to the study team.

May, 1980

Keisuke ARITA
President
Japan International Cooperation Agency

Acknowledgements

The Republic of Tanzania has always held a tradition of nature conservation. Until now, several parks and reserves have been established in an effort to protect nature, the first being the Serengeti National Park. New plans are now being made for the creation of an eleventh national park. For those of us who have conducted research on the chimpanzees, it has been a great honour to have participated in the planning.

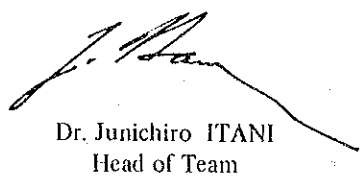
Numerous people and government agencies, as well as generous contributors, on both the Tanzanian and Japanese sides have been involved in this project. We are all watching with great expectations as the final stages are steadily completed.

It is often thought that Africa is one of the last regions on earth that is relatively unspoiled. But even in Africa, the gradual deterioration of the environment is taking place as a result of man's actions. Virgin nature can be found only in remote, truly uninhabited places, which are inaccessible by land routes. Mahale, which can only be reached by boat on Lake Tanganyika, happens to be one of those spots.

The entirely new and unique Mahale National Park will open in the 1980's. We sincerely hope that it will permanently protect its very special natural environment. More details can be found in the Master Plan about the particular characteristics of Mahale's environment. Important findings were the result of some two decades of continuous research. It was the accumulated scientific data, combined with the unique natural elements of Mahale, that gave rise to the idea of establishing a new national park. We wish to express our heart-felt respect to the Republic of Tanzania for setting down the guidelines for the establishment of the national park.

The park will be an important achievement for people all over the world. It is hoped that it also holds promises for fruitful future ecological research. In closing, we wish to renew our profound gratitude to the Tanzanian and Japanese governments, as well as to all the people who have been involved in this endeavour.

May, 1980



Dr. Junichiro ITANI
Head of Team
Associated Professor Kyoto University

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1. Purpose and General Description of the Present Plan

On the basis of various preliminary activities, the Tanzanian Government has requested the preparation of a master plan and implementation program for the park. As a results, the Japanese Government a study team of seven experts, including two ecologists, to Tanzania in August of last year. These experts consulted with officials of the Ministry of Natural Resources and Tourism and the National Park Corporation, gathered a great deal of ecological data, and conducted technical field surveys. After they returned to Japan, work began on the planning for submittal of this report.

The following shows the scope of work of the study team:

(1) Reporting results of basic ecological surveys in Mahale

The report includes details on the characteristics of the area with respect to natural conditions, flora, and fauna, for use as a basis for designing the park master plan.

(2) Designing of the Mahale National Park Master Plan

The master plan delineates the park boundaries and land-use, specifies distribution of park facilities, means of transportation, and other physical elements as well as plans for nature conservation, park management, research, and opening of the park to the general public.

(3) Formulation of implementation program for construction of the park

The implementation program includes data on the scope of project, specifications, construction schedule, and cost estimates for park ferryboat and other vessels facilities, trails, etc.

This plan provides details on the long-term development of the national park. It provides guidelines regarding its future development, construction schedules, and methods of implementation after parliamentary approval. Detailed planning and design, including detailed technical studies will have to be carried out after such approval or after a decision has been made regarding the scale of project.

2. Team Organization

2-1 Study team

Ecologists:

ITANI Junichiro (Dr.)	Head of Team Associated Professor, Kyoto University
HASEGAWA Toshikazu	Staff of Psychology Research Center, Tokyo University

Consultants:

KIKKAWA Takashi	Technical Coordination Japan City Planning
KAMITANI Toshio	Ship Planning Japan City Planning
NAGAI Yasutaka	Park Planning Japan City Planning
CHIHARA Kentaro	Facilities Planning Japan City Planning

Japan International Cooperation Agency:

KAI Hiroshi	Social Development Cooperation Department
IGARASHI Teizo	Social Development Cooperation Department

2-2 Tanzanian officers

F. LWEZAULA	Director of Wildlife Division
G. NTENGA	Senior Assistant Bee Keeping Officer
W. MCHACHA	Chief Preventive Officer
G. BIGURUBE	Game Management Officer (Training)
R. K. TIBANYENDA	Game Management Officer (Research)
F. MLAGALILA	Game Management Officer (in Charge of Planning)
P.J.P. KITOMARI	Finance and Planning Officer, Tanzania National Parks
J. MAGOMBI	Park Warden, Ruaha National Park

2-3 Kasoge Chimpanzee Research Station

NISHIDA Toshisada (Dr.)	Tokyo University
TAKAHATA Yukio	Kyoto University
HASEGAWA Mariko	Tokyo University
KAWANAKA Kenji (Dr.)	Okayama University of Science
NORIKOSHI Kozi (Dr.)	Sophia University
UEHARA Shigeo	Tokyo University

3. Profile of the Mahale National Park

Mahale will be the eleventh national park to be established in Tanzania. While basically conforming to the existing national park administration system, it will also have some unique innovation features. Although embracing such goals as ① nature conservation and field management, ② environmental study and research and ③ providing opportunities for the general public to come into close contact with nature, as propounded by the National Parks Charter, some of its features will set it apart from the other national parks:

(1) It will be the only national park in Tanzania mainly dedicated to the protection of chimpanzees in their natural habitat. Although established for the same purpose, Gombe Stream National Park is not open to visitors.

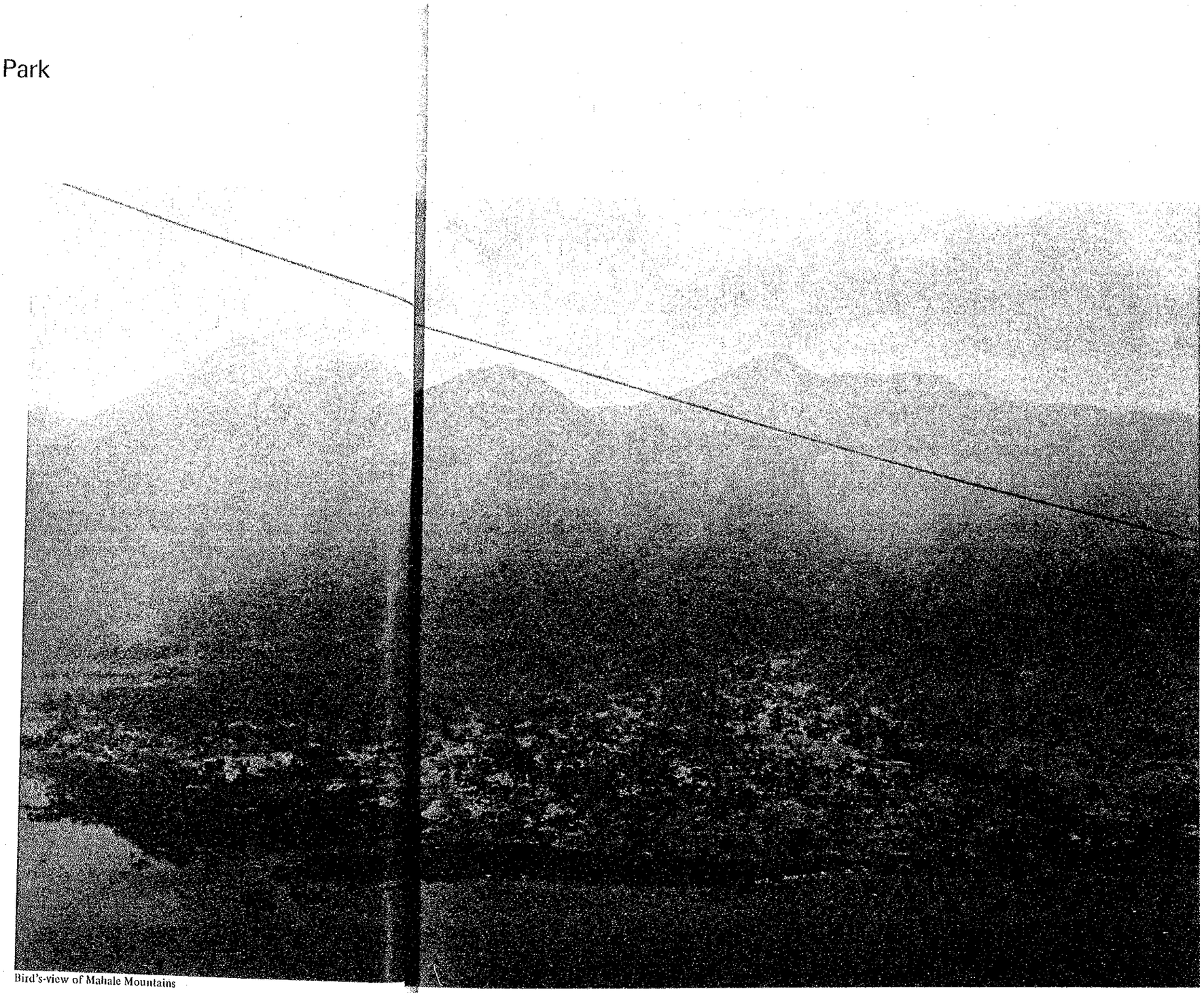
(2) It will be unique in botanicogeographical terms in that it is the meeting place of the natural scenic grandeur of Lake Tanganyika and the Mahale Mountains, the Congo Type tropical rain forests, and the miombo woodlands.

(3) It will be the only national park in Tanzania affording an opportunity to observe together a wide variety of wildlife with homelands in eastern, western, and southern Africa.

(4) It will be a research-oriented national park where scientific research activities will be conducted on a permanent basis as a continuation of the efforts made in this respect over the last twenty years. This will be particularly important since research of this type is only done at Serengeti National Park at present.

(5) It will be a national park closed to all motor vehicles with a view to protecting the environment, but hiking excursions for the enjoyment of the natural surroundings and casual observation of wildlife will be allowed, there being no predatons posing a threat to the safety of visitors. At present, only in Kilimanjaro National Park hiking is allowed.

(6) Together with the Gombe Stream and Katavi national parks, it will become one of the main links in western Tanzania's Tourism circuit around Lake Tanganyika.



Bird's-view of Mahale Mountains

..... Even at present we can point out several important characteristics of the Mahale area in biogeographical terms. The greater part of Tanzania is consisting of dry land, one notable exception of which is the slopes on the western side of the Mahale Mountains, where the terrain is moist and provides good environmental conditions for forest-living animals. .....

..... There are three subspecies of chimpanzee, those [illegible] long-haired chimpanzees (Pan troglodytes schweinfurthii). They are found in the area from the left bank of the Ubangi river to the Congo basin to eastern Zaire and western Uganda and western Tanzania. .....

..... Female offspring are nurse – protected by their mother for 5 – 6 years and gradually come to receive and require less and less protection by age 7 or 8. From the age of 10 or so, the relationship between mother and daughter can rather be described as in a state of estrangement, for it is around this time that the female offspring separates from her mother's unit-group. On the otherhand, males do not experience this drastic separation from the mother. .....

Chapter 1

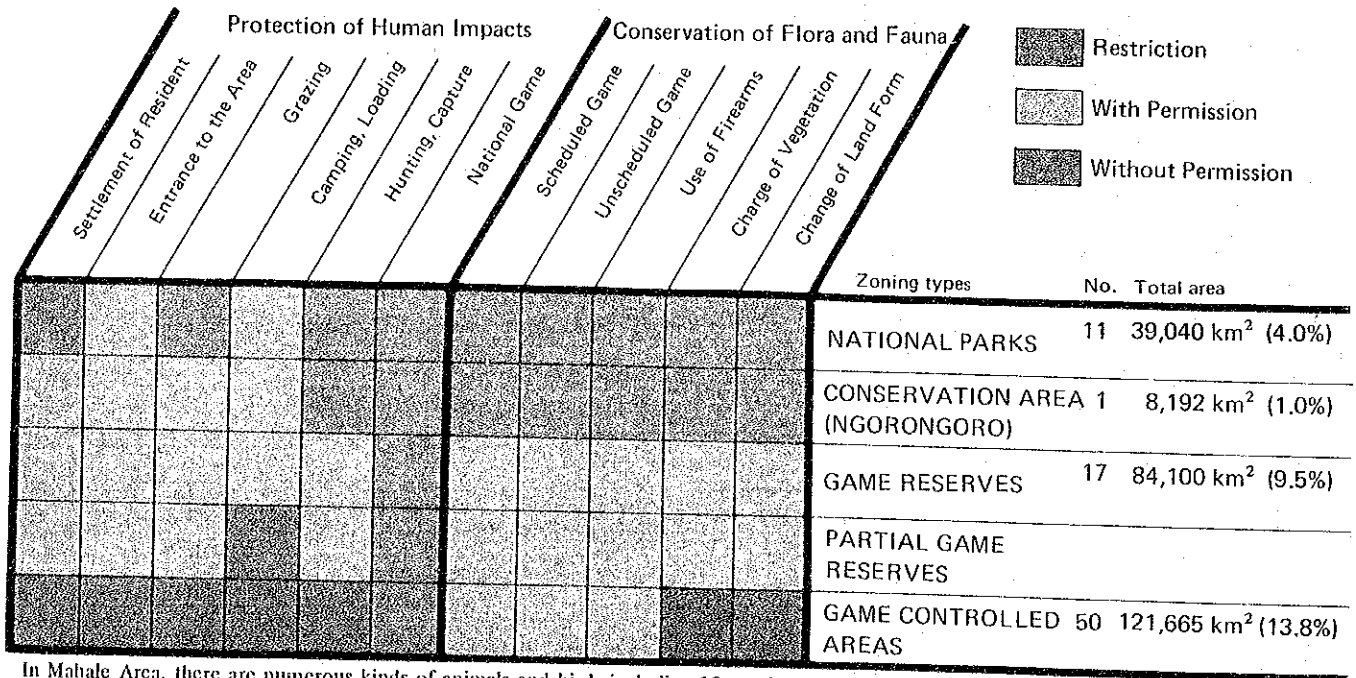
Present Condions of Mahale

1. Nature Conservation and National Parks Administration in Tanzania

East Africa abounds in wildlife, and Tanzania has a richer variety of wildlife and puts more effort into protecting their natural habitats than almost any other country in the world.

Since the beginning of this century, Tanzania has practiced a unique policy of nature conservation and wildlife protection on a national level. Nature conservation and wildlife protection areas, so designated under the Wildlife Conservation Act of 1974, now account for 28% of the total land area. Ten national parks established under Chapter 412 of the Law (formerly the National Parks Ordinance) cover a total of 37,523km^2 or 4% of the land area. The national parks, the first of which was Serengeti National Park, established in 1951, are not only for protecting the wildlife; but also they are an attempt to maintain a perfectly natural environment free from an human impact; this makes the national park system of Tanzania one of the best in the world.

Fig.-1 Nature conservation system of Tanzania



In Mahale Area, there are numerous kinds of animals and birds including 12 species of mammals and 5 species of birds which designated as the National Game; so, it should be undertaken strictly preservation measurement on this area.

Fig.-2 Wildlife conservation system in Tanzania

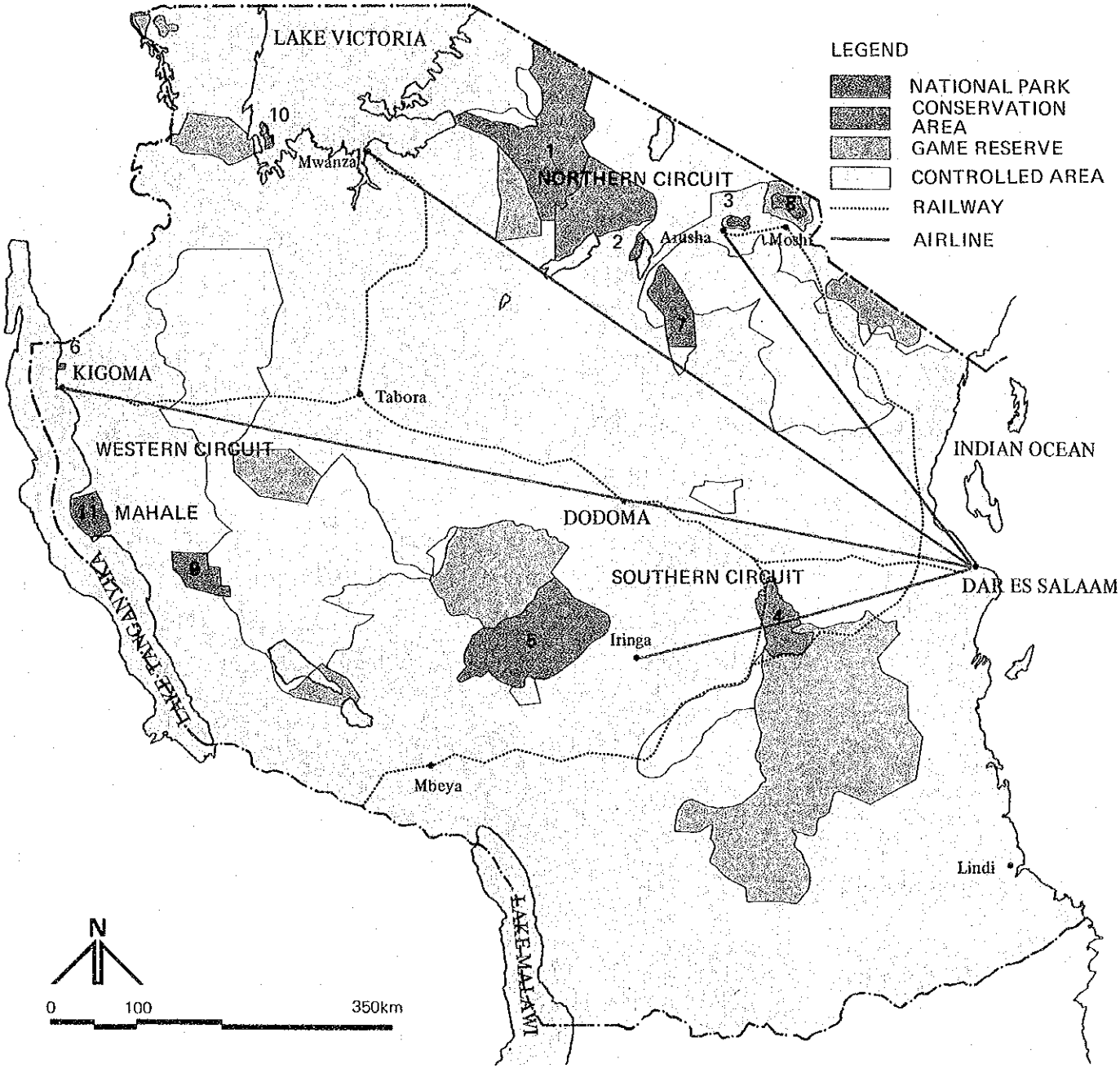


Table-01 Tanzania national park

	Established year	Area (km²)
1 Serengeti	1929 GR 1951 NP	14,763
2 Lake Manyara	1957 GR 1960 NP	325
3 Arusha	1960 NP	137
4 Mikumi	1954 GC 1964 NP	3,230
5 Ruaha	1951 GR 1964 NP	12,950
6 Gombe	1945 GR 1968 NP	52

	Established year	Area (km²)
7 Tarangire	1957 GR 1970 NP	2,600
8 Kilimanjaro	1973 NP	756
9 Katavi	1974 NP	2,253
10 Rubondo Island	1977 NP	457
11 Mahale	1980 NP	1,613
Total		39,136

Notes : GR = Game Reserve, GC = Game Controlled Area, NP = National Park

2. Preliminary Activities

As the following chronological table shows, Japanese researchers have been involved for nearly twenty years in field research over a wide area that includes Mahale; since the establishment of the Kasoge Chimpanzee Research Station (KCRS) by the Ministry of Natural Resources and Tourism Tanzania in 1975, research and other activities conducted prior to the establishment of Mahale National Park, including ecological studies, have been in full swing and have produced an enormous output. Administrative preparations for the national park are also underway, and parliamentary approval is expected shortly.

2-1 Survey and research activities

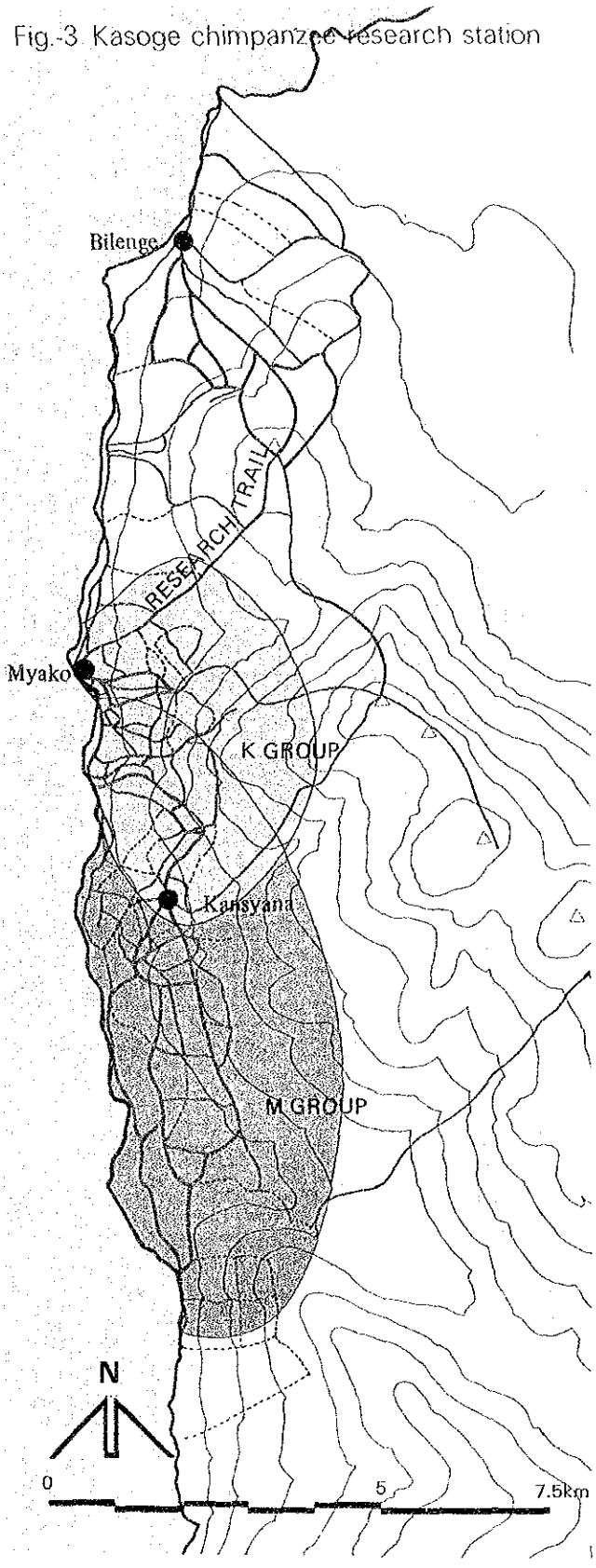
1961 First studies in Tanzania by the Kyoto University African Primatological Expedition (KUAPE).
1965 Establishment of research camp at Kasoge in Mahale.
1966 Succeeded in feeding chimpanzee K-group (30 subjects).
1968 Succeeded in feeding chimpanzee M-group (80 subjects).
1975 Establishment of KCRS and beginning of basic ecological research activities in Mahale up to the present.

2-2 Governmental action

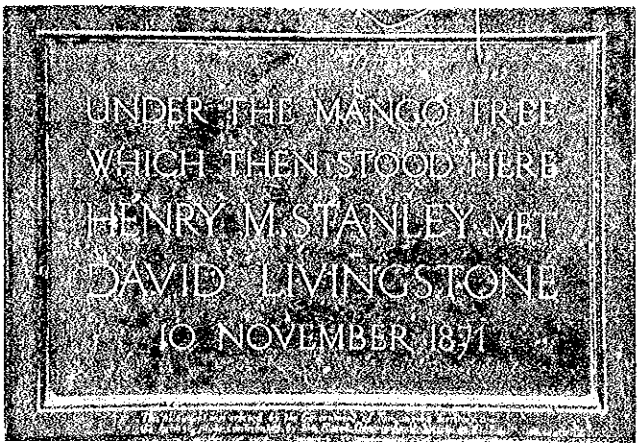
1973 Resettlement of Mahale residents in the context of the Kigoma region villagization program.
1975 Resolution passed by the Kigoma regional parliament for the establishment of Mahale National Park.
1979 Formulation of master plan and implementation program for Mahale national park by JICA mission.
1979 Announcement of establishment of Mahale National Park official government bulletin (scheduled).
1980 Approval of Mahale National Park establishment by the national parliament (scheduled).

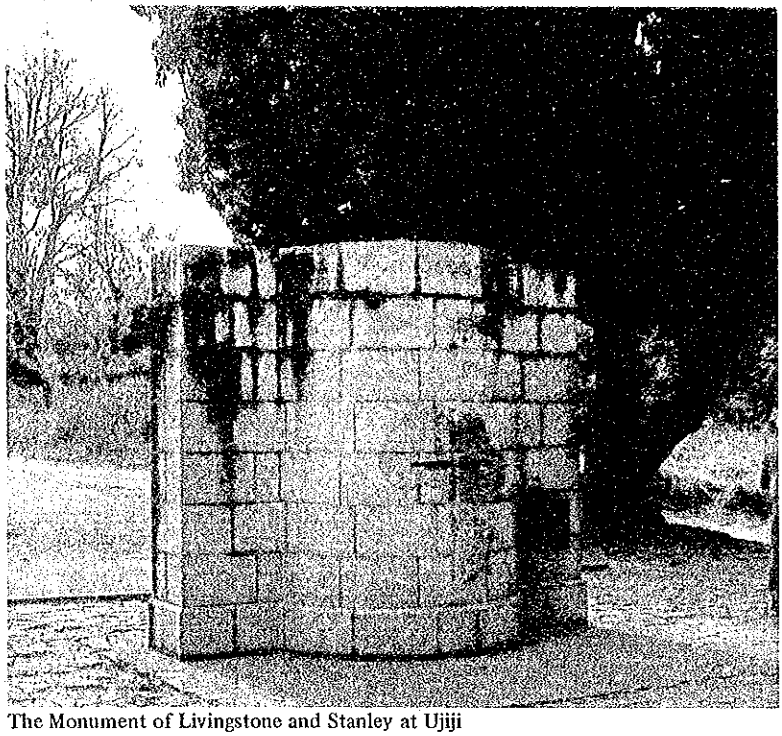
In preparation for the establishment of the National Park, the Japanese government has maintained, a staff of four ecologists at KCRS since 1975. In cooperation with the staff of the Wildlife division of the Ministry of Natural Resources and Tourism, Tanzania, these specialists help in carrying out the research necessary for this purpose.

Fig.-3 Kasoge chimpanzee research station



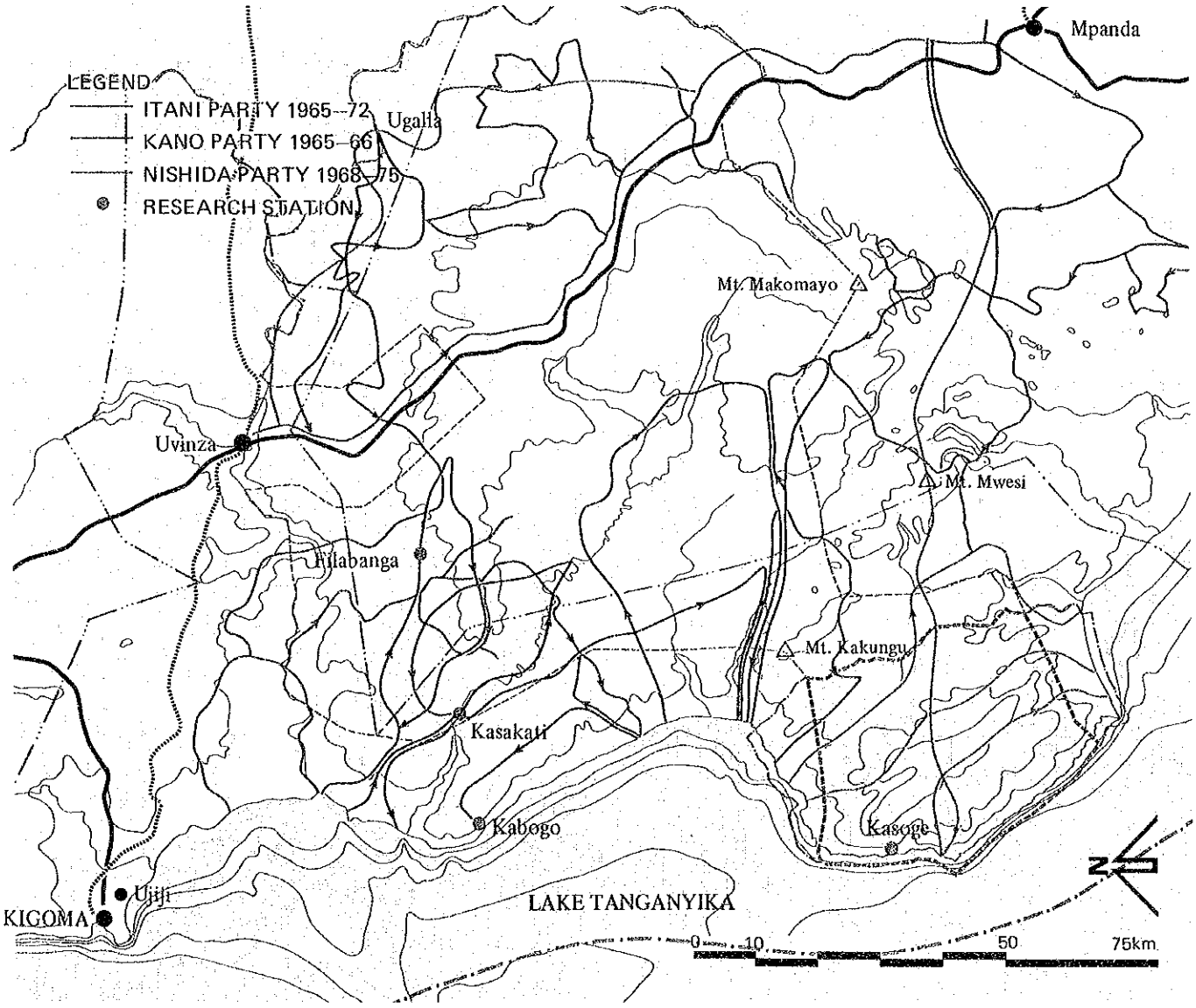
Ujiji 1871





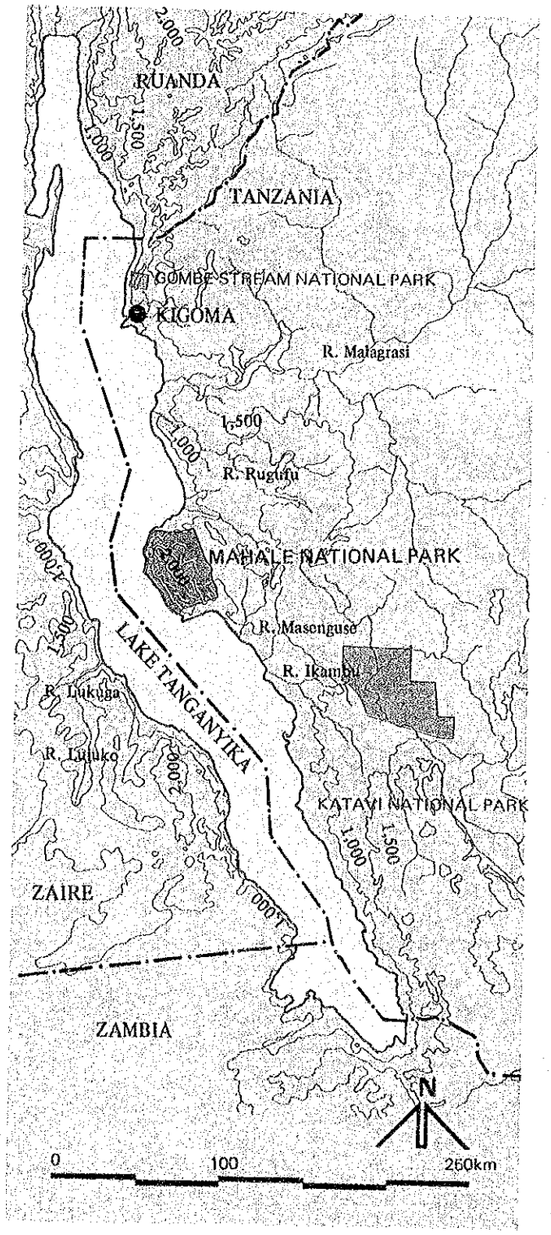
The Monument of Livingstone and Stanley at Ujiji

Fig.-4 Survey safari by KUAPE since 1965



3. Nature of Mahale

Fig-5 Lake Tanganyika



3-1 Lake Tanganyika

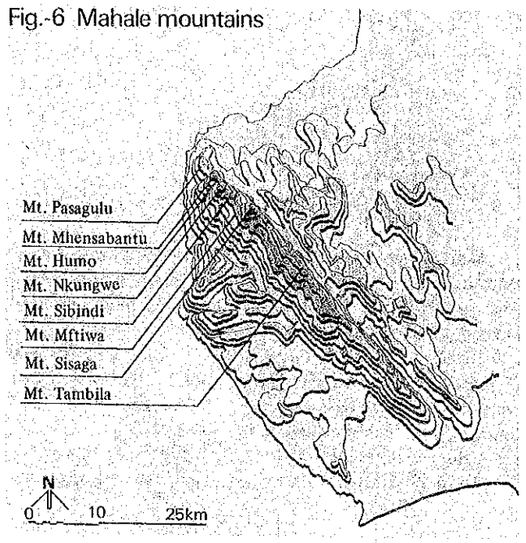
Lake Tanganyika is the longest in the world (720km) and the third deepest (1,435m); its bottom being 655m below sea level. Of all the areas along L. Tanganyika, Mahale is one of the richest in topographical variation, and its imposing mountain chain makes for splendid scenic harmony with the lake waters. A beautiful view is to be had of the lake from the main ridge of the Mahale chain.

Landscape of Mahale Mountains from Lake Tanganyika

3-2 The Mahale Mountains

The Mahale Mountains run from NNW to SSE with an elevation range of 2,400--2,000m, and the chain's length is about 50km. In the western part of Tanzania, it is one of the largest mountain chains. Its highest peak, Mt. Nkungwe, has an elevation of 2,462m above sea level. The peaks Humo, Muhensabantu, and Pasagulu to the north of Mt. Nkungwe and Sibindi, Mfitwa, Sisaga, Tambila, and so on to the south of it form the main ridge of the chain. Western slopes of this main ridge drop precipitously down to the lake. Since the elevation above sea level of the surface of the lake is about 780m, a gigantic wall soars up about 1,500m from the banks of the lake. On this side of the main ridge a large number of ravines have been cut into the surface of the slopes like the teeth of a comb, running into the lake.

Fig.-6 Mahale mountains

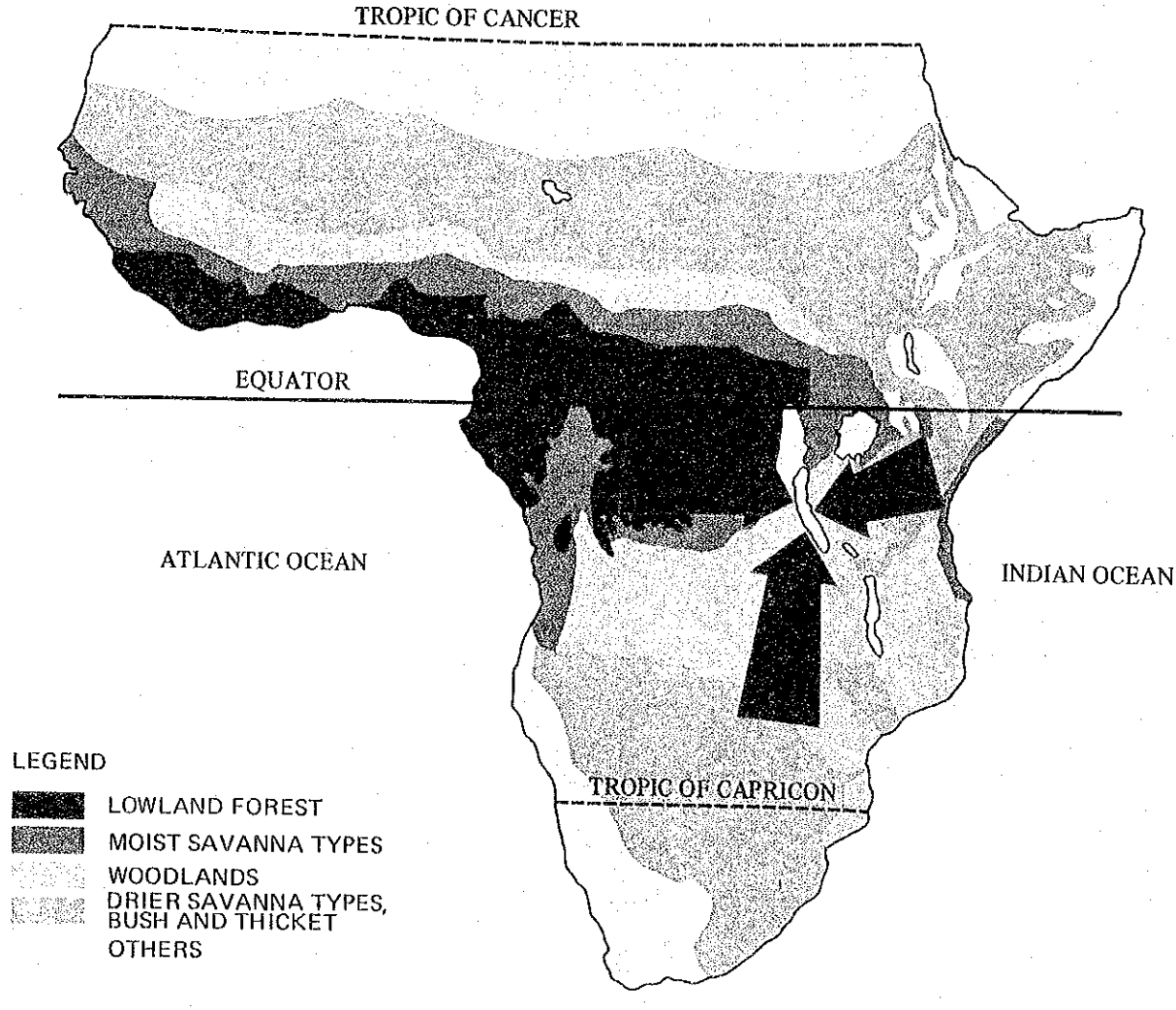


4. Flora and Fauna of Mahale

Mahale has a greater variety of wildlife with homelands in other parts of Africa than just about any other area. The tropical rain forests are thought to have advanced beyond their eastern limits of today during pluvial periods and to have receded farther to the west during interpluvial periods of the diluvial age. Furthermore, it is surmised that when the tropical rain forests receded to the west quite a few species of wildlife that came to the area with them were left behind as relics; making for a unique fauna of Mahale.

As we have seen Mahale is an area where east, west, and south and equatorial Africa meet, and as such it may hold the key to the past of that continent. Not only, therefore, is the permanent preservation of the area of great importance in biogeographical terms, but also ongoing research in this field in the area can be expected to yield important results piecing together the paleo-ecology of the whole continent. Furthermore, it goes without saying that the park will be offer of great social educational value in terms of allowing the public to enjoy its unique natural conditions and to be apprised of the results of the research that will be carried on in it.

Fig-7 Mahale is melting pot of nature

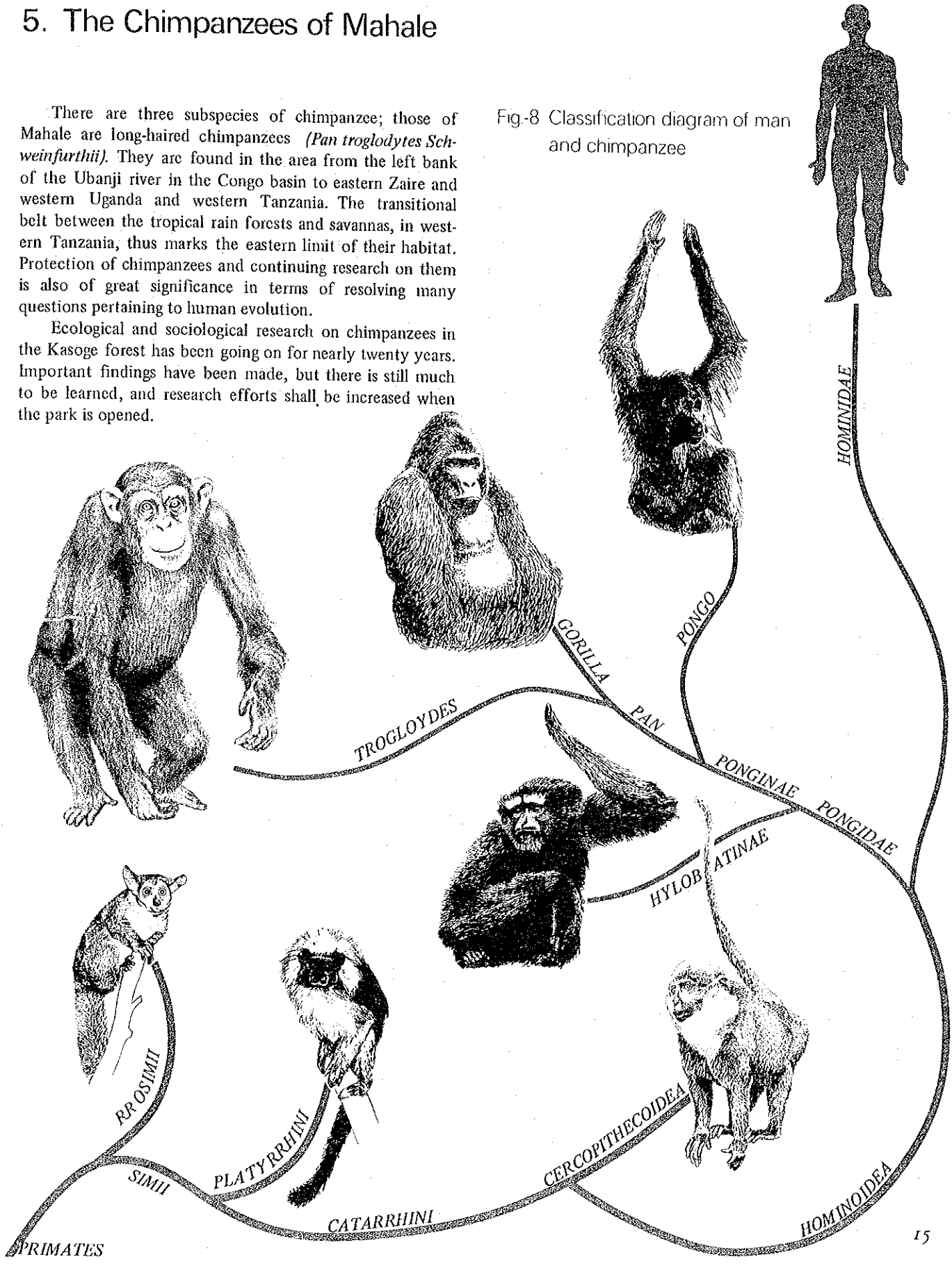


5. The Chimpanzees of Mahale

There are three subspecies of chimpanzee; those of Mahale are long-haired chimpanzees *(Pan troglodytes Schweinfurthii)*. They are found in the area from the left bank of the Ubanji river in the Congo basin to eastern Zaire and western Uganda and western Tanzania. The transitional belt between the tropical rain forests and savannas, in western Tanzania, thus marks the eastern limit of their habitat. Protection of chimpanzees and continuing research on them is also of great significance in terms of resolving many questions pertaining to human evolution.

Ecological and sociological research on chimpanzees in the Kasoge forest has been going on for nearly twenty years. Important findings have been made, but there is still much to be learned, and research efforts shall be increased when the park is opened.

Fig.-8 Classification diagram of man and chimpanzee

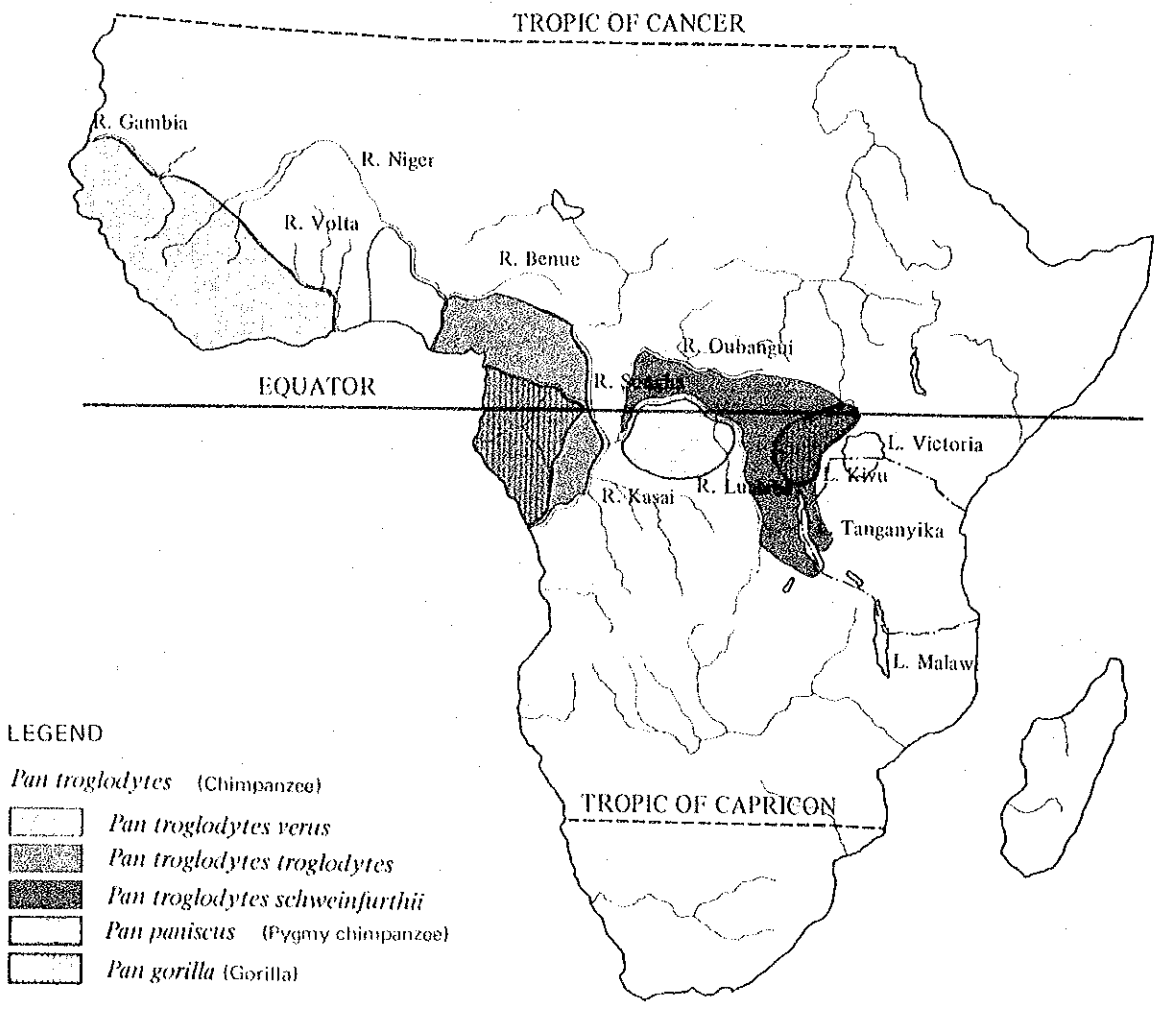


6. Distribution of chimpanzees

The areas of western Tanzania which form the natural habitat of this subspecies are located in the Kigoma region and in a part of Mpanda region. They are found in greatest numbers on the left bank of the Malagalasi river, the largest river flowing into lake Tanganyika on its eastern shore, and in fewer numbers in the Gombe stream and Lilamsimba areas. On the left bank side of the Malagalasi river, they are distributed over an area consisting of six distinct zone. In western Tanzania, the chimpanzees can be found over a total area of 10,000km^2. With a total population for this species of about 2,000. Population densities depend on the density of the tropical forests in each area. Since Mahale has more forests than other areas, it also has the largest concentration of chimpanzees, their number being estimated at 700–1,000.*

* The data on the distribution of chimpanzees in Tanzania is based on the 1967 KUAPE findings of Takashi Kano. Although he estimated that about one-third of the total number of 2,000 were to be found in Mahale. Their number is now believed to be somewhat higher.

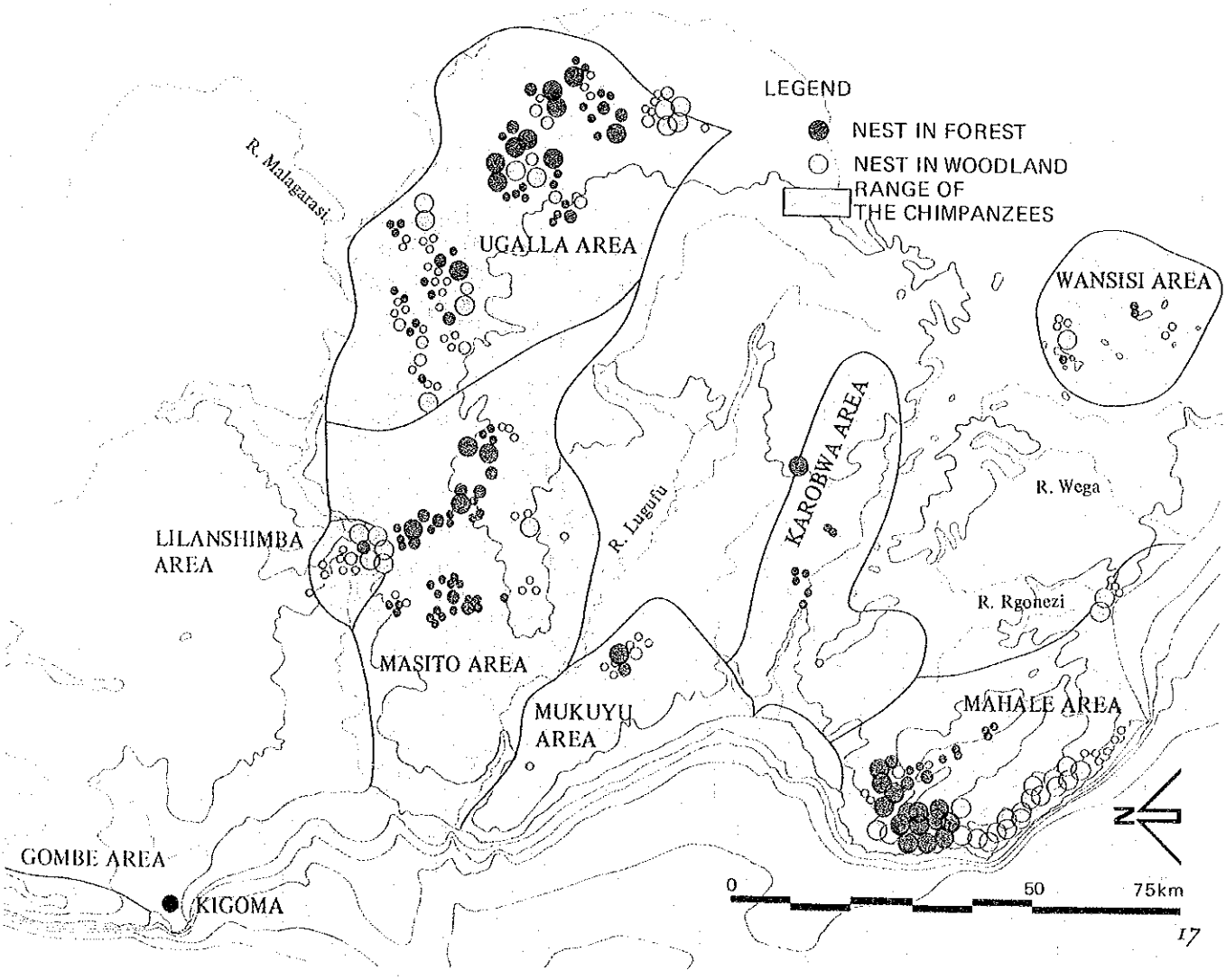
Fig. 9 Habitat of Greater apes in Africa



There are also other extensive areas inhabited by chimpanzees east of the proposed limits of the park. These include the Ugalla area, which is the driest and marks the easternmost limit of their distribution, and the Wansisi area, which marks the southern limit. These areas offer only a marginal living environment for chimpanzees. Still, as buffer areas for Mahale National Park, it would be imperative that more than 10,000km^2 of such areas be given protection by the national government as a game reserve in the near future, and the administrative preparations for such a game reserve ought to proceed at the same time as the planning for the national park. Furthermore, the research carried out in the national park can be expected to contribute to the protection of these chimpanzees.

There is a particularly high concentration of chimpanzees in the Kasoge forest of Mahale on the western slopes of Mt. Nkungwe, where six different unit-groups have been identified. They are scarcer in the miombo forest; nevertheless, there are thought to be at least fifteen groups of them in all within the proposed limits of the national park. As the area in Tanzania with the highest chimpanzee population density, it is very important that Mahale be designated as a national park in order to protect the chimpanzees and their natural habitat. Two of the groups in this area (approximately 100 individuals) have already taken to being fed and can be observed from a very close distance. Biographical records are being kept for each chimpanzee. This is the only place in the world where such detailed records are being kept on chimpanzees, besides the Gombe Stream National Park. However, since the latter is not open to visitors, this is of particular significance.

Fig. 10 Chimpanzees distribution in west Tanzania



7. Fauna of Mahale

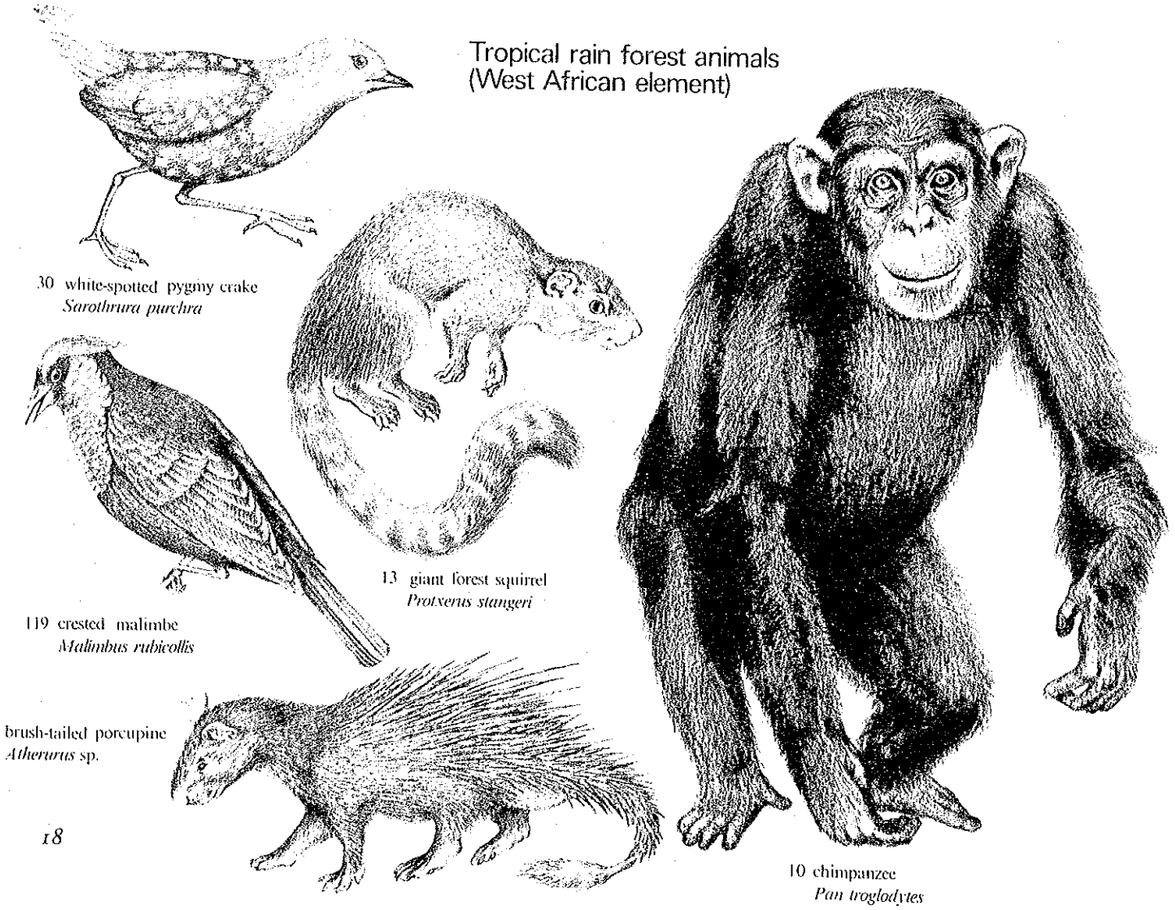
7-1 Mammals

The fauna of Mahale is also varied as the flora. It can be classified into three groups according to the original homeland of the species involved: tropical rain forest animals such as chimpanzees, red colobus, Angolan colobus, red-tailed monkeys, brush-tailed porcupines, giant forest squirrels, and blue duiker, savanna animals such as lions, grant:s zebras, wart hogs, and giraffes; and species endemic to miombo forests such as roan antelopes, sable antelopes, and Lichtenstein hertbeest. The existence of all three of these groups in a single area is a major feature of Mahale.

Thus far the existence of 55 species of mammals has been confirmed in Mahale 11 forest species, 30 open land species, 11 species with distribution throughout Africa regardless of the type of vegetation, and 3 aquatic species. With more detailed surveys in the future, however, this number will no doubt be doubled.

A fact worthy of special notice is that of these 55 species, 9 are primates; this is more than in any other national park in Tanzania.* This large number is explained by the fact that those native to West Africa such as the Angolan colobus, red colobus, and red-tailed monkeys are included. Furthermore, the question of how these primates relate to one another in paleo-ecological terms is an interesting subject for future research.

* Non-human primates inhabiting in national parks in Tanzania.



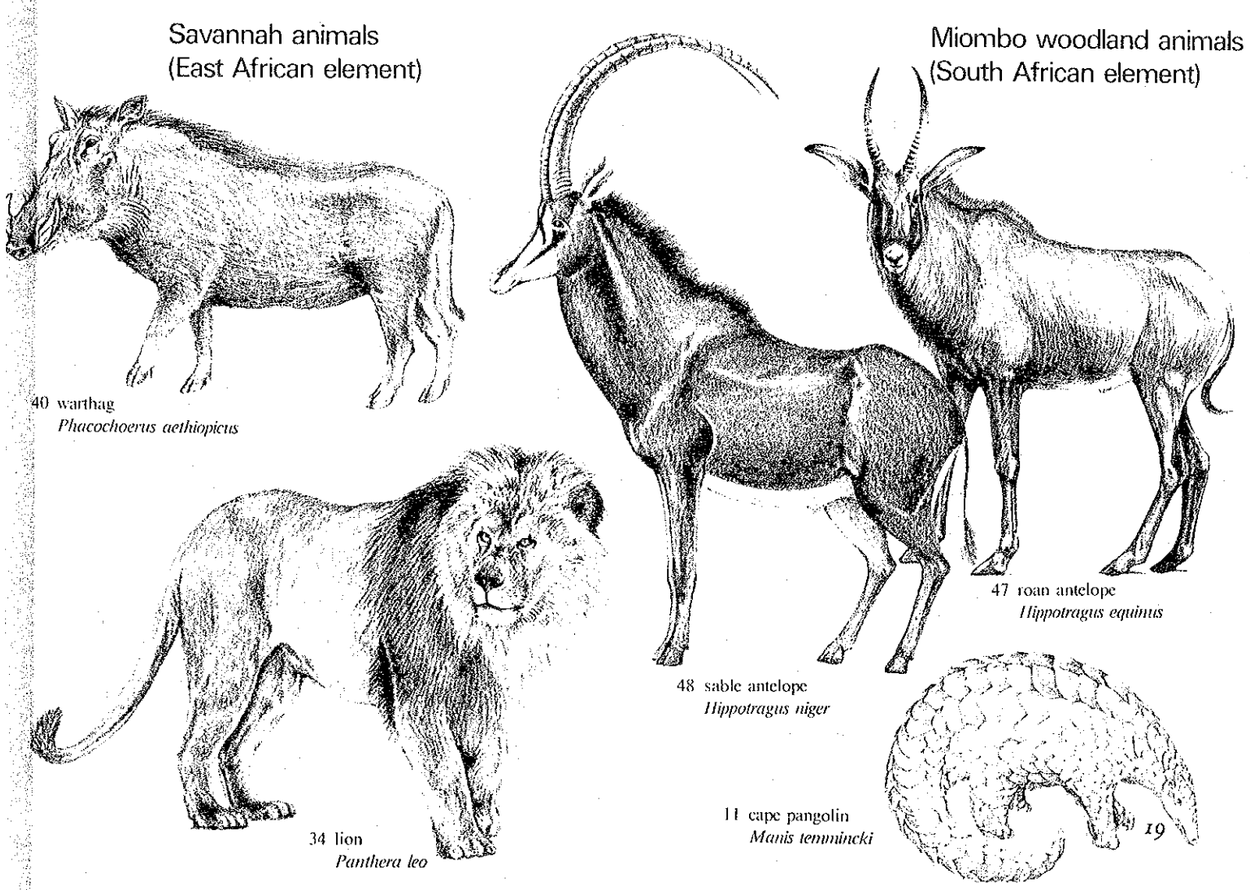
National Park

Chimpanzee *Pan troglodytes*	Serengeti	Tarangire	Lake Manyara	Mikumi	Ruaha	Katavi	Gombe Stream	Arusha	Kilimanjaro	(Mahale)
Olive baboon *Papio anubis*										
Yellow baboon *Papio cynocephalus*										
Red colobus *Colobus badius*										
Angolan colobus *Colobus angolensis*										
Abyssinian colobus *Colobus abyssinicus*										
Savanna monkey *Cercopithecus aethiops*										
Blue monkey *Cercopithecus mitis*										
Red-tailed monkey *Cercopithecus ascanius*										
Patas monkey *Erythrocebus patas*										
Greater galago *Galago crassicaudatus*										
Senegal galago *Galago senegalensis*										

Fig.-11 Non-human primates inhabiting in national parks of Tanzania

Inhabiting in National Park

The Serengeti National Park has 7 species of primates, and the Gombe National Park 8 species.



7-2 Birds

The omithological makeup of Mahale is also quite varied, so the park will also afford wonderful opportunities for bird watchers. So far 120 species of birds have been confirmed in the area – 26 lake or lake shore species, 52 openland species, 28 found both in forest and in openland, 7 forest, and 7 highland species. Detailed surveys have not yet been made, but some of these species, such as the crested marimbe, the white spotted pygmy crake, and the crested Guinea fowl clearly represent tropical rain forest elements.

7-3 The fishes of Lake Tanganyika

The lake was formed about 10 million years ago, and for 6 million years it has been completely isolated from other water system. As a result, it has a very large number of endemic species of fish, including rare species that have made the reefs along the lake's shores their habitat as well as many species of shellfish. All these rare species will figure prominently in research aimed at piecing together the history of the continent. Although the Mahale National Park waters along the lake represent only 60km of the lake's total length of 720km, putting the species in them under park protection is a very significant step. It is also to be expected that the Mahale National Park will in the future serve as a center for limnological research.

7-4 Other fauna

Little is known yet about other kinds of animals in the area, including reptiles and amphibians, and about insects. There is a great number of insects, especially butterflies, several new species of which have recently been discovered there. Moreover, it is likely that more species will be discovered in the future.

Landscape of Kasoge forest

8. Flora of Mahale

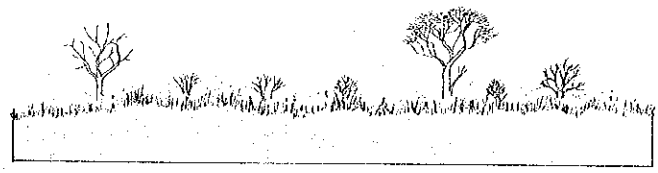
The west part of Tanzania consists of dry woodedland savanna, known locally as miombo forests, and Mahale is no exception. The miombo woodlands, which form an outer perimeter around the tropical rain forests of the Congo basin, consist of sparsely distributed tall trees, mainly of the *Caesalpinioidea* family, and a dense covering of low trees; and they account for about one quarter of the land area of the African continent, not taking deserts into account. In Mahale, about three-quarters of the area is represented by such forests with the remaining one-quarter consisting of typical residual natural vegetation. On the western slopes of the Mahale Mountains rising from the shores of L. Tanganyika (780m above sea level) to an elevation of 1,300m, the topographical features make tropical rain forests possible in spite of the fact that the surrounding areas all consist of dry woodedland savanna. This forest area is known as the Kasoge forest and represents a sort of exclave of the Congo forest, with various kinds of tall semi-deciduous trees forming a high canopy, evergreen vines entangled between them, and a thick floor covering of ferns. Another characteristic pattern of natural vegetation can be seen in the vicinity of 1,500m in elevation in the Mahale Mountains, consisting of a mosaic of montane forest, bamboo bush and high altitude glassland.

Fig.12 Vegetation in national parks of Tanzania

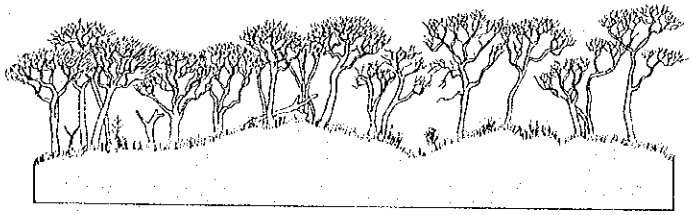
National Park	Grass steppe	Acasia savannah	*Adansonia* sav.	Miombo woodland	Tropical riverine Forest	Tropical rain Forest	Montane Forest	A. Bamboo Forest	Alpine grass steppe
KILIMANJARO									
ARUSHA									
MAHALE									
RUBUNDO									
GOMBE									
KATAVI									
RUAHA									
MIKUMI									
L. MANYARA									
TARANGIRE									
SERENGETI									

Fig.13 Typical vegetation in Mahale

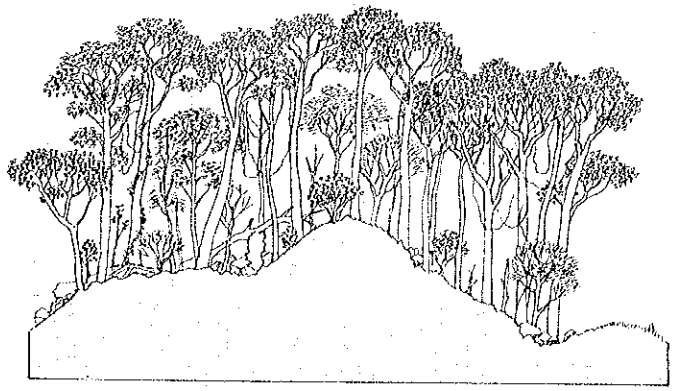
Savannah



Woodland



Montane Forest



..... In this area, feature of the West-African tropical rain forest can clearly be observed, interlaced with stretches of savanna; as a matter of fact, Mahale is the ecotone of forest and savanna. Biogeographical components of eastern, western, and southern Africa are present in Mahale. .....

..... The commonest social behavior patterns observed are those that are connected with a dominant vs. subordinate relationship. Patterns of social behavior include facial expressions, and gestures such as ..... So-called appeasement behavior patterns on the part of a subordinate are also many in kind; he may run to a dominant and hug him from behind, or extend his hand and touch the other on the chin. .....

Chapter 2

Master Plan

1. Outline of the Proposed Mahale National Park

1-1 Survey and research activities

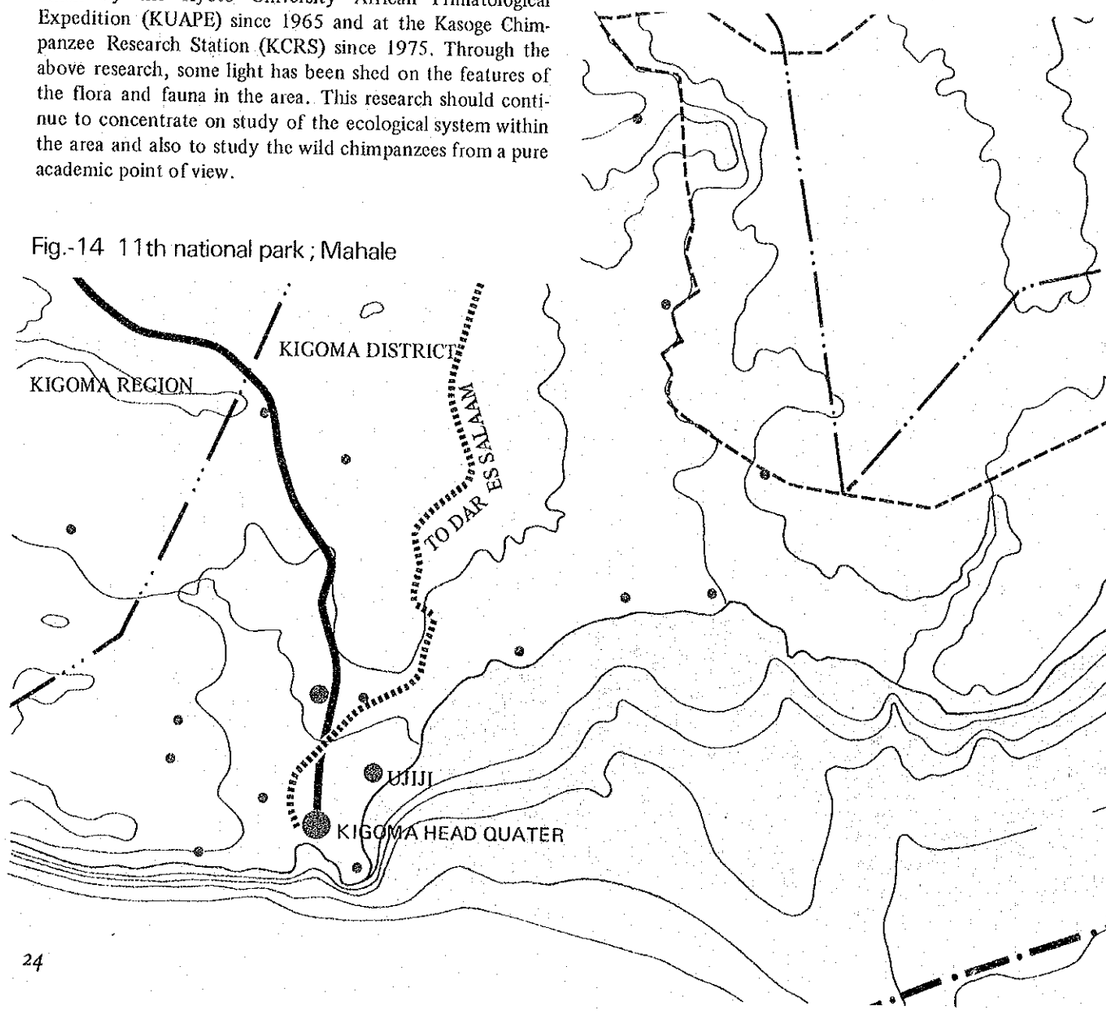
The purpose of the scientific research activities in the national park after its establishment will be to obtain data and information useful and even indispensable to its operation and management, including the protection of its natural environment.

The research in this area on the ecology, habitat, and social structure of chimpanzees in the wild has been undertaken by the Kyoto University African Primatological Expedition (KUAPE) since 1965 and at the Kasoge Chimpanzee Research Station (KCRS) since 1975. Through the above research, some light has been shed on the features of the flora and fauna in the area. This research should continue to concentrate on study of the ecological system within the area and also to study the wild chimpanzees from a pure academic point of view.

1-2 Nature protection and field management

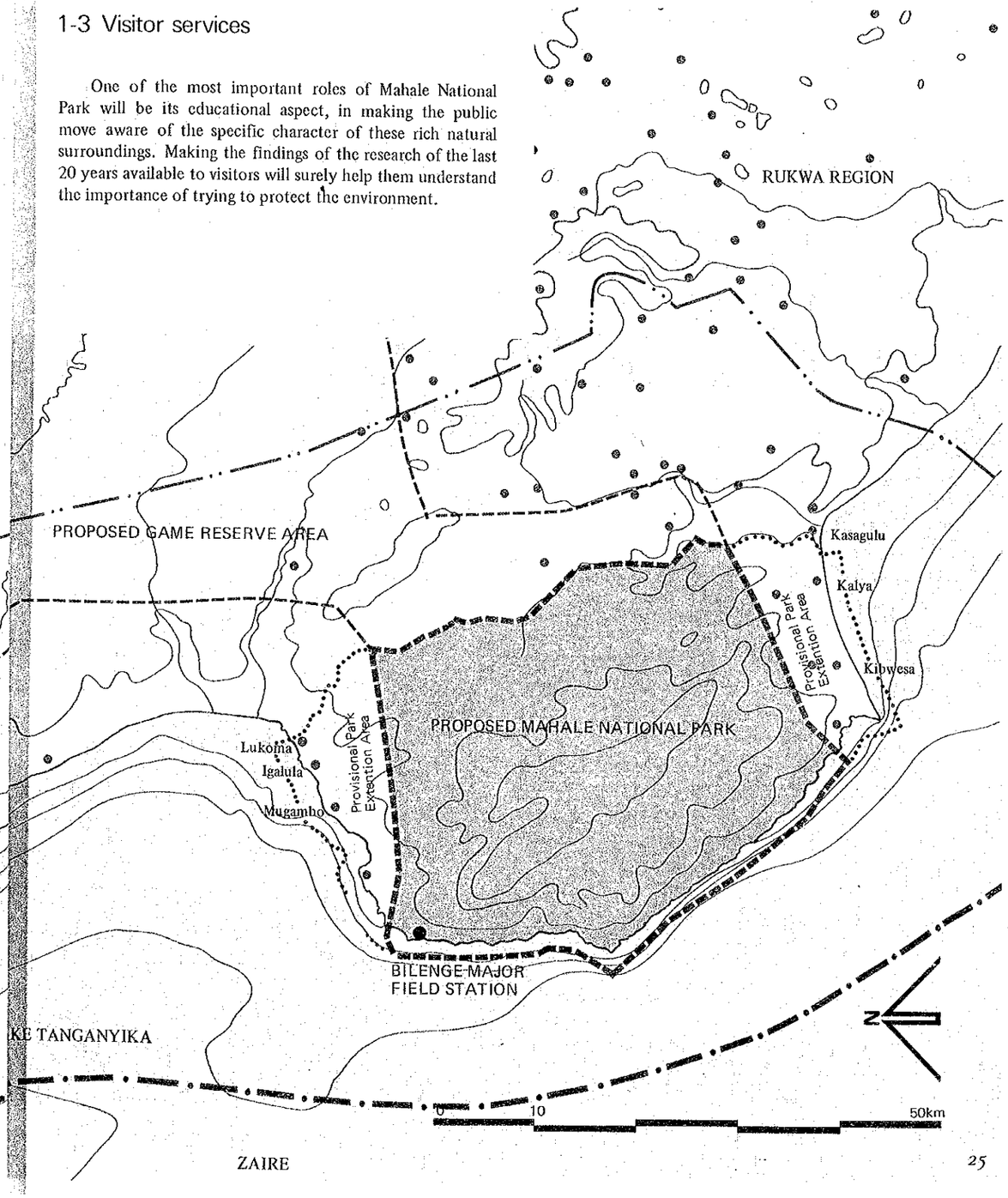
Chapter 412 of the Law (formerly the National Park Ordinance) provides for the mandatory protection and management of the natural environment of its national parks. As in the case of other national parks Mahale National Park is to be established in order to preserve the ecological equilibrium, to restor natural conditions that have been impaired by humans, and to prevent possible future detriment to nature in the park. In this case a total area of 1,613km^2 (1,517km^2 on land and 96km^2 on L. Tanganyika) is involved.

Fig.-14 11th national park ; Mahale

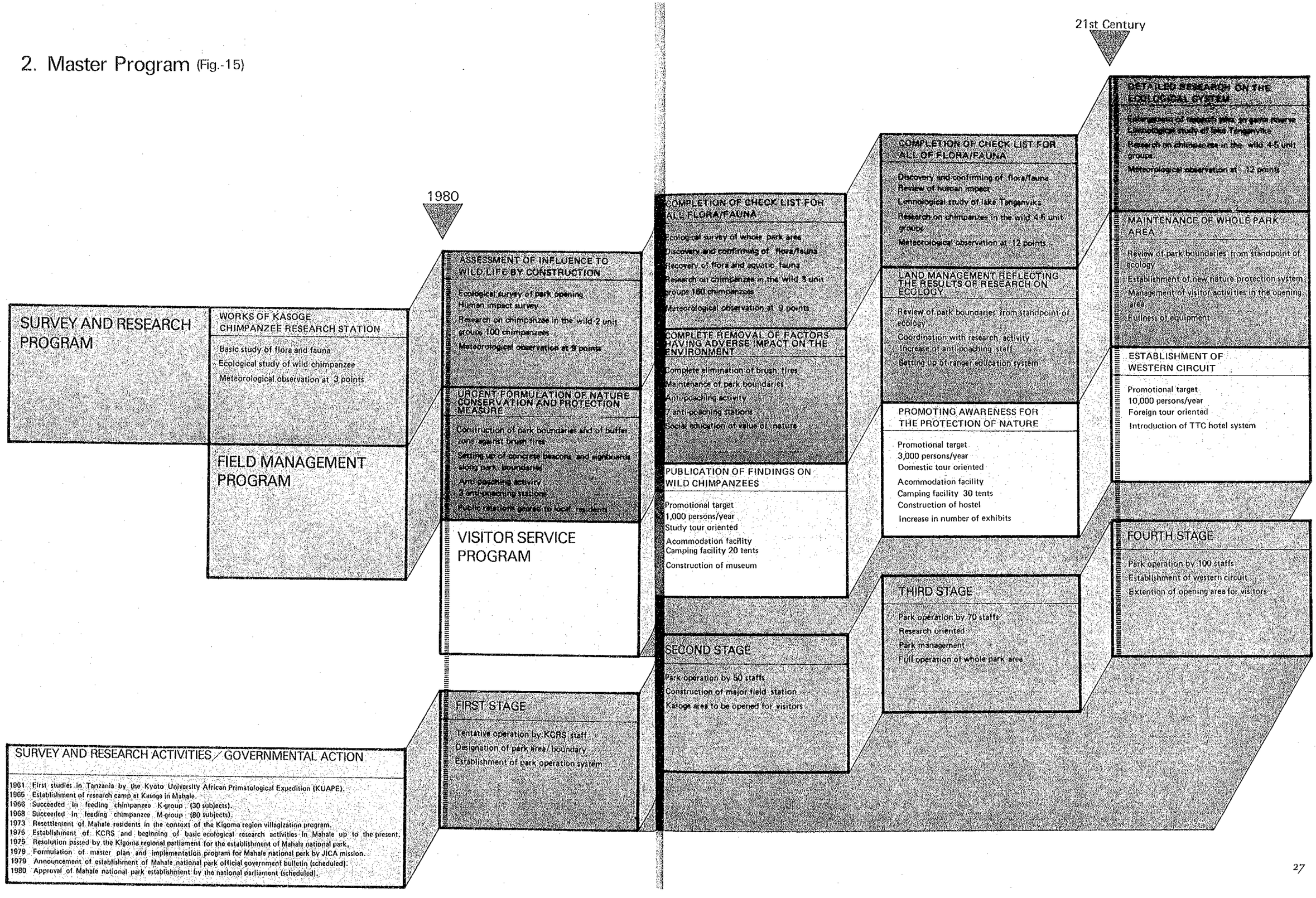


1-3 Visitor services

One of the most important roles of Mahale National Park will be its educational aspect, in making the public move aware of the specific character of these rich natural surroundings. Making the findings of the research of the last 20 years available to visitors will surely help them understand the importance of trying to protect the environment.



2. Master Program (Fig.-15)



3. Park Management and Manpower Requirements

At least 70 people will have to be trained and assigned to Mahale National Park considering the area 1,600km^2 that will have to be supervised. The four sections will be administration, field management, research, and the Kigoma headquarters.

Fig.-16 Staff organization of park operation in the second stage

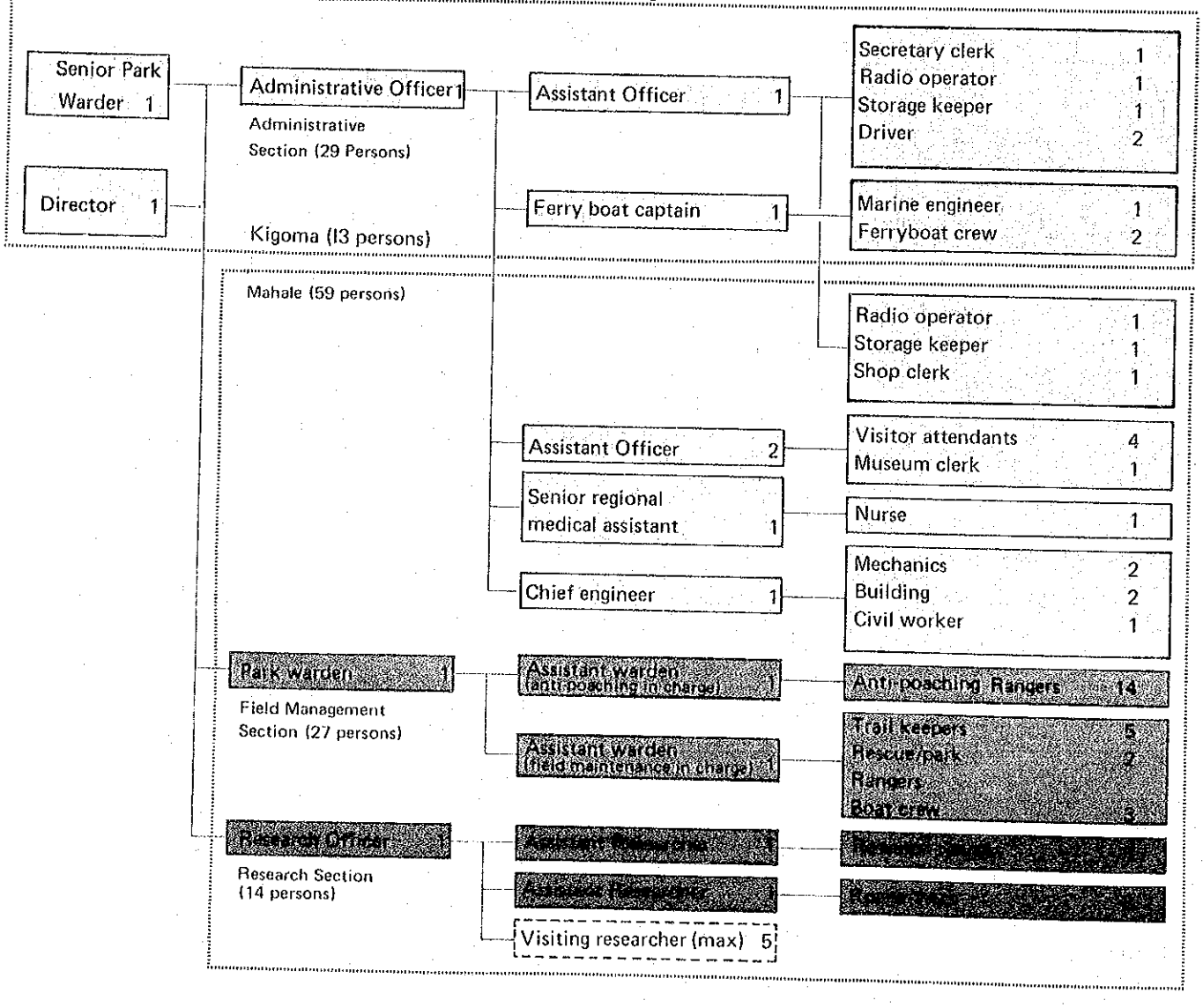


Table-02 Manpower requirement in progression

	KCRS in 1979	Construction stage*	First stage	Second stage	Third stage
Kigoma Headquarters					
Administative Section :					
1) Office management	—	5	8	8	10
2) Transportation	4	4	4	4	7
Research Section :					
1) Head office	–	1	1	1	3
Sub total	4	10	13	13	20
Bilenge Major Field Station					
Administrative Section :					
1) Office management	2	2	3	3	6
2) Visitor service	—	—	7	7	14
3) Social welfare	—	—	2	2	4
4) Facility maintenance	—	—	4	6	8
Sub total	2	4	16	18	32
Field Management Section :					
1) Anti-poaching stations	—	—	6 (3 stations ×2 persons)	14 (7 stations ×2 persons)	21 (7 stations ×3 persons)
2) Field maintenance	10	7	8	10	15
3) Transportation		3	3	3	5
Sub total	10	10	17	27	41
Research Section :					
1) Research stations	6 (Bilenge, Myako)	6 (Continuity of research)	8 (Construction of Nganja)	8 (4 stations ×2 persons)	12 (4 stations ×3 persons)
2) Major Field Stations	3 (Kansyana)	3 (〃)	6	6	12
3) Visiting researcher (Forign)	(3) JICA experts	(3) (〃)	(3)	(5)	(5)
Sub total	9	9	14	14	24
Total	21	33	60	72	117

* Non including construction staff The figures in ( ) not counted as a total no. of staff.

4. Location and Extent of the Park

The area and boundaries of the proposed Mahale Mountains National Park decided upon by the Kigoma district and regional parliaments in 1975 are described in the following location map.

In deciding on the boundaries, basic considerations was given to following.

(1) Avoidance of areas where people are already settled.
(2) Natural boundaries of features, geological and ecological units. (rivers, contourline, vegetations, etc.)
(3) Natural limits of the habitats of chimpanzees and other species of wildlife.
(4) Easily identified landmarks.

Table-03 Description of boundaries (proposed)

	Description	Lenghth of boundaries
North side	This boundary consists of the segments AE and ED of straight line AB between Bulu Point A and the top of Mt. Karobwa B, 42km to the east and straight line CD between Pasagulu Point C and the point D where the Lungwa River flows into the Lugungwisi River, E being the point where AB and CD intersect on the tableland on the right bank of the Kalungu River, southeast of Konkwa Village.	29.0km
South side	This boundary consists of line FG from the mouth F of the stream that runs into the lake 8km north of Kibwesa Point to the top G of a hill at the upper extremity of the stream and running along the course of the stream and the straight line connecting G with H, the point where the Sombwe River flows into the Rufubu River.	26.5km
East side	This boundary consists of the section of the Lugungwisi River upstream of point D, I, E, to the watershed point J, and the section of the Rufubu River from that point, where it also originates, to point H.	48.5km
West side	This boundary runs parallel to the lakefront, 1.6km (1.0mile) offshore, between Bulu Point A and point F.	63.0km

The government will decide on the exact location of the northern & southern boundaries now lying in the provisional park extension area, by taking local interests into account.

Geographic location: 6°00' – 6°28' south latitude
29°43' – 30°07' east longitude

Administrative location: Mgambo division, Kigoma district, Kigoma resion

Area: Land area: 1,517.3km^2
Water area: 96.0km^2
Total: 1,613.3km^2

Geographical Description:

The park is located at the southern edge of Kigoma, bordering on Rukuwa, on a peninsula that juts out into Lake Tanganyika near the middle of its 650km length. It occupies 80% of the peninsula, which is the area occupied by the Mahale Mountains, the rest being the flat and populated areas of Mgambo ward to the north and Kalya ward to the south.

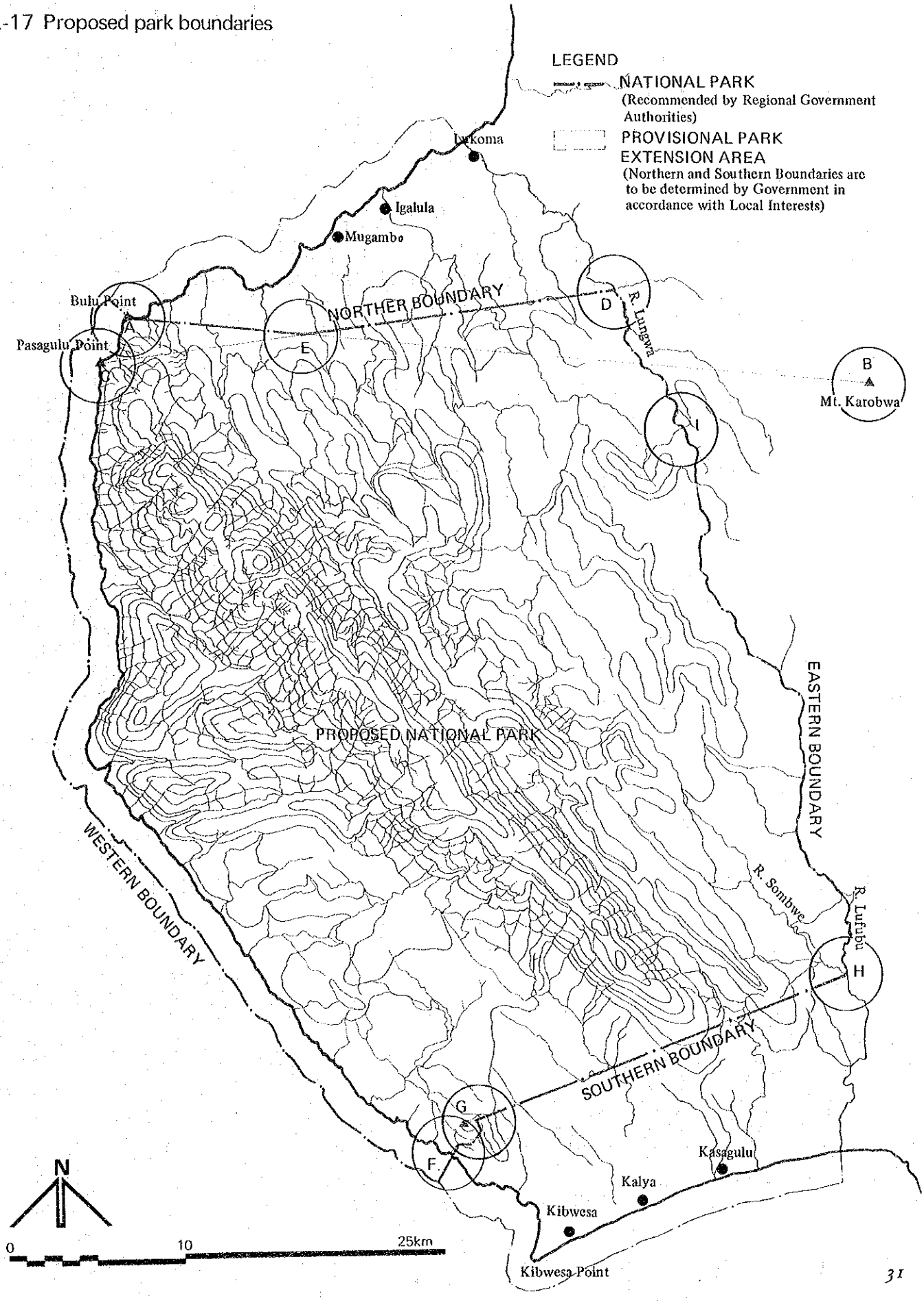
Elevation: Lowest point: 782m above sea level (surface of Lake Tanganyika)
Highest point: 2,666m (top of Mt. Sisaga)

Table-04 Geographic Location (Approx.)

Code	Point Name	Eest Longtitud	South Latitude
a	Bulu Point	29° 44' 79"	6° 00' 81"
b	Mt. Karobwa	30° 07' 58"	6° 03' 42"
c	Pasagulu Point	29° 43' 84"	6° 02' 17"
d	Cross point of northern and eastern boundaries	30° 00' 16"	6° 00' 13"
e	On northern boundary	29° 50' 09"	6° 01' 38"
f	Cross point of southern and western boundaries	29° 54' 78"	6° 26' 68"
g	Kibwesa Point	29° 55' 59"	6° 25' 76"
h	Cross point of southern and eastern boundaries	30° 07' 11"	6° 21' 46"
i	Watershed point	30° 03' 01"	6° 06' 27"

Source : Y742 TANGANYIKA

Fig.-17 Proposed park boundaries

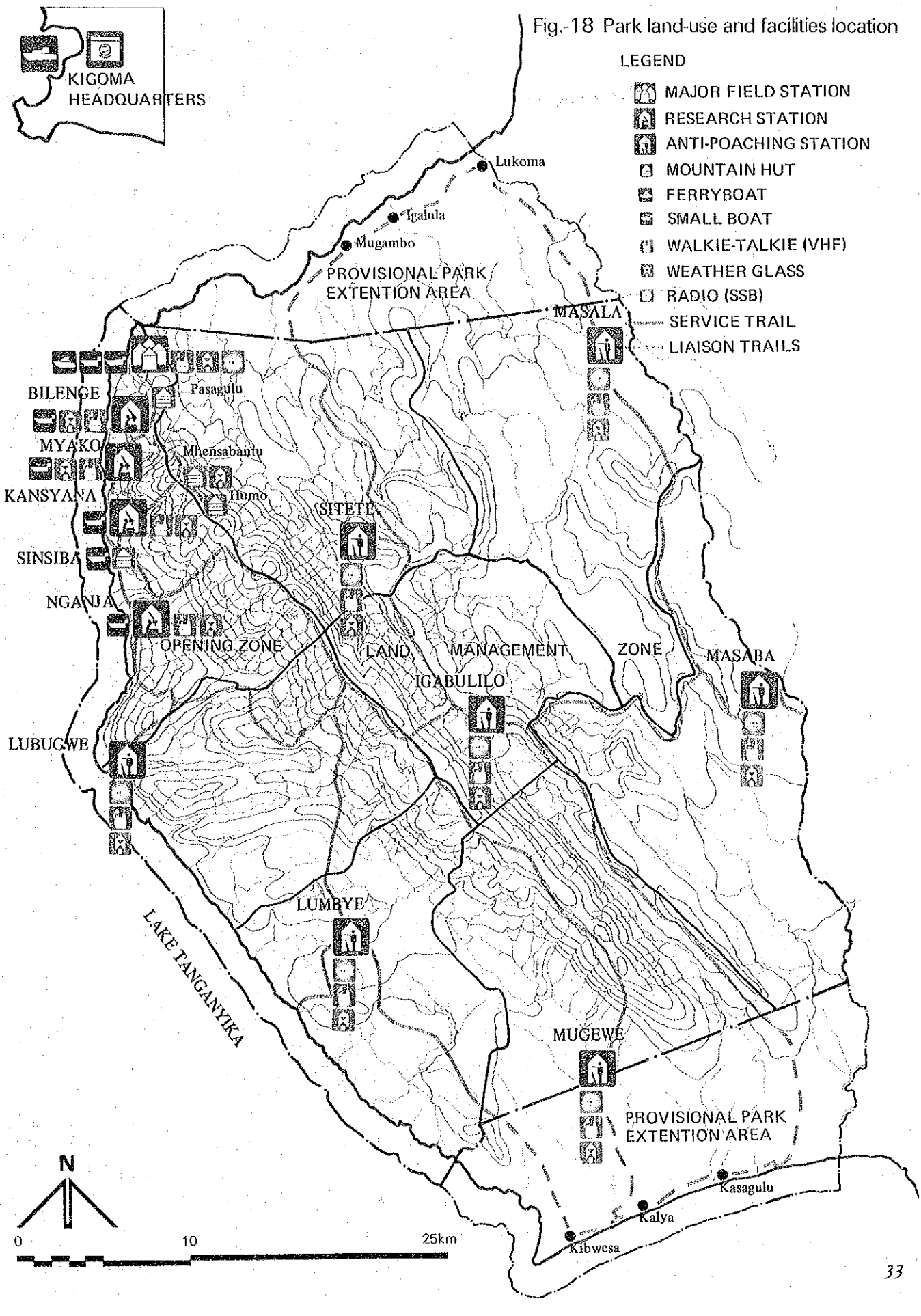


5. Landuse and Park Facilities

Facilities are to be provided for adequate fullfilment of the park's triple functions, namely nature conservation, research activities, and visitor services.

Table-05 Outline of facilities

Facility	Purpose	Location	Items
1) Kigoma Headquarters	Centralized park operation and management.	Kigoma	Office, Storage, Information center
2) Bilenge Major Field Station	Centralized park management and research.	Bilenge	Office Research laboratory Museum
3) Staff Housing	Accomodation for staff	Bilenge Kigoma	Staff house, Guest house, Public toilets
4) Research Stations	Continuation of field research on chimpanzees	Bilenge Myako Kansyana Nganja	Office Staff house
5) Anti-poaching Stations	Prevention thoughout the park of poaching and other illegal activities detrimental to the environment. Also used for meteorological observations.	Sitete Masaba Mugewe Masala Lumbye Lubuguwe Igabulilo Sinsiba	Office Staff house
6) Sinsiba Substation	Information and services for visitors.	Sinsiba	Office
7) Mountain Huts	For mountain climbing and during survey safaris	Nkungwe Muhensabatu Pasagulu	Huts


KIGOMA
HEADQUARTERS
Fig.-18 Park land-use and facilities location
LEGEND
MAJOR FIELD STATION
RESEARCH STATION
ANTI-POACHING STATION
MOUNTAIN HUT
FERRYBOAT
SMALL BOAT
WALKIE-TALKIE (VHF)
WEATHER GLASS
RADIO (SSB)
SERVICE TRAIL
LIAISON TRAILS
Lukoma
Igalula
Mugambo
PROVISIONAL PARK
EXTENTION AREA
MASALA
BILENGE
Pasagulu
MYAKO
Mhensabantu
KANSYANA
Humo
SITETE
SINSIBA
NGANJA
OPENING ZONE
LAND MANAGEMENT ZONE
IGABULILO
MASABA
LUBUGWE
LUMBYE
LAKE TANGANYIKA
MUGEWE
PROVISIONAL PARK
EXTENTION AREA
Kasagulu
Kalya
Kibwesa
N
0
10
25km

6. Park Transportation Network

The park can be reached by ferryboat (65 tons, 30 passengers) on Lake Tanganyika, between Kigoma and Mahale. In addition, small boats with outboard engines are to be used for travel to and between the different stations, and for transporting personnels, visitors, supplies, and materials within the park and for patrolling park waters on the lake. On land, within the park, the facilities are to be connected with one another by trails of four types of trails: research trails, service trails, mountain trails, and walking trails (for visitors).

Table-06 Lake transportation

Route	Purpose/description	Type of vessel	Time required	Remarks
1) Kigoma~Park route	140km in length	Ferryboat (65tons) Crew 4 Passengers 30	5hrs. (16knots)	One run a week at outstart (with barge to be towed for transportation of materials and supplies), equipped with SSB radio.
2) Lake shore routes	Runs between park station and villages along the shore, inside the 1.6km offshore park boundary.	Small boat (with 15ps engines) Capacity: 8 persons		
3) Emergency liaison routes	Both within the park and with the outside	Speedboat	3hrs. (25knots)	Kigoma~Park

Fig.-19 Transportation network

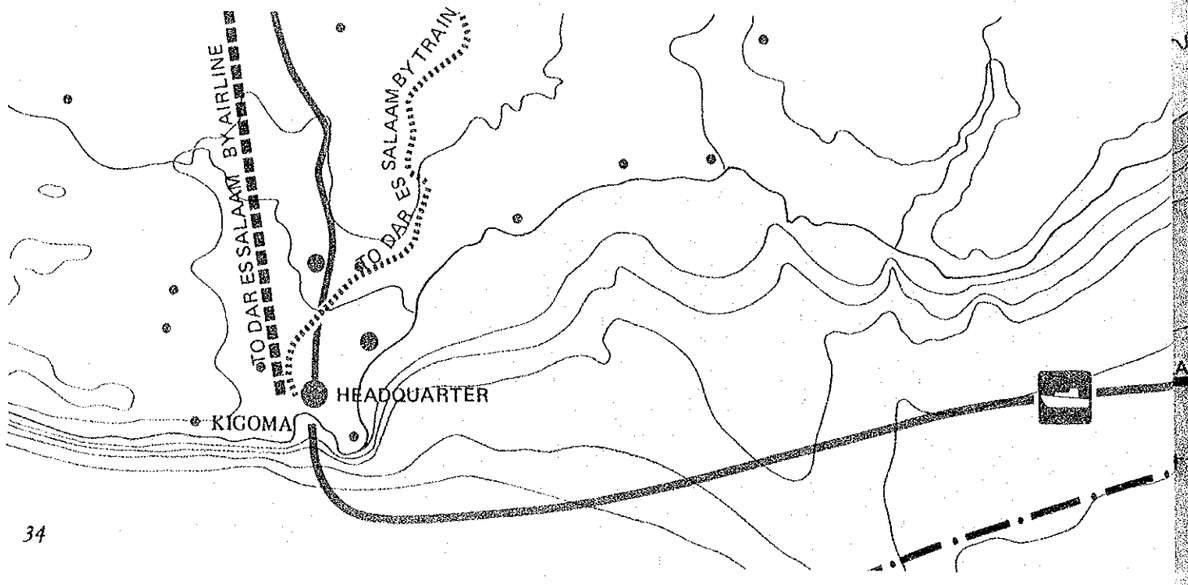
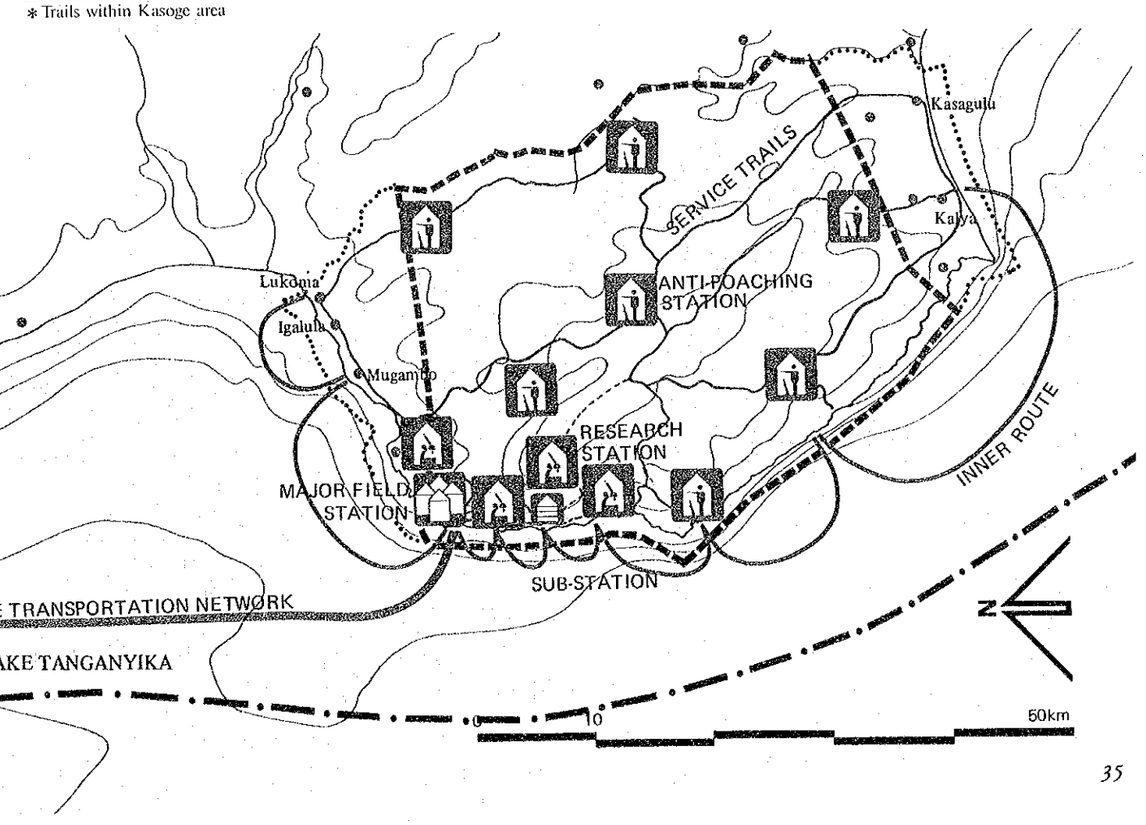


Table-07 Inner park transportation

Type of trail	Purpose/description	Width	Construction			
			Existing (km)	To be Widened (km)	New Const. (km)	Total Length (km)
1) Service trails	Between anti-poaching stations and villages for supply and patrols (use of off-road vehicles in emergencies)	1.0m ~ 2.5m	—	—	370	370
2) Research trails	A fine network of trails in the Kasoge area for survey and research purposes, and for connecting the 4 research stations with major field station	1.0m ~ 2.0m	87	26	45	158
3) Mountain trails	Survey and research trails connecting peaks of the Mahale Mountains along ridge lines and the park stations with major field station (to be opened to visitors in the future)	1.0m	37	—	27	64
4) Visitor trail	Network of trails connecting major field station and three of the research station for appreciation of nature by visitors to the park.	2.5m	—	39	2	41
Total Length (km)			124	65	444	633

* Trails within Kasoge area



7. Park Communication Network

As in the case of other national parks, Mahale Park should be provided with equipment for long-distance communication with the national park head office in Arusha. Considering the location of Mahale Mountains National Park, communications with Arusha will have to be relayed by headquarters in Kigoma. Furthermore, there should be a communications network within the park to keep the major field station in close touch with the anti-poaching stations and research stations, since frequent travel would be impractical due to the difficult terrain.

Table-08 Outline of telecommunication system

Type	Linking:	Description
1) Long-distance communication network	Kigoma——Arusha	Fixed 150W SSB station in Kigoma for regular contact with Arusha head office.
	Kigoma——Bilenge M.F.S.	Fixed 50W SSB station at Bilenge for regular contact with Kigoma headquarters.
	Ferryboat——Kigoma Bilenge M.F.S.	SSB 50W station on boat for communication during runs.
2) Within park communication network	Bilenge M.F.S.——Masaba Sitete Mugewe	50W SSB and 10W VHF stations at the first three anti-poaching stations.
	Bilenge M.F.S.——Masala Igabulilo Lubugwe Lumbye	Same type of stations at the four other anti-poaching stations, for completion of communications network within park.
3) Kasoge area communication network	Bilenge M.F.S.——Bilenge Myako Kansyana Nganja	Setting up of 10W VHF stations at the four research stations for regular communication with major field station and during intensive tracking surveys and other mobile operations.

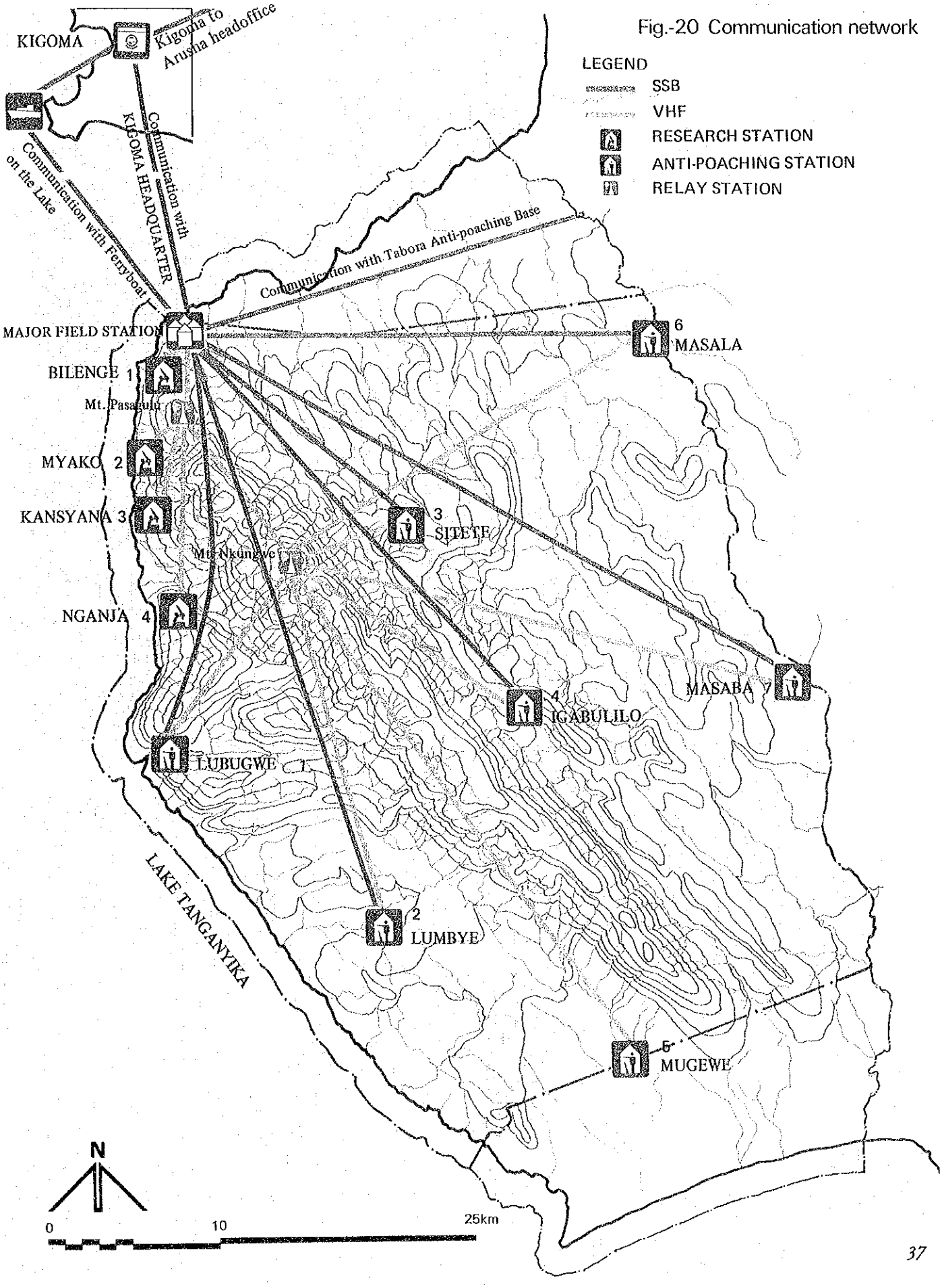


Fig.-20 Communication network

8. Kigoma Headquarters

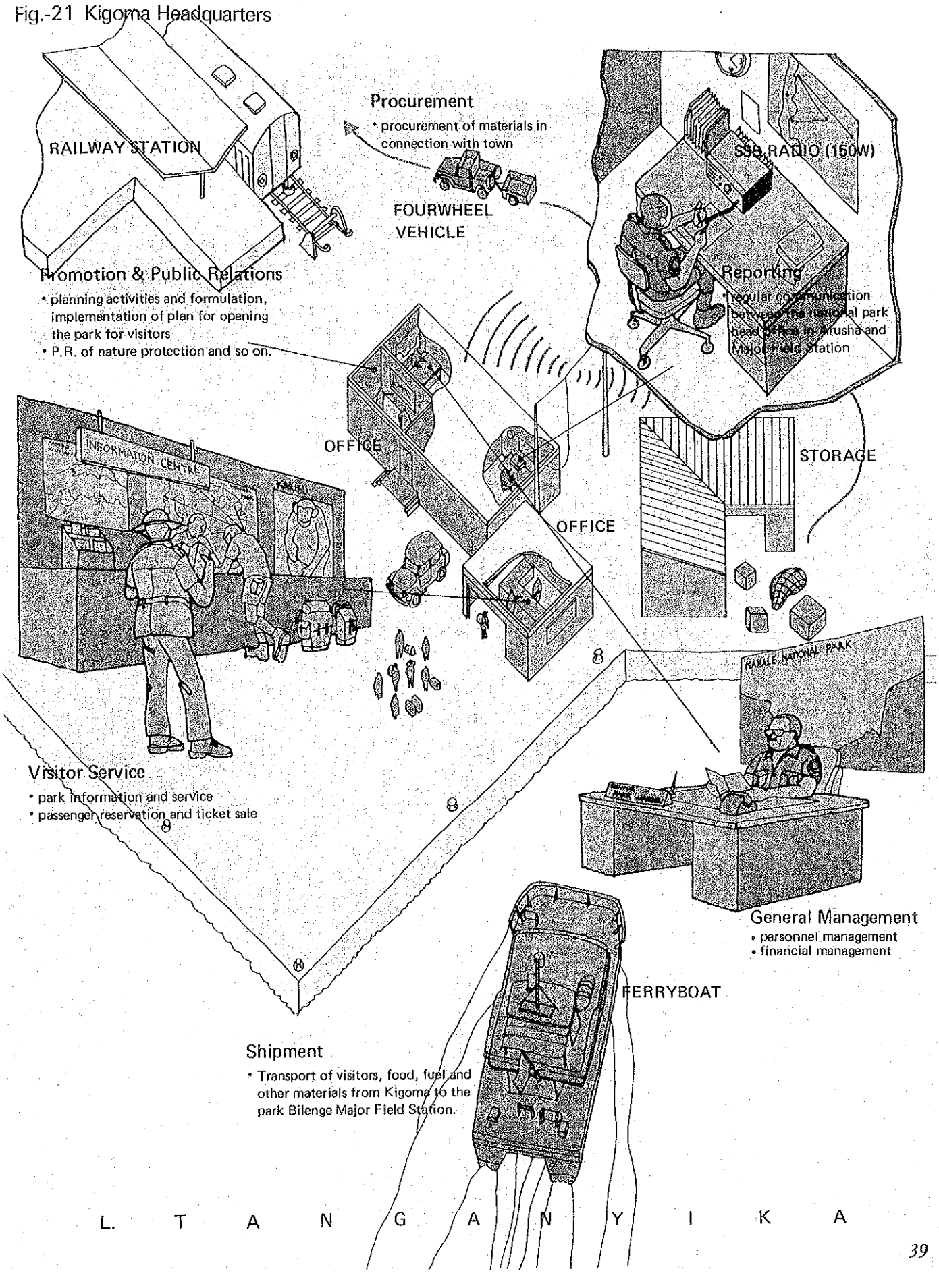
Headquarters are to be established in Kigoma because of the remote location of the Mahale Mountain although the National Park is far away from the city.

Operations at headquarters will consist of general affairs, management and research in connection with the park, for transportation of all supplies and equipment as well as visitor services.

Table-09 Function of Kigoma headquarters

Activities	Description
General Management	Personal management : Staff assignment augmentation training. Financial management : Accounting and other financial aspects Maintenance : Purchase of equipments, materials.
Park Construction	Purchase, Supply, Construction materials, Transportation of materials, Equipments, Labor management.
Reporting	Regular reporting to Arusha
Promotion / Public Relations	Visitor promotion. Visitor statistics.
Research Management	Management and control of research activities.

Fig.-21 Kigoma Headquarters



9. Bilenge Major Field Station (Fig. 22)

	Phase 1, 2			Phase 3		
	Site area (m²)	Building area (m²)	Number of staff	Site area (m²)	Building area (m²)	Number of staff
Major field station						
head office	1,063	153	24	850	170	30
research laboratory	1,700	258	11	1,360	272	17
museum	938	138	2	1,360	272	4
utility building	255	38	-	340	68	8
camping site	1,600	40	-	2,000	40	-
hostel	-	-	-	2,400	481	30
total	4,745	649	43	8,310	1,303	89
staff housing						
upper class housing	480	120	2	960	240	4
middle class housing	1,350	432	9	2,690	672	15
lower class housing	4,500	1,080	24	7,200	1,800	60
guest house	240	60	1	480	120	2
hostel for staff	480	120	4	960	240	8
duplex flat	360	90	3	360	90	-
total	7,410	1,901	43	12,650	3,162	89