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THE IMPACT ON NAIROBI NATIONAL PARK OF
CHANGES IN LAND USE IN ADJACENT AREAS.

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A THESIS SUBMITTED IN PART FULFILMENT FOR
THE DEGREE OF MASTER OF ARTS, IN PLANNING
AND ENVIRONMENTAL SUTDIES IN THE UNIVERSITY
OF NAIROBI.

JUNE, 1984.

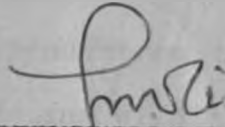
URBAN AND REGIONAL PLANNING
DEPARTMENT
FACULTY OF ARCHITECTURE,
DESIGN AND DEVELOPMENT,
UNIVERSITY OF NAIROBI,
NAIROBI, KENYA.

(ii)

D E C L A R A T I O N

This thesis is my original work and has not been presented for a degree in any other University.

Candidate

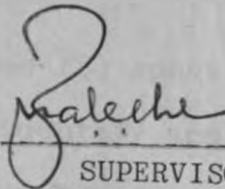


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ABSTRACT

The future of wildlife in our conserved ecosystem depends largely on the future planning for land use in the adjacent areas. All National Parks and game reserves in Kenya, as they now exist, are in some degree or other dependent on the relationship between land use changes and wildlife in the areas surrounding them. If the surrounding lands deteriorate through misuse, or if, in the management no consideration is given to wildlife, the national parks and game reserves will suffer, or even be destroyed. Nairobi National Park presents a case in point. If this park has to survive, as it is, there must be a check of the land use changes in the Kitengela and Ngong hills areas.

There were three (3) specific objectives of this study. Firstly, to identify and, analyse the changes in land use which have been/or are taking place in the adjacent areas of Nairobi National Park since its establishment in 1946; secondly, to find out their main impacts on the park and its immediate environment. Finally, to suggest an optimum land use system for the area that takes into account the ecological, social, economic, cultural and political factors at local, regional and national levels.

From the study it was observed that Nairobi National Park, Kitengela area and Ngong hills form one natural ecosystem. It was found that changes in land use in the adjacent areas of Nairobi National Park have been taking place over along time but the pace has increased particularly, since independence. Six significant areas of land use changes, namely, changes in land tenure, livestock production, crop production, urban settlement, rural settlement, physical infrastructure, conservation and others were identified. It was found further that these changes in land use exercise impacts on the Park and its immediate environment. Specific impacts were realized on wildlife, vegetation and water resources. It was observed that a number of constraints and limitations, namely, high population growth rate, land tenure system, change in attitudes, rapid urban development, national government policies, departmentalization of the government bodies, lack of technical manpower, lack of equipments and lack of funds exist and may hinder future development in the area.

The study proposes an integrated land use policy upon which Nairobi National Park, Athi Kaputei plains and Ngong hills can be planned and managed as one ecosystem. Its aim is to identify areas of concentration for the different land use activities and interests and plan these as areas of land use specialization but

maintaining a clear functional linkage between them so that, at the same time they are together capable of functioning as an interrelated whole system. The study further suggests that a detailed study regarding the possibility of planning and managing Nairobi National Park as an "outdoor zoo", be undertaken by the wildlife planning unit in consultation with relevant experts as may be identified by the unit. Its aim should be to establish in more clear terms the feasibility or otherwise of such a policy, and the advantages and disadvantages associated to it. As policy priorities, it is suggested that in order to create a strong public participation, the government should establish measures to provide the landowners who permit wildlife the use of their land resources with an economic incentive from wildlife conservation. Finally, we propose a need to constantly monitor the changes in land use and human population in the study area so that any trend representing a hazard to wildlife is observed and appropriate counteraction initiated in time.

However, it is considered that the implementation of an integrated land use policy would ensure the continued viability of Nairobi National Park and other ecosystems in the country.

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This research would not have been possible without the help and cooperation of many individuals and organisations. It is not possible to give a complete list of all of them here.

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CHAPTER ONE

I:1:0 BACKGROUND TO STUDY PROBLEM:

The continued viability of Kenya's National Parks and Game Reserves which provide the last refuge for wildlife is now threatened by the changes in land use in the adjacent areas. At present, virgin lands in the adjacent areas of these nature reserves all over the country are brought or being brought under intensive agricultural activities, urban developments, industrial expansions, rural-re-settlements and several physical infrastructural development programmes such as roads, dams, boreholes and wells. In addition, former land uses are being changed into less conservation oriented ones. These changes in land use come as a result of trying to satisfy the range of aspirations of the increased human population.

Out of Kenya's total land area of 569,250 square kilometres, only about 12 per cent is arable under existing agricultural technology. This consists of the areas receiving adequate rainfall for intensive crop farming and accommodates over 70 per cent of the rural population. Seasonal rainfall distribution is the most critical factor in determining land productivity and therefore population distribution

in Kenya. As a result, over 80 per cent of the country's land area is classified as Arid and Semi-Arid lands (ASAL) (Ominde 1967).¹ And nearly 25 per cent of Kenya's population dwell in these regions. In the past the Kenya Government has tended to concentrate on developing higher potential lands so that Arid and Semi-Arid lands have generally received less attention (Campbell 1982).²

Until fairly recently due to high population growth rate, leading to land shortage relative to demand particularly in highlands of Kenya, the government attention to Arid and Semi-Arid lands has been increased. This is particularly emphasised in the 1979-83 National Development Plan.³

Kenya's current population is over 16 million people and is estimated to be growing at a rate of 4 per cent per annum.⁴ Such an increase in itself in terms of more numbers, does not constitute the problem. The problem emerges when we relate the socio-economic demands of this population to the proportion of the country's national reserve lands in terms of the man/national parks-land ratio. Land in Kenya provides the only means of socio-economic livelihood

and production of over 80 per cent of the population. Since the majority of these people have been concentrated in the better-watered highlands where there is acute land shortage, there is a population movement towards the Arid and Semi-Arid lands. These spontaneous migrations are encouraged by the government strategies to re-settle people in less densely populated areas which are the Arid and Semi-Arid lands. Hence, several government sponsored projects such as cattle-ranching are encouraged where appropriate. There is also government desire to gain greater administrative control over the Arid and Semi-Arid lands' nomadic people and increase through cultural, social and economic change their standard of living. These strategies are being undertaken through land adjudication leading to change in land tenure system from communal ownership to individual, group or private, created grazing blocks and homestead fencing and several infrastructural developments such as roads, wells, dams and boreholes.

It would appear that these aspects of changes in land use have attracted the interest of fairly few planners particularly those involved in National Parks Management Planning. As a result, little has

as yet been done both on the nature of these land use changes and on their causes, impacts and possible solutions. Instead, it is apparent that the studies, planning and management of our nature reserves have been concerned largely with the internal problems of the park such as provision of water, roads, campsites and feeding habits of some specific wild animal species (Jari, 1982,⁵ Owaga, 1975⁶ and Hillman 1979⁷). The aspects of external pressures therefore have been forgotten or deliberately ignored. This, I think, is a great mistake. It overlooks the principles of ecosystems interconnectedness - what geographers summarize as "Everything is connected to everything else".

The National Parks should be seen as key parts of the total environment to conserve natural resources hence to be managed not in isolation but with local, regional, national and world perspectives. Parks' plans should be developed concurrently with plans for the surrounding areas.

In Kenya, the role of National Parks particularly in the fragile Arid and Semi-Arid lands, cannot be over emphasised. The country's park system contain

some of the most important natural resources and their wildlife resources in them hence the tourism industry. The basic policy direction for National Parks lands in Kenya is contained in Sessional Paper No. 3 of 1975, "Policy on Wildlife Management in Kenya"⁸ which notes that National Parks are state lands that are managed exclusively for the following four objectives:

1. To preserve in a reasonably natural state examples of the main types of habitat which are found within Kenya for aesthetic, scientific and cultural purposes;
2. To provide educational and recreational opportunities for Kenyans;
3. To provide an attraction for tourist and to serve as a major basis for Kenya's economically profitable tourist industry; and
4. To sustain other activities not in conflict with the above.

The sessional paper further states that agriculture, pastoral activities, forestry and consumptive wildlife uses are not allowed on National

Parks' lands. Added to these natural reserves are areas strigently protected for their endemic qualities, wilderness areas and water catchment reserves.

The above policy, apparently does not state what kind of activities should take place in the immediate environment of the parks. As a result there are difficulties in managing a National Park to "preserve park resources" and provide for environmentally compatible public use. The preservation of objects in or near the parks therefore provide more complex questions concerning allowable impacts and since the local inhabitants needs also have to be considered, a realistic possible solution is very controversial.

The present study is concerned with the impacts on Nairobi National Park of the changes in land uses in its immediate environment. The Park's immediate environment is here defined as:

The phenomena that surround and affect park and the surrounding phenomena that are affected by the park. Spatially, this immediate environment of the park is restricted for the purpose of this study to Ngong-Hills on the South-West and Athi-Kaputi Plains on the South - what one may call the southern quadrant of the park. This is currently the only area open that wildlife of the park can retreat to and from across the river Mbagathi. The Northern and Eastern Parts of the park are completely fenced and there is very little interaction with the park.

1:1:1 THE STUDY PROBLEM:

NAIROBI NATIONAL PARK:

The survival of Nairobi National Park and the wildlife in it depends largely on the form of land use in its adjacent areas - the Kitengela (the area immediately south of it and is part of the Athi Kapiti Plains) and the Ngong-Hills. This fact was recognized when the park was established in 1946 and that is why Kitengela and Ngong-Hills were declared conservation area and National Reserve, respectively, immediately the park was gazetted.

The Nairobi National Park was, in fact created in an atmosphere of increasing land use controversies. This is so, because even at the time of its creation, a railway line and the subsequent railway town - Nairobi, Military Camps and Human Settlements had long been established and around the present site of the park. Consequently, since its establishment, there have been continuing land use changes and development around the park. The park, now is almost an isolate lost amid the mass of urban, industrial, agricultural and several physical infrastructural development programmes such as roads, railways and airports. Hence, it is fenced on all sides except for a length

of about 22 kilometres along the southern boundary formed by the only permanent river course - the Mbagathi. This is the only open side to the buffer zone of Kitengela-Athi Kapiti Plains and Ngong-Hills - that in the history of the park has allowed the retreat of wild animals of the park as they migrate.

In these dispersal areas of the park, there are rapid changes in land use. Given the country-wide increase in human numbers and aspirations, the problem of landlessness, the national land and food policies, the government's objectives to settle the nomadic pastoralists and develop potential areas of Arid and Semi-Arid lands, there is little doubt that changes in land use will intensify in the near future.

The impacts of these changes in land use on the park and the surrounding dispersal areas are many and will be disastrous in the near future. To all intents and purposes, Nairobi National Park will become isolated from its only migratory areas and reduced to a kind of an enlarged zoo which would have to be fenced off. Such a disastrous development would mean the loss of one of Kenya's most renowned and spectacular wildlife assets. The wildlife population distribution and densities will

be affected. Already it is evidenced that some species have decreased in number particularly in the dispersal areas of Kitengela. Browsers such as Giraffes for example, have apparently become permanent residents of the park largely due to the human activities in the Kitengela area. This will certainly affect the carrying capacity of the park. It is estimated that only 10% of the current migratory herbivores population could be expected to survive if these areas are not maintained as the dispersal areas of the park. Changes in land use will also lead to destruction of the terrestrial flora due to clearance for cultivation and/or human settlements. There will also be over-utilization of vegetation in the park by the confined species. Changes in aquatic resources such as Hippopotamus, Crocodiles in the Mbagathi river within the park due to pollution of the river and other streams flowing through the park from Ngong Hills is eminent. Grazing within the park-particularly along the Mbagathi river may also increase as other land uses take over grazing areas of Kitengela and Ngong-Hills.

All these are planning and management issues coming as a result of changes in land use in the

surrounding areas of Nairobi National Park. Despite the prevailing views of conservationists that the park is rapidly turning into a dust-bowl, no detailed and specific studies seem to have been undertaken about the nature, impacts and possible solutions of these changes in land use in its dispersal areas. Unbelievably, the park does not have a Master Plan or even specific conservation value upto now. From the literature, it appears that Nairobi National Park was established simply as a creation of an environment in which wild animals could re-establish themselves after years of disturbance. Once there were numerous animals in the park, attention seemed to focus on Lions, for these were what the visitors wanted to see above all else.

Nevertheless, in the absence of a Master Plan and specific conservation objectives of the park, its role as a conservation of wild animals, tourist attraction, educational and scientific research area has been sound. The park has a variety of fauna and several remarkable features of aesthetic and scenic value such as deep river valleys cutting through the park's sloping plains and gorges. This park is the

most visited one as compared to other parks in the country. In 1976, it received a total of 134,790 of visitors and earned a total revenue of 1.6 million shillings from sales of entrance tickets and maps at the gates. The importance of maintaining this park is therefore indisputable.

The problem therefore is; how can the continued viability of this park and the wildlife in it be planned and managed adequately when changes in land use in its dispersal areas, curtails the migratory routes and confines the migrating animals into this small park, hence affect its carrying capacity; destroy the habitat and the park? Can we justifiably advocate solely for wildlife conservation in this area oblivious of the other sectors of the economy or other development possibilities? How can we accommodate the needs of the landowners in this area?. How can we maintain Nairobi National Park's Ecosystem and view it within abroad ecological and human framework of Athi-Kapiti Plains and Ngong-Hills, rather than as a biological island?

1:1:2 SIGNIFICANCE OF THE STUDY:

National Parks, equivalent Game Reserves and the protected species therein are of great economic, scientific, educational, aesthetic and environmental conservation importance to our country. In fact, the second highest foreign currency earner (tourism) after agriculture in Kenya depends largely on the existence of National Parks, Reserves and the Wildlife that they protect. However, external pressures on these nature reserves, particularly, the National Park of Nairobi are reducing their natural qualities. The population of the conserved species in them are either increased or reduced or starving because of being confined within the park. This is rather unfortunate. Because if the species are being lost, then they will never be recovered and if they are starving, then no tourists will appreciate observing an unhealthy species in such a modified environment. It is therefore of paramount importance that we protect our National Parks if they have to keep protecting the wildlife.

Secondly, although a number of studies or researches have been undertaken on Nairobi Park and the surrounding Athi-Kapiti Plains, none has focussed

or examined the specific impacts of the land use changes on the park and its surroundings. This study is therefore significant since it "pioneers" the attempts to fill in this valuable information gap. Such information is viewed here to be very essential for the present and future planning and management of this park.

Thirdly, virtually all National Parks and equivalent reserves in Kenya are threatened by external pressures. We have literature on Tsavo National Parks (Ecosystem, 1982), Amboseli National Parks (Western, 1975), and Aberdares National Park (Muiruri 1979) that clearly express these pressures. This study is therefore expected to be a kind of model whereby lessons drawn from its findings can prove useful to the understanding and planning of the other National Parks and Game Reserves. Furthermore, land use pressures on systems in Kenya, now, is not only on National Parks and reserves alone, even the urban areas, forest areas and water catchment reserves are threatened. The findings of this study can therefore be used to plan and manage such other systems with their surrounding areas on an integrated land use policy.

Last but not least, Nairobi National Park itself is one of the most threatened in the whole country. It is therefore considered extremely significant to save the future of this park. It would even be more interesting if it can isolate individual land use impacts say agriculture and specify its impacts on conservation of the park. Nevertheless, it may as well serve as a prelude to studying such specific external and internal aspects with reference to a National Park or any other conserved ecosystem.

1:2:3 OBJECTIVES OF THE STUDY:

The objectives of this study are:

1. To identify and, analyse the changes in land use which have been/or are taking place in the adjacent areas of Nairobi National Park since its establishment in 1946.
2. To find out the main impacts on the park and its immediate environment of these changes in land use in the adjacent areas.
3. To suggest an optimum land use system for the area that takes into account the ecological,

social, economic, cultural, political factors at the local regional and national level.

1:1:4 ASSUMPTIONS:

In order to realise the above objectives, the following assumptions are formulated:

1. That there have been/or are changes in land use in the adjacent areas of Nairobi National Park since its establishment in 1946.
2. That these changes in land use exercise impacts on the park and its immediate environment.
3. That there are several possible alternative solutions to the problems facing the park of which the most realistic one is an integrated development policy which creates a multiple use of land in the area.

1:2:0 SCOPE OF THE STUDY:

The scope of the study is limited spatially as the Nairobi National Park and the adjacent Athi-Kapiti Plains to the south and Ngong Hills to the South-West. With regard to the information required,

the study raises and will attempt to answer the following questions:

1. What are the main land use changes which have been/or are taking place in the adjacent areas of Nairobi National Park since its establishment in 1946? Here, the study intends to identify and analyse the main land use changes in the adjacent areas of the park in a historic, present and future perspectives. The main land uses are viewed to include agriculture, pastoralism, conservation, human settlements, and other physical infrastructure such as roads, water reservoirs (dams, wells and boreholes). The analysis is expected to show the changes in land use in space and overtime. The attempt here is to fulfil the assumptions advanced above that land uses have been/or are changing in the study area.
2. What are the main impacts of these land use changes on the park and its immediate environment? Here, the specific land use change's impacts on

the park will be identified. This will enable the study to generate realistic possible solutions to the problem.

3. What are the possible options for solving the problem? Here, different possible land use alternative, are discussed and an apparently feasible one will be highlighted.

1:2:1 ORGANIZATION OF THE STUDY:

The study is organized into seven chapters. Chapter One deals with the introduction - the background to the study problem, the study problem itself, significance, objectives, assumptions, scope, organization, study area, review of literature, research methodology, definition of terms used and limitations.

Chapter Two is concerned with the issues involved in the development of the idea and concept of National Parks in some parts of the World and Kenya in particular. It also looks at the pressures on National Parks and Game Reserves in Kenya.

Chapter Three comprises an explanation of the historical background of the study area, its physical

environment in terms of topography, geology, soils and rainfall. It also explains the population distribution of wildlife, the vegetation, the drainage pattern and other water resources.

Chapter Four deals with the identification and analysis of the changes in land use in the adjacent areas of Nairobi National Park since its establishment in 1946. This is the first of the three chapters on survey and data analysis, interpretations and discussions of the findings of the study. The other is chapter five which deals with analysing and discussing the impacts of the changes in land use on the park and its immediate environment. It also assesses the possible constraints and limitations to future development.

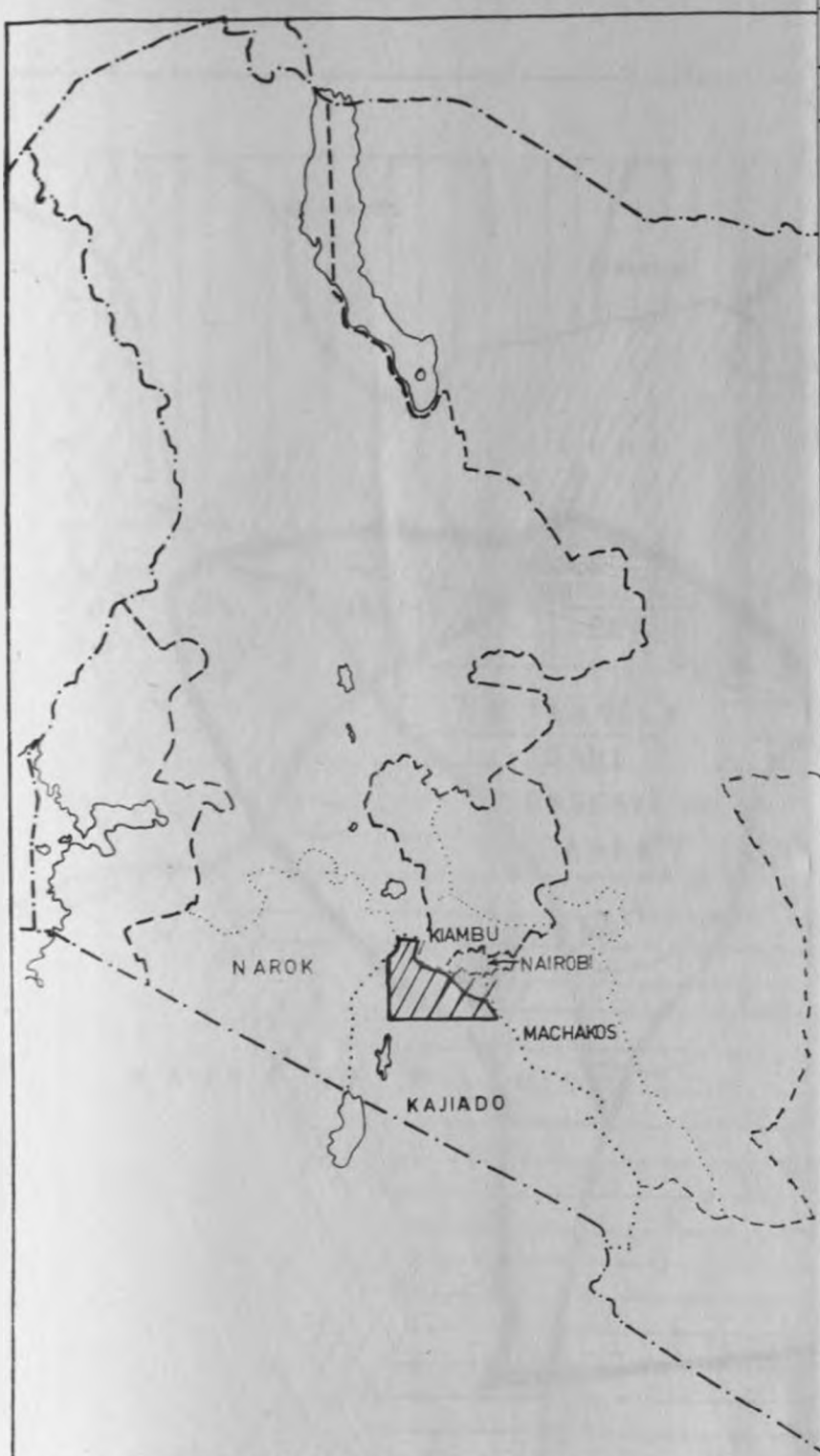
Chapter Six deals with possible solutions to the problems and their limitations. It also presents the recommendations made in the study. Chapter Seven presents summary and conclusions.

1.3 THE STUDY AREA:

The study area falls under the zone of the ecological classification of Kenyan lands - the so-called the marginal lands. Map No. 1 shows the national setting of the study area. Regionally, the study area is part of the vast expanse of the Athi-Kapiti Plains. Administratively, the Nairobi National Park is within the Nairobi City hence falls under Nairobi Provincial area. The Ngong-Hills and Athi-Kapiti Plains fall under the Rift Valley Province-Kajiado District. Map No. 2 shows the study area in a regional setting.

The study area therefore, includes the Nairobi National Park and the adjacent Athi-Kapiti Plains to the South and Ngong-Hills to the South-West. This area is spatially bounded on the East by the Nairobi-Konza-Railway, to the South by the Konza-Kajiado railway, to the North, by the Northern fence between Nairobi National Park and the City, and on the West by the rim of the Rift Valley escarpment.

Map No. 3 shows the extent of the study area. It is an area of about 2,000 square kilometres situated from 1,500 metres to 1,800 metres above sea-level.



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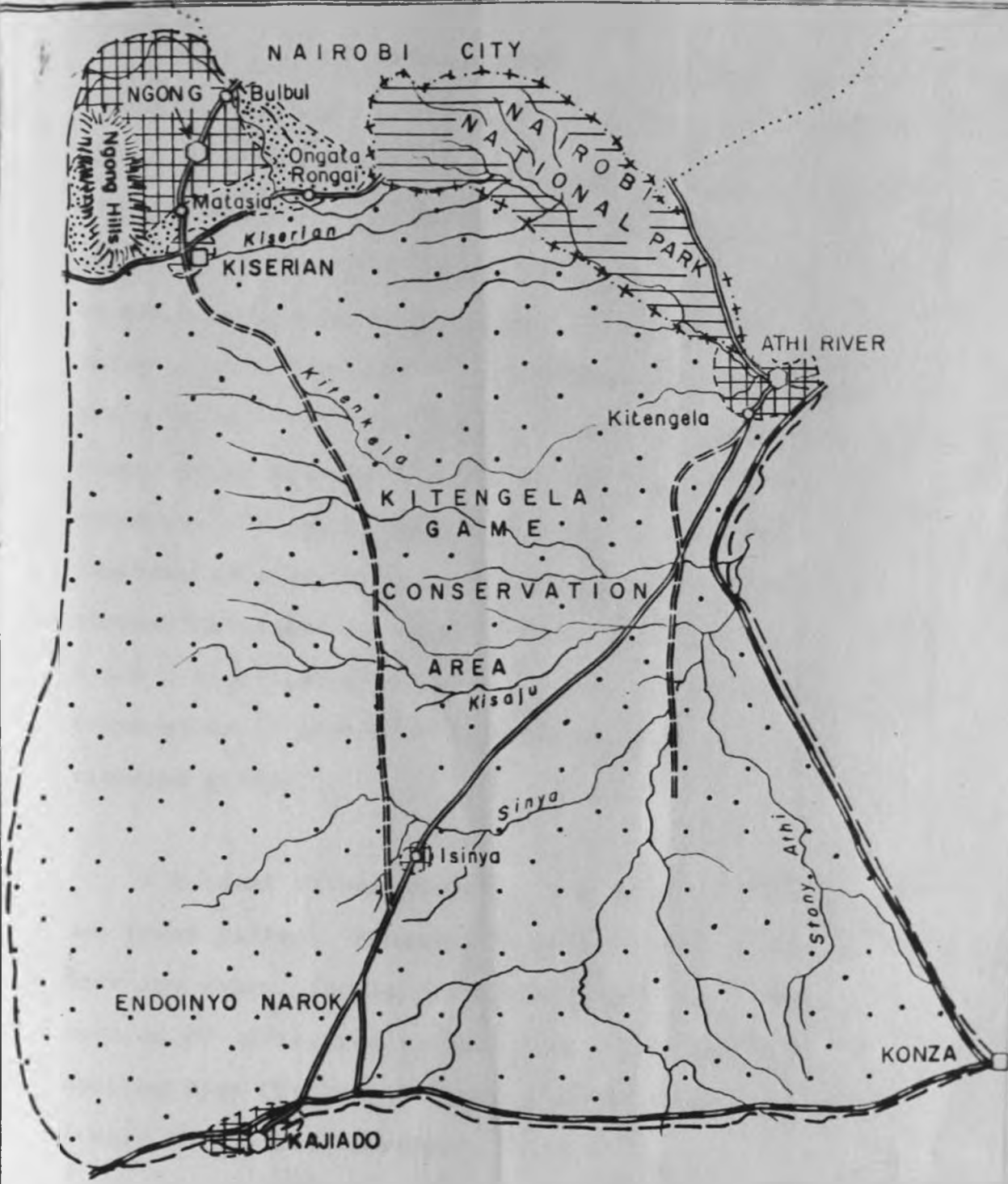
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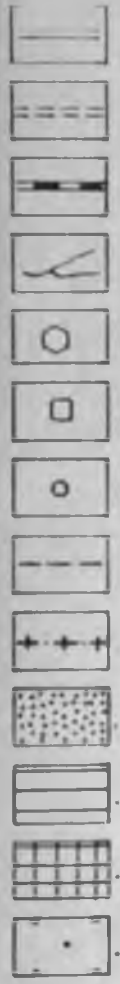
IMPACT ON NAIROBI NATIONAL PARK
LAND USES IN ADJACENT AREA

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STUDY AREA



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

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The plains are essentially volcanic with old extrusive lava and lesser exposures of ancient crystalline rocks. The area is poorly drained due to low angle slopes and the nature of the soils. Stony Athi is the principal stream receiving water from the higher ground in the west and flowing into the Athi River. Other streams include: Isinya, Kisaju and Kitenkela. Pools of water are scattered throughout during the two normal rainy seasons but dry up rapidly during the droughts. The main vegetation type is *Themeda triandra* (Forsk) grassland with *Harpachne Schimperii* (Hochst) abundant on eroded hillsides and poorly drained black cotton" soils of the valleys. *Acacia drepanolobium* (Harmex) and *A tortilis* (Fork Sttayne) mark the riverine strips.

A bundant of both domestic and wild herbivores use these plains. Amongst the wild animals common to the area are zebra, impala and wildebeest. The primary species of carnivores include Lion (*Panthera Leol*), spotted Hyna (*Crocuta Erxleben*) and black-backed Jaccal (*Cenis Mesomelas Schereber*).

The general land use pattern of the study area and the adjacent areas is very varied. Map No. 2, the regional context Map is used to show the main land

uses. Nairobi National Park which is part of the study area is entirely used for conservation. Part of Ngong Hills - the Ngong Forest is also an area of forest conservation. On the northern spreading across to Ngong town and Athi River town has, do facto become a Nairobi suburban (Map No. 2).

The choice of the study area came as a result of the need by the wildlife planning unit to assess and analyse the external problems facing Nairobi National Park. Because of ease of access to Nairobi it was seen fit to select the area for study purposes without much inconveniences. The study area is the immediate neighbour of the city on the southern side. In fact the park which is within the study area is only about 7 kilometres from the city centre.

The limit of the study area are mainly determined as a matter of practical convenience, and corresponds approximately to the area studied by a number of previous workers (Lusigi, 1979, Modha 1969, Casebeer 1970, Peterson and Casebeer 1972, Hillmann 1979 and Njoka 1979).

1.4 REVIEW OF RELATED LITERATURE:

Relevant previous studies that would provide a conceptual framework to this study are apparently not available in Kenya or other parts of the world. However, until fairly recently several studies (Leach, 1971, Krinitskii 1974, Lamprey, Olindo 1974, Carry Lindahl 1974, Ayodo 1967, Crowe 1974, Saibull, Davis and Capone 1969) most of which were papers presented on world and Regional Conferences on National Parks have touched on the threats on National Parks and Game Reserves from their adjacent areas.

Leach 1971, Lamented that:

"Before only a hundrend years ago, Wildlife was just compatible with man and his land uses all over the world. Human population was still very scarce and land was abundant. Technology was relatively low and there was no human pressures over land. Hunting and gathering which was the main human activities in most parts of the world never depleted wild species below minimum levels of self-regeneration at all."⁹

Simon 1962, explained the situation in Kenya as follows: "In Kenya, until the coming of European administration, only a very small percentage of land was occupied by human beings in any sense of

permanency. As a result, wildlife was able to survive supreme and undisturbed, down to down of the twentieth century. The main problems started with expanding human population largely due to improved medical care. Coupled with this were increases in human needs and technological knowhow leading to changes in land use practices."¹⁰

These two passages explain how the concept of National Parks started. They state that as a result of these changes in land use practices, pressure was being exerted on certain species of fauna and flora. Consequently, the National Park idea started to develop when it was felt in the industrialised countries that due to human needs and pressures, certain species of fauna and flora were beginning to disappear. The first National Park, the Yellowstone National Park, hence was set-up in U.S.A. in 1872. Gradually, the concept of National Parks began to be adopted by other nations of the world. In Kenya, the development of National Parks, dates back to the beginning of the 19th century. The concept, as it stands to the present day is rather alien to the changes. The idea of National Parks and Game reserves and the Wildlife conservation as a whole must be made adaptable

to new social, cultural, ecological, economic and political environment.

Fears about the future of National Parks and Reserves as Wildlife conservation measures have been expressed in both academic, official and unofficial circles.

Krinistkii (1974) said:

"The spread of civilization has now reduced many nature reserves to isolets (Oases) lost amid the mass of authropogenic landscapes which are not only foreign but sometimes even hostile to the complex under protection. This, he said has greatly reduced the capacity of the preserved complex for proper natural self-regulations and self-reproduction. ----- the biological cycle in natural ecological systems is disrupted; ---- the animals from disturbed areas would flock to protected isolets; and it would be more difficult for species breeding within the preserve to spread across the adjacent territories transformed by man". (pp. 62)¹¹

Kai Carry-Lindahl 1974; said:

"National Parks give protection but they also must be protected. There are few countries with National Parks, where the latter have not been threatened by being over run, reduced, altered, or even destroyed by external pressures. ----- it is a great but necessary task to protect the already existing National Parks, because they represent some samples of the world's major habitats biomas, and ecosystems". (pp. 88).¹²

Lamprey 1974; added:

"Despite their reduced number, wildlife herbs cannot be completely accommodated within the existing parks. They migrate out in the surrounding areas of the parks and onto private land. As a result, they are subjected to the influences of cultivators and pastoralists in adjacent areas. Consequently, the migratory animals are confined into the parks. And the concentration of game in a limited area is damaging the habitat that remains in the parks." (pp. 240)¹³

Olindo (1974), said:

"The problem of water pollution and siltation in rivers which originate outside National Parks are

posing very formidable problems in many countries and the hippo and crocodile among water-loving animals, face imminent danger of being expelled from their normal surrounding inside the parks. ---- this problem faces the parks mainly because of human activity outside protected areas." (pp. 58).¹⁴

As specific cases in Kenya, such views about the future of National Parks include:

The National Environment Secretariat Report (1976),¹⁵ which stated:

"While accepting that there is total governmental commitment to the concept of National Parks serving as wildlife sanctuaries, it is felt that there may not be sufficient awareness of the dangers likely to jeopardize effective continuation of present policies. Enhanced human population pressures affect the National Parks as they do other rangelands. Should the population continue to expand at the present rates, and unless alternative proposals for human employment and endeavours can be implemented, there will undoubtedly arise an instant clamour that portions of parks could be completely engulfed."

Ayodo (1967) in his opening speech on the First Wildlife Conference for East Africa, remarked that:

"Most of our protected areas are not in themselves ecological unit capable of supporting the wildlife conserved in there. Many of the protected species depend for their existence on being able to meet their requirements for living by retreating over the artificial boundaries established by man. Because of the changing land uses in areas bordering the parks and equivalent reserves, we are now faced with the disquieting fact that despite efforts given to the wildlife conservation, this most valuable resource is once again endangered.¹⁶

Some general remarks include, for example, those of Darling (1960), Lamprey (1972) and Simon (1962). Later studies include Western (1975), and Muiruri (1977). These were concerned with various aspects of Ecosystem conservation. Western (1975), Muiruri (1977) and Capone (1975) particularly presented critical and comprehensive studies on land use competition issues. Capone, for instance, centralised on the competitive conflicts of the wildlife and

human ecosystems around the land resources.

A few studies have been carried out on the Nairobi National Park and its adjacent areas of the Athi-Kapiti Plains or the entire Kajiado District.

In Kajiado district, a number of studies have been done regarding wildlife conservation and land use. F.A.O. (1978),¹⁷ did a study on wildlife management. This study carried out surveys of the wildlife populations of Kajiado district and their seasonal movements in the three ecosystems of Amboseli, Athi-Kapiti and Ewaso Ng'iro. To conserve these populations and realize their economic potential for tourism, it proposed a wildlife utilization fund to support ranchers sustaining wildlife on their lands. It calculated the level of payments on the basis of the potential value of domestic livestock foregone by the ranchers. Plans for the operation of this fund in the various areas of the district were drawn up, and the needs for roads, tracks and tourist accommodation were assessed for each area. It was calculated that the requirements of the fund could be met from existing wildlife viewing revenues, and it is believed that it should be phased out as

landowners begin to earn income directly from wildlife in the form of concessions etc. The report emphasized that the plan will be contingent upon the successful operation of a wildlife extension service, which should promote wildlife conservation, assist in land use Planning and Management, help to resolve wildlife-related conflicts, and ensure that the ranchers secure maximum economic benefit from wildlife. The report also recommends continuing survey and assessment of the resources, studies of the plant and climatic patterns of the district, and the development of economic appraisal techniques for the proposed integration of domestic livestock and wildlife.

Another FAO/UNDP, 1970, Wildlife Management in Kenya, Mission, also stated: "Land use is being intensified in the all country and ownership status is rapidly changing from public to private. This has accelerated so greatly in the last five years that serious pressures are now building up on wildlife. Wildlife administration in Kenya must be updated by legislative policy and management guidelines, so that wildlife will be recognized as an important resource in the overall government land use planning programme."¹⁸

The foregoing literature are considered is in this study as providing only general information. They lack specificity in terms of spatial area and issues discussed. None of them is on specific National Park. None of them treats any specific land use impacts. However, they have been quite useful in this study for generating a conceptual framework of the study problem. Most importantly, they seem to agree that National Parks are not ecological units capable for proper natural self-regulation and self-reproduction; but are some form of land use which depend on their immediate environment for survival. As a result, the conserved animal species seasonally retreat over the artificial boundaries out in the surrounding areas of the park and onto private land. At the moment, the papers observe that due to increased human population and civilization, the existence of National Parks are threatened from the pressures for land use in the adjacent areas. There are now few countries in the world where parks have not been threatened by being overrun, reduced altered or even destroyed by external pressures.

These views has helped alot in this study in the process of delineating the Nairobi National Park

ecosystem. They supported the fact that Nairobi National Park, like many others, is not a self-supporting ecological unit. It depends on the dispersal areas of Kitengela and Ngong Hills areas.

The papers explain what sort of impacts that such changes in land use may exercise on the park and its immediate environment. They state that the impacts can be both long term, large and local. Most impacts, would be on wildlife, vegetation and water resources. All these arguments have assisted to determine and choose which are the most conspicuous areas in which to test the impacts in this particular study area.

With reference to possible solutions to the impacts. The literature already cited discussed the following: Firstly, complete fencing of the park to separate them from their dispersal areas. This alternative, they state, is ecologically un-welcome. We also feel in this study that such a move will completely destroy Nairobi National Park - hence remarkably affect the tourism industry. Secondly, they talk of buffer zoning. This they state is not easily done and requires sound ecological research. Krinistkii's

Paper warns that "use of measures such as buffer zoning to control the activities adjacent to the National Parks must be done through good and adequate ecological, cultural, social and economic constraints in the particular area." He suggest that buffer zoning must have activities which are compatible to the Parks' existence and purposes." The argument on fuffer zoning has helped in this study not to weigh' it as one of the alternatives solution to the study problem. Most literature that have attempted to discuss solutions seem to stress on the integrated multiple land use plan. Crowe 1974: said, "Parks cannot be planned in isolation from their surrounding areas." Krinistkii added, "it is better for those responsible for parks' management plans to make the initial and informed assessment of any possible changes or modifications around the parks rather than perhaps to be ignored while assessments are drawn by others."

A few studies have been carried out on the Nairobi National Park and its adjacent areas of the Athi-Kapiti Plains (Owaga 1975, Hillmann 1979, Modha 1975, and Lusigi 1979). They have, despite their lack of direct linkage to the present study,

contributed to its conceptual framework. Most of them, however, characteristically have tended to concentrate on isolated aspects of the area. Some are basically concerned with studies of the wildlife species food spectrum, as it is related to the habitat or niche separation of these species. Perhaps this is so because most of these studies are done by the field officers of various government departments and other bodies such as FAO responsible for the management use and maintainance of the area. In fact, most of these studies have tended to be available in the form of reports and projects e.g. UNDP/FAO technical project, or occasional papers.

Studies that are most recent and concerns again the study area include, the Wildlife Planning Unit organized reports such as Ecosystem (1982 a and 1982 b). All of them on land use survey. Unlike the above works, these reports attempted to examine the conflicting use of land and resources between the parks and adjacent areas in specific parks - Nairobi, Amboseli, and Tsavo Parks. They examined the different land use changes and the possible impacts that they may exercise on the parks mostly in the future.

The studies include census of migratory animals, distribution and problems in the areas. They give surveys of other physical factors of the areas. These reports are fairly comprehensive, regarding game distribution and combined activities of human beings. They also outlined the various solutions to the impacts of land use changes on wildlife conservation.

In summary, relatively little comprehensive research has been carried out in the National Park Ecosystem in the world, East Africa and Kenya in particular. Where studies and papers of these ecological habitats have been done, particularly in Kenya, they have tended to be general statements or focus on specific aspects of the environment or on specific animal species. As a result, most of the available information on the land use changes' impacts with regard to National Parks is therefore highly scattered and compartmentalised, while also being extremely generalised. Moreover, there has been little data or any kind of information on the more general theme of policy and decision making criteria for various land uses in Kenya's National Parks' adjants.

However, as explained above, the cited literature have helped the present study in defining the study area as one natural ecosystem. They have assisted to justify the fact that parks and game reserves cannot survive in their total natural qualities without dispersal areas. The literature has also helped in identifying areas of land use changes, impacts and possible land use option to solve the conflicts.

Thus, the present study, hopes to help to bridge the gap in the argently required information about the impacts on National Parks of the changes in land use in the adjacent areas.

1.5 RESEARCH METHODOLOGY

A. INFORMATION REQUIRED:

To discuss the above issues the kind of data required included both secondary and primary. This broadly include:

1. information on physio-ecological variables such as topography, geology, soils, rainfall, agro-climatic zones, drainage pattern and other sources of water resources, vegetation, wildlife population, distribution and their migratory routes;

2. information on demographic pattern and trends, economic and socio-political variables;
3. information on land use types and changes over time and space as depicted in maps, photographs and field observations;
4. information on the opinions, preferences, and attitudes of the local residents of the study area, and government officials. Extra information was required about the expertise knowledge of wildlife conservation and management.

B. SOURCES OF INFORMATION:

The above required information was collected from secondary and primary sources.

a) Secondary Sources:

The main sources of secondary data included government publications and other private published and unpublished materials and reports.

GOVERNMENT PUBLICATIONS AND EXISTING LITERATURE

These provided useful background materials for the study. The main sources included, the Central

Bureau of Statistics, the Wildlife Planning Unit, the Kenya Rangelands Monitoring Unit, Wildlife Research Unit and other sections of the Department of Wildlife Conservation and Management in the Ministry of Tourism and Wildlife. In addition, some data was collected from the Kenya Survey, the Regional Centre of Surveying and Mapping, the Ministry of Livestock Development (Range), the National Environment Secretariat and the Kajiado District Offices. A number of Planning documents were also collected. These included Kajiado District Development Plan, Ngong and Athi River town's Plans. Some information was also collected from some private firms such as Ecosystem Ltd.

Specifically, the above sources provided information on the physio-ecological variables wildlife population, distribution and their migratory routes, vegetation condition and the general land use changes in the study area. Such data was also important in delineating and understanding the study area even much more comprehensively.

b) PRIMARY SOURCES:

Field Surveys

Two major sets of field techniques were used to gather data from the above mentioned sources. The

first set consisted of direct field surveys and observations plus documentation of maps, photographs and satellite images of the major spatial and temporal characteristics of the physical and human factors of the study area. However, this was mainly to confirm what had been known from the publications since it was impossible to observe such aspects over such a short period of study time. Vegetation characteristics for instance, was observed simply by open habitat differences in terms of coverage and utilization. Range Scientist's assistance was of great help in this case. Other physical infrastructural land use observations were also undertaken. Photographs and on-sport maps sketches were also undertaken in the field.

The second set of field work was by use of interview schedules and guided discussion questions. The data required included changes in land use, the impacts of these changes on the Park and the surrounding areas and the possible alternative from the local residents of the study area, the government officials and, the wildlife conservation and management experts was undertaken beginning October 1982 to June 1983. Three interviewing schedules (Appendices A, B and C) were used for this purpose.

The data analysis, interpretations and discussions of the findings are presented in Chapters 4, 5 and 6 that deal with the three previously stated research objectives. The three categories of interviewees were as follows:

a) LOCAL PEOPLE IN THE STUDY AREA:

Personal interviews were undertaken with the local inhabitants of the study area. These were mostly the pastoralists and farmers in individual or group ranches. Attempts were made to reach mostly those who had been in the area for long (over 40 years). These were the people, it was hoped, who could explain the condition of the environment as, it were, when the park was established in 1946.

The principal purpose of this survey was to find out the attitudes, preferences and general observations of the people with regard to land use changes, their impacts on the study area, and possible alternative solutions. This information is used in the discussion of the findings regarding the three previously stated research problems in Chapters 4, 5 and 6. It was deemed relevant that since planning is for the people, any proposals must inco-operate their views.

The survey was intended for those living mostly in the Kitengela conservation areas, (2) Ngong-Hills (Kiserian area) (3), Kaputei (4), and Senya (5) (Map No. 4). Table 1 gives a breakdown of the number of people interviewed and their zones of residence. The area was zoned according to the predominant land use and their distances from the park. The sample size per each zone was determined by the universe of the population estimated for sample. Kajiado District according to the 1979 National Census had a total of 8,983

TABLE 1: SAMPLED LOCAL PEOPLE IN THE STUDY
 AREA BY ZONES

ZONE	NO UNIVERSE	SAMPLE SIZE	% OF UNIVERSE
Kitengera (2)	300	5	1.75 %
Ngong-Hills(3)	1,400	30	2.14%
Kaputei (4)	200	2	1.00%
Senya (5)	100	1	1.00%
Total	2,000	38	1.90%

Source: Research Data.

both males and females aged 55 years and above. A sample of 38 people was selected from a crudely estimated 2,000 universe aged 55 years and above in the study area. It was assumed that most of the in-migrants are mostly in the Ngong-Hills areas, Ongata Rongai, Kiserian and Athi River. Hence, there are very few old people in these areas given that most of them are actually employed in Nairobi.

b) GOVERNMENT OFFICIALS:

In-depth personal interviews and discussions were undertaken with 27 government officials who represented 9 Departments which are concerned in one way or another with the planning and management of the resources of the study area.

Persons interviewed included the officials of the Wildlife Conservation and Management Department which constituted the majority. Other officials in the Ministry of Agriculture, Livestock, Local Government, Water Development, Office of the President as represented in the District were also interviewed. The aim was to assess their views regarding the study problems. A number of the officials interviewed stated that their views did not conform to those of

their departments. However, they emphasised that though they were speaking as individuals, they represented the views of their departments. The views of the interviewed officials concerning land use changes around the park, their impacts and what can be done as a solution are further discussed in detail in Chapters 4, 5 and 6.

TABLE 2: OFFICIALS INTERVIEWED BY DEPARTMENTS

	NO INTERVIEWED	% OF ALL DEPARTMENT
Wildlife Conservation and Management Department	11	40.7
Ministry of Agriculture	2	7.4
Forestry Department	2	7.4
Livestock Department	4	14.8
Local Government	2	7.4
Physical Planning	2	7.4
Water Development	1	3.7
Office of the President	2	7.4
Politicians, e.g. Councillors	2	7.4
Total	27	103.2

c) WILDLIFE CONSERVATION AND MANAGEMENT EXPERTS

The wildlife conservation and management experts provided information regarding mostly the impacts of changes in land use and possible alternative solution. Seven (7) experts were consulted and their views are incorporated in the report in the relevant sections mostly in Chapters 5 and 6.

In analysing the data collected, both secondary and primary, tables, calculated percentages, charts, maps, and photographs are used. In some cases, the opinions of the respondents are simply summarized. Data was analysed manually by hand. Environmental impact assessment weighing technique is used with regard to proposals. This made it easy to pick on the most desirable alternative proposal.

d) LIMITATIONS AND DIFFICULTIES

A number of limitations and difficulties were encountered with regard to achieving the data required.

i) Secondary data:

In order to document the changes in different land uses over the three periods, namely 1943-1963, 1963-1983 and 1983-2003, maps, photographs and

satellite images were used. Reports and other published and unpublished materials were also used. However, all these materials, that were found, were limited in terms of providing changes in the six different land uses. For instance, photographs and maps of the period 1943-1963 were limited to areas on the northern side of the park. They were largely focused on the Nairobi City. Photographs showing features in the Kitengela and Ngong hills were missing in these photographs and maps. The railway authority that was established quite early in this area mostly showed residential headquarters of the officers and the Labourers constructing the railway line. Most of them are all about the Nairobi City area. The 1947 Nairobi area map was also largely on the development of the city. The landat images that cover the study area were not able to show detailed land use features such as extent of cultivated land or rural settlement (homesteads). The reports and, published materials that were reached were also limited in providing the information required from them. They tended to be largely descriptive. None provided quantified changes in land use, for instance, in hectares or percentages in the study area. For the present period, existing maps, apparently, used data

collected in 1960/61 and late 60s, hence do not show the clear picture of the current situations. These imply that the study had to rely on field observations and primary data from the interviewees which were also not without limitations and difficulties.

(ii) Primary data:

Local inhabitants

The local inhabitants were required to state their observations regarding the land use changes and their impacts over the three periods. We also wanted to assess the changes in their attitudes towards wildlife and their preferences and opinions regarding the solution to the study problems. To undertake these, interviews were conducted with the 38 respondents aged over 55 years. It was assumed that these people could remember the situation, as it were, when the park was established in 1946. They were also those whose attitudes towards wildlife is now changing (Simon 1962). A number of limitations and difficulties were experienced with regard to interviewing the 38 local inhabitants:

a) It was not easy to locate them. As a result, we had to look for the administrators such as Chiefs and Assistant Chiefs in the different areas to guide us. At times we were using the Game Guards in the area. This caused some fear in some respondents. It appeared to them as if it was the government investigating some of their activities. The fear was more particularly, with those who are still in group ranch. The members in group ranch have some restrictions with regard to the use of land. For instance, they are not supposed to cultivate the land. Hence, a question such as how much of your land do you cultivate? was not very freely answered. A number of the respondents in the group ranch, apparently, preferred saying that they only own livestock meaning they do not cultivate the land. Yet general discussion revealed that some of them have resorted to cultivation in some places far from their homesteads. To solve this problem of fear, we took time to explain to the respondents the purpose of our visit. Sometimes we could use the Chief or the Sub-Chief to explain to them more about the study.

b) Because of the scattered nature of the rural homesteads, particularly, in Kitengela, Kaputei and Senya zones, we resorted to using a government registered vehicle. This we realized had a similar effect on the respondents as with the case of going to their homes in the company of the Chiefs or Assistant Chiefs. On the other hand, some respondents thought we had gone to compensate them for the loss they might have suffered from wild animals damage. This problem was solved by instant explanation of our purpose of the visit.

c) The other difficulty encountered was with regard to language. A few Massais were not able to talk in Kiswahili throughout the conversation. More difficulties in language was experienced when the respondents were referring to the names of some wild animals in their language. To respond to this language barrier, we made a list of the names of the common species referred to such species included:

1. Wildebeest (English - Ngati (Kimsaai)
2. Lion " - Oloworu or Orangatuma

3. Buffalos (English) - Alaroi (Kimasaaai)
4. Zebra " - Oloitiko "
5. Plains Impala - Ngoili "

The names of these species were often referred to when commenting on their availability in the past or their effects.

- d) The other limitation was with regard to the ability of the respondents to remember the past. Some respondents were not able to remember much. To jog their memories abit, we resorted to asking specific aspects that we wanted to know. For instance, we could ask about homesteads that were around his home during the 1943-1963 period.

With regard to changes in attitudes towards wildlife, the respondents were generally free to state their "stands". To get a general attitude towards wildlife in the study area, we conducted informal discussions with some younger inhabitants. This was not subjected to any statistical procedure. It was meant to determine that there is a general change in attitude of Masaais towards wildlife.

1.6 DEFINITION OF TERMS USED:

In this section some terms used in the report are defined:

1. Changes in land use

This is broadly defined to include any new use or development of any kind of the formerly virgin (new) land or existing land use in the adjacent areas since the park was established in 1946.

2. Impacts of changes in land use

These refer to effects on the environment in totality of the study area, and specifically, on wildlife, vegetation and water resources by the changes in land use. The effects may be positive or negative. However, we have highlighted mostly the negative effects. Effects particularly negative ones, are seen to occur when as a result of a land use change, the wildlife, for example, is forced to adjust or adapt itself to the new conditions.

3. Concept of National Parks

Concept of National Parks mean different things to different observers. The delegates to the first World Conference on National Parks had widely desperate concepts in mind when they referred to

National Parks. Some felt strongly that parks were areas in which there would be no human occupancy to permit unfettered inter-play for natural forces. Others argued for intensive manipulation of the environment in order to maintain a single evolutionary stage.

In this study, we have adopted the following definition, which has been accepted by the International Union for conservation of nature and Natural Resources (IUCN) at the General Assembly Meeting in New Delhi in November, 1969. It also conforms to Kenya Government's explanation of Parks' land explained earlier in this report.

"A National Park is a relatively (1) large area where one or several ecosystems are not materially altered by human exploitation and occupation where plant and animal species, geomorphological, and habitats are of special scientific, educative and recreative interest or which contains a natural landscape of great beauty. (2) where the highest competent authority of the country has taken steps to prevent or to eliminate as soon as possible exploitation or occupation in the whole area and to

enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment and (3) where visitors are allowed to enter under special conditions for inspirational, educative, cultural and recreative purposes.

4. Park Ecosystem

From the above definition of a park, we realise that it can include several ecosystems. This is normally not the case. Our National Parks and Nairobi in particular are but part or a section of the Ecosystem. Defined with reference to Nairobi National Park, Park Ecosystem should include the biologically, ecologically related area of the Nairobi National Park, Kitengela (Athi-Kapiti Plains) and the Ngong-hills.

5. Multiple land use practices

This is taken to mean an approach of land use in which different land uses are able to co-exist through compatible goals and management. It means the accommodation of a maximum number of other compatible uses with the highest single use of the land. In our study area, the highest single land

use in wildlife conservation and water catchment areas of Ngong-hills forest.

6. Adjacent areas, surrounding areas and immediate Environment of Nairobi National Park

These three expressions are used in this report so frequently and interchangeably. They mean the same thing or refer to the same area. They mean the areas immediately around the park and mostly on the southern park. Specifically, they refer to Ngong-Hills and the Athi-Kapiti Plains - Kitengela.

1.7 LIMITATION OF THE STUDY

This research study suffered some limitations in terms of space and issues observed and included:

1. The study would have included land use changes that have taken place on the side bordering the Nairobi City and assessed their impacts. Such land use changes include the two airports (Jomo-Kenyatta and Wilson), the expanding Langata Barracks and the sporadic new estates such as Onyonka, Langata, Kibera, and Ngei. All these land uses are closeby the

park boundary and came-up after the establishment of the park. However, since the park is completely cut-off by fence from these land uses, there has been very little interaction between wildlife and these areas. It was therefore felt in the study that little impact is exercised on the park by changes in land uses in this side. Impacts is predominant only on the 22 km. unfenced southern boundary. However, there are some effects that do not recognize the fence. For instance, the noise pollution from the Nairobi Industrial area and mostly, the landing aircrafts of Wilson Airport. As they approach ground, these aircrafts zoom directly over the park. These may have impacts on the wild animals inside the park and should be researched on. This is an area proposed for future researchers.

2. It would have been much more desirable if we compared this study with the situations existing in the adjacent areas of other parks and reserves such as Tsavo (East and West), Amboseli and Masai Mara. Such a comparison would help in identifying and treating Nairobi National Park as a unique case, as it were. It

would sharpen our recommendations more given wider experiences. This was not done largely due to lack of time. For that to be done, a period of about 1 year for field work would have been required.

3. Detailed analysis of such a study would have included such tests of impacts of specific land use and on specific plant and wild-life species inside and outside the park. This was not done, instead, we have assessed impacts quite generally without specifying species and areas of impacts. The tendency has been to support the statements by findings and quotations. This detailed analysis was not possible largely due to lack of enough time, equipments and appropriate skills. The time for this study was too short. And, such analysis would have required more biological inputs.

Despite these limitations and problems of this research project, data which was reached and the area covered is adequate to make it achieve its objectives. It is however, treated as a prelude to some future more specific and detailed studies that it has exposed.

REFERENCE:

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CHAPTER TWO

THE DEVELOPMENT OF NATIONAL PARKS

2.0 INTRODUCTION:

The idea of National Park started to develop some 100 years ago, when it was observed in some industrialized countries that due to human needs and pressures certain species of plants and animals were beginning to disappear and features of geological, eminence were being disrupted by many forces. The concept of National Park then provided for large tracts of land set aside as wilderness areas and natural areas - devoid of all human influence. The objective was to accord complete protection to representative areas in an environment that was rapidly changing. At that time, the landscapes adjacent to areas of preservation, though differing from untouched country, did not seriously affect the natural aspects of the reserve.

This chapter reviews in general, the development of the idea and pressures on National Parks under three broad sections. Section One discusses issues involved in the development of National Parks in some parts of the world. Section Two traces the historical development of the National Parks in Kenya. This is done under three periods. The last section analyses in general, the pressures on National Parks and

reserves due to increased human population. Specific examples of National Parks in Kenya are mentioned.

2.1 THE DEVELOPMENT OF THE NATIONAL PARKS IN SOME PARTS OF THE WORLD.

2:1:1 AMERICA:

The idea of National Park started in U.S.A. with the establishment of Yellowstone in 1872. In Canada, the first National Park or prototype of a National Park was created in 1885, only fourteen years after the bill establishing yellowstone National Park was signed by President Grant.¹

In United States, the Act for creating the Yellowstone was as follows:²

- (1) "The Act provided that the park areas is hereby reserved and withdrawn from settlement, occupancy or sale under the laws of U.S.A. and dedicated and set a part as a public park or pleasing ground for the benefit and enjoyment of the people".
- (2) "..... and persons who shall locate or settle upon or occupy the same or any part thereof, except as herefrom".

- (3) "Jurisdiction was given to the secretary of the interior who was directed to public rules and regulations, such spoilation of all timber, wonders, mineral deposits within the park and their retention in their natural conditions. The Secretary may indiscretion, grant leases for building purpose for time not exceeding ten years, of small parcels of ground, at such place in the said park as shall require the erection of building for the accommodation of visitors".
- (4) ".....all the proceeds of such leases, and all other revenues that shall be derived from any source connected with the said park to be expended under this direction in the management of the same, and the construction of roads and bridle paths therein".
- (5) ".....he shall provide against wanton destruction of the fish and game found within this park, and against their capture and destruction for the purposes of merchandice or profit."

(6) "..... he shall also cause all persons tresspassing upon the same after the passage of this act to be removed there from, and generally shall be authorized to take all such measures as shall be necessary or proper to fully carry out the objects and purposes of this Act".

This act is of great importance to the development of National Parks in some parts of the world-being the first one. The issues and situations that were prevailing during the time of the establishment of Yellowstone Park were considered in other countries. For instance, the establishment of Yellowstone was a few people's idea and the responsibility of maintaining it was entirely on the hands of the central authority. The local inhabitants the Indians' interests were never considered .

Secondly, land acquisition for the development of National Parks in U.S.A. was done by simply removing the people through treaty of force. This was the same situation in Kenya. People were moved from present park lands either by treaty or force. Nairobi National Park is a case where the Somalia's

were displaced in the same manner. These people who were removed by force or treaty are now just around the park and ready to invade the park any moment. Infact, they still maintain that the park is their land. My discussion with some Somalian ex-resident of the present Nairobi National Park indicated this very clearly.

Thirdly, when parks like Yellowstone were established, property (such as land) ownership was communal. The European settlers had not ventured into this region. These were relatively areas of low economic returns. There were few developments in these areas. No railroad or airfields within hundreds of miles of Yellowstone. A similar situation prevailed in Kenya. The Kenya Highlands suitable for settlement was never set aside for park development. Parks were established mostly in the areas of the nomadic tribes whose living style were rapidly changing. As has already happened in U.S.A. Kenya's human population is now rapidly increasing. Private interests now takes up the former communal interests. The result is a changed situation that threatens the parks' existence.

2:1:2 EUROPE:

In all of Europe's thirty countries, the National Parks movement was not significant until the beginning of the 20th century. The idea was apparently stimulated and encouraged by the establishment of National Parks in other countries like America. However, many European countries developed an interest in National Parks much earlier although due to large population densities - hence lack of land, National Parks of the American sort have seldom been established. Infact, many National Parks in Europe were established in areas which were for along time left intact by the course of human activities either because they were remote or were considered as marginal or non-productive.³

a) GREAT BRITAIN:

The National Park movement started in Great Britain in the late twenties when Lord Bledisbe began to campaign for them after seeing the National Parks in Canada and U.S.A. The Act of the National Parks and Access to country-side was passed in 1949 to conserve as an inviolate resources in the areas of wild and beautiful country-side.

The situation prevailing in Britain at this time was quite different from that of America during the establishment of Yellowstone. Major factors in Britain's development of National Parks concept was the acceptance from the beginning of lack of vast expanses of virgin land which could be set aside for public enjoyment or conservation of wildlife. Instead, there was a closely populated and high developed country, where almost every acre of land was used in some form for economic needs of man, and in a complex design of agricultural, industrial or residential use. Nevertheless, "some of the extensive areas of beautiful and wild country in England and Wales were protected as part of national heritage."⁴

The situation in Britain allowed careful control of the new developments to the best satisfaction of all interests involved in the area. Quarrying, farming and mining activities are allowed in the parks to the extent that they fit in the park objectives. The parks conservation objectives are clearly explained. The National Park areas are seen not as biological islands but as part of the whole environment. The National Parks are planned given the local, regional and national objectives. Most

land in many National Parks is privately owned. The local population is made aware of the presence of the park. The land use is planned to allow the co-existence of other uses. These land use systems were not prevailing when National Parks were established in Kenya. They are only coming up when the parks were long established.

b) GERMANY

The first proposal for a National Park in Germany came on 26th March 1898, through Wilhelm Weteramp, in a speech to the prussian parliament. He asked for the establishment of state parks for the protection of nature, but the government did not follow his proposal. This was however, done by a private association, the "Verein Naturschutzpark", (Society of Nature Protection Park), founded in 1909, who established in 1921 "Naturschatz Park Lune-burger Heide" as the first German Conservation area-comparable to National Park. At present, there are 57 nature parks covering almost 4 million hectares or 16 percent of the area of the Federal Republic, providing a very successful development.

However, National Parks as a form of land classification were first officially recognized in Germany by the State of Bavaria in 1969 when it set aside its first National Park in Bayerischer Wald. The supporting law however, was not passed through parliament until 1973. Federal recognition of the National Parks concept did not come up until 1976 with the publication of the new federal law on nature conservation which has now replaced the Reichsnaturchutzgesetz.

In Germany, the formation of National Parks was done out of land that had undergone intensive human activities for over a thousand years. This is remarkably different from the Kenya's case where parks were set aside just about the time the country was being settled by the European. Kenya's land is yet to undergo more intensive human activities.

c) OTHER EUROPEAN COUNTRIES

Other European countries such as Spain, Italy, France, Switzerland, Sweden and Netherlands developed National Parks in an already reshaped environment by human activities. In the words of Kai-Curry-Lindahl; "In the Mediterranean parts of Europe, during the past three thousand years, the soils have been dissipated -

the land which was rich in forest is no more. Almost every part of the mediteranean area-Spain, Southern France, Italy and the Balkan Peninsula-has been reshaped by man. Only small segments such as delta-regions, strips of Coast, and the highest mountains may be characterized as untouched."⁵

Despite this changed environment, Spain has two National Parks, Italy has four, France established two in 1963, although the French Alps had already been set aside in 1914 for conservation. This reserve was not a true National Park. Switzerland has one National Park, situated in the Alps-established as early as 1914. Sweden created its first National Park in 1909 and has been the custodian of the largest National Parks of Europe. In 1962, the sixteenth National Park, Padjelanta National Park (204,000 hac.) was established. Parks in Sweden have not been kept entirely untouched. Sweden's government has shown very little respect for the integrity of National Parks. A series of violent changes for hydro-electric installations have altered the Storasjafaller National Park in a tragic way. Parts of the Sarek National Park has also been destroyed and a new development plan, again for hydro-electric purposes, now threatened the Sjaunja Reserve.

Almost all Swedish seven National Parks in Lapland have been exposed to exploitation and partial destruction, despite years of energetic defense battles by conservation organizations. One of the effects of all industrial activities in or adjacent to most Swedish National Parks has been the opening up of these reserves and the whole surrounding regions by roads.

Netherlands, the most densely populated country in the whole world, apparently had alot of difficulties in setting aside and maintaining nature reserves.

2.1.3 JAPAN AND OTHER PARTS OF ASIA:

In Japan, the National Park idea was also inspired by the establishment in 1872 of the American Yellowstone National Park. The National Park Law was enacted in Japan in 1931 and even before World War II, twelve areas were so designated under this law (Telsumaro Senge, 1969).⁶

In 1957, the National Park law was abolished and a new Natural Park law enacted in its place. This law embraces prefectural Natural Parks as National Parks and forms of the Natural Park system. As of

March 1968, National Parks numbered 23 (1,963,649 hectares), accounting for 5.3 percent of the total national land. However, the natural scenic beauties are often threatened by rapid development and urbanization due to increased population pressures.

In India, the idea of nature conservation is relatively a recent phenomena. The idea began with the information of the Indian Board for Wildlife in 1952. The aim of the Board was for conservation and control of wildlife to sponsor national sanctuaries and zoological Gardens with an objective, "to promote public interest in wildlife, prevent cruelty to birds and beasts, advice government on policy in respect to export of wild animals and wildlife products, and to perform such other functions as are germane to the purpose for which the Board was constituted". Given the high human population demand for land, India's National parks and other sanctuaries are equally threatened.

2:1:4 AFRICA:

Africa is remarkable for its greater wealth of wildlife than elsewhere in the world. Prior to the European settlements in the interior parts of the continent, wildlife was abundant. The European

settlements rapidly destroyed wildlife. The earliest parts of the continent to be affected was South Africa. Road building, the advance of stock farming, and the fencing of grazing lands completely did away with the large mammals in most parts of Africa. In addition, game eradication campaigns, certain methods of combating human and animal epidemics resulted in a sharp decrease in the game animals. Hundreds of thousands of wildlife were destroyed.

As a result, the idea of setting aside of areas for the parks in African was arrived at. This followed the two conferences in London in 1900 and 1933 respectively. The second conference of 1933 known as the international convention on parks stimulated the establishments of National Parks in Africa. The objective of the conference was to protect the most spectacular fauna and flora of the continent. It also introduced the basis of modern park and wildlife conservation and management techniques. Some of those who attended the conference, were convinced and adopted the idea of establishing National Parks and game reserves in the colonies. A number of parks were then established. The first National Park in Africa - the Kruger National Park

in South Africa, hitherto the Sabi game reserve was declared in 1926. This was followed immediately in the same year by Albert National Park in the Belgian Congo. In Western and Northern Africa, a number of countries also created National Parks in the colonial period. In 1956, Nigeria established Yankari game reserve. This was largely for general protection, both as forest reserve and as a, "no shooting area". In Morocco, Tazzeka National Park was established in 1950. In Ethiopia, the Menagasha National Park was established around 1958. Most of these parks were established before 1960s.

In East Africa, National Parks were established also as early as 1940s. The first National Park was in Kenya - the Nairobi National Park established in 1946.

Meanwhile, discussions to establish more areas for wildlife conservation in Africa continued. In 1968, the African Convention the conservation of nature and natural resources convened in Algiers. This was followed in 1969 by the 10th General Assembly of IUCN in New Delhi. All these conferences furthered the interests in the setting of National Parks in

African countries. The African Convention then replaced the London Convention of 1933 and applied the whole problem of resource conservation in Africa. However, there was not much difference in the concept of parks as was established by the London based conferences. Nevertheless, these conferences in Africa, encouraged establishments of more parks.

Several countries such as Malawi, Botswana Rwanda, Zaire and Botswana have established National Parks and reserves at varying dates. They are mainly Savannah Parks with few mountain and Marine Parks. As a result, they depend very largely on the dispersal areas since they are not ecologically self-sustainable.

In general, most parks of Africa followed the basic ideas and issues prevailing when Yellowstone of America was established in 1872. The parks were not established in areas where human interests, such as farming already existed. They were proclaimed mostly, in marginal areas. Furthermore, the parks in Africa are often fixed in response to political expediency rather than ecological expertise. Hence, with the recent increase in human population, and

consequently, in the numbers of cattle, sheep and, goats and accompanied infrastructure, the future of the parks are threatened. The present situation therefore dictates that different approach to managing the wildlife and the protected areas must be adopted to ensure their future.

In summary, this section of Chapter Two has attempted to review the development of National Parks in selected parts of the world, namely, America, European countries, Japan and other Asian Countries and Africa. The aim was to consider issues and prevailing situations when the National Parks in these countries were established. It is seen that parks of United States, Canada, Japan, India, Africa and other nations were devoted large tracts of land on the premises of conserving, protecting and preserving the natural fauna and flora. The areas set aside were in most cases relatively areas of low economic returns. Few development had taken place in those areas and most private interests were not significant. These areas were mostly occupied by nomadic ethnic groups whose living style were rapidly changing. The occupants were still very few in numbers and could be removed easily although they kept close to the

parcs' boundaries. With the general human population increase, they started developing these areas. And with the problem of landlessness in some parts of these countries, spontaneous population movements have been taking place. These areas in which National Parks were established start experiencing rapid land use changes. These changes are now causing threats to National Parks.

On the other hand, we have seen that areas such as most of the European countries where there was already large population densities, hence lack of large tracts of virgin land, National Parks of Yellowstone type are seldom. Many National Parks were established in areas which had for a long time been developed or left intact either because they were remote or non-productive. Countries like Germany, for example, established National Parks out of land that had undergone intensive human activities for over thousands of years. These are different from the situations that were prevailing in Africa when most parks were being established. Intensive land use came fairly recently and yet more intensity is to come.

2.2 THE HISTORICAL DEVELOPMENT OF NATIONAL PARKS IDEA IN KENYA:

Tracing the historical development of National Parks in Kenya, requires a general consideration of the whole of East Africa, since the development in Kenya, Uganda and Tanzania was so closely linked in those early days. Thus during the pre-colonial and colonial periods, this section traces the National Parks development in the whole of East Africa.

2:2:1 THE PRE-COLONIAL PERIOD:

The development of National Parks as a means of wildlife conservation was unknown before the European settlement in the whole of East Africa. However, the history between Wildlife and Man was known. Trade in Wildlife items between the East African Coast and other parts of the World started long before the arrival of the Europeans. Major items of trade included ivory which was exchanged mostly between Africans and Persians and Indians. Other items which were traded included dyked cloaks, turnics, copper, tin, worked silver wine and drinking cups. From East African Coast, there was export of Cinnamon, Franinsense, Fragrant gums, Tortoise Shell and Ivory. The Greek trading handbook

"periplus of the Erytherean Sea" written approximately A.D. 110 is the earliest surviving detailed description of the Coast of East Africa.⁷

The trade continued throughout the period A.D. 100 - A.D. 1498 during which some wildlife items such as rhinoceros horns, Leopard skins became increasingly attractive.

A part from the trade between the East African Coast and the outside world was the internal trades - particularly from the 16th century to the middle of the 19th century. Most tribes were subsistant agriculturalists. Others were either pastoralists or hunters. As a result, the trade were either an exchange of hides for grains or plaintan crops of the hillier areas. For instance, there were such internal-trades between the Masai women with the Chaga and Kikuyu ones.

Throughout this period, the exitence of wildlife could not be threatened by any form of land use. Wildlife was treated as sources of food or skins or were seen as important natural heritages; or used as trading items with other parts of the world. All

these did not exercise any significant impacts on the existence of wildlife. Remarkable changes came with the settlement of the Europeans.

2:2:2 THE COLONIAL ERA:

This was the era of signs of wildlife disturbance due to increased modernized hunting and later land use changes. The Europeans started showing interests in East African in the late 19th century. The main attraction was the ivory trade although Missionaries were also involved. Because of the use of the firearms, the trade in wildlife items increased. There were killings of much more wildlife than before. The Africans were also being invaded in their villages which were being burnt with the modern fire. The environment was rapidly changing. As a German traveller - Hermann Wissmann records in his second Journey through the upper Congo region:

"Where formerly thousands of Benecki, inhabitants of the strikingly beautiful and prosperous villages, had joyfully welcomed us where peace and amity we had been conducted from village, we now found a waste, laid bare by murder and fire, the clearings in the bush on both sides of the straight tracks, which three years before had been occupied by neatly cultivated plots of the Benecki, were now overgrown with grass of a man's height, while here and there a burnt pole, a bleached skull and a broken pottery were left as the only reminders." (Wissman, 1895)'

The increased commercial need for ivory, local hunting and the survival need for food-all started causing remarkable impacts on wildlife numbers. Evidences of declines in numbers of some wildlife species such as elephants were significant. This was due to the intensive European settlements and exploitation of the resources. Early movements efforts to conserve wildlife started coming up from individuals.

a) EARLY MOVEMENT OF WILDLIFE CONSERVATION:

Expressions and warnings of decline of wildlife population started coming up as early as 1894, when Sir. Harry Johnston, Commissioner of Uganda, called for special measures to safeguard certain species. He lamented, "it would be Melancholy to think that such glorious creatures as the Eland, the Kudu, the Sable, Antelope and the Zebra were passing into extinction when they might be saved and perpetuated by our making a little effort in the right direction." These expression came even before the formal declaration of the East African protectorate which came on June 15th 1895.

At this early stage, the destruction of wildlife was mostly by travellers and traders. As spelt out in the letter from the Marguess of Salisbury-

the Foreign Secretary - dated 27th May 1896 and addressed to Mr. Harding and Mr. Berkeley, Commissioners in the East African protectorate and Uganda respectively (Simon, 1962). It states:

"My attention has recently been called to the excessive destruction by travellers and others in East Africa, of the larger wild animals generally known as "big game". There is reason to fear that unless some check is imposed upon the indiscriminate slaughter of these animals, they will in the course of a few years, disappear from the British protectorate. It is eminently desirable that some step should be taken; and you will furnish me with a report on this subject. It will be --- for your consideration whether it would be advisable to deal with the question to some extent by establishing a close time, by specifying reserved districts and by limiting the number of any particular class of game to be shot by an individual sportsman. In any case a regulation should be issued, if not already in force, requiring persons intending to shoot big game for sporting purposes, to take a licence, the fees for which should be sufficiently high to serve as a check" (pp. 33-34).

It is pretty clear from this quotation as to why the British wanted to conserve wildlife at this early stage. The purpose was largely to avoid the wanton sportsmen who shot and killed large number of wild animals and the local and foreign skin hunters. The regulations were not set for control of land utilization. This was certainly unnecessary since land was still abundant. The problem of land pressures was never envisaged.

The German East Africa who then mostly in Tanganyika also issued a set of regulations (Simon 1962). Von Wissmann, the imperial Commissioner - issued regulations to district authorities. He however, observed that the new regulations would diminish "existing sporting rights" but considered that sportsman had a duty to think of the future generations. Wissman apparently was already considering forming game sanctuaries for future generations. He therefore issued instructions for the immediate establishments of two sanctuaries. This led to the establishments of the first official East African Game Reserves. These were all in Tanganyika. The first was "bounded on the north by plateau on the south by the river Rufiji as far as Mtemesa, on the east by a line including the steppe lakes as far as Mserakera". The second constituted the district lying west of Mt. Kilimajaro as far south as Meru Mountains, west through the Ololbolo and Mation Hills and north through the Anglo-German Frontier (Simon 1962, pp. 34-35). These efforts were aimed at providing special protection of certain species. Infact, they were largely anti-poaching moves and efforts to regulate indiscriminate Game Killing. They were not aimed at solving the pressuers on land.

b) THE KENYA'S FIRST RESERVES:

When the large defined areas prohibiting shootings were set by Germans in Tanzania, the British representatives in Kenya had apparently not taken any step towards that. It was on 31st July 1877, that Sir. John Kirk, writing from seven Oaks, Kent, after retiring from Zanzibar, recommended that the British representative should press for a large defined area to be set aside wherein no shooting would be allowed. As a result of this appeal, a whole Kenia district of the province Ukamba, except the area within 10 miles around the Government station of Kikuyu," the area comprised within a radius of 10 miles around each of the government at Naivasha, the Eldama Ravine and Nandi were declared Reserves in 1899 under the Uganda regulations. Another temporary reserve, from the Turkwell river, extending down to Lake Baringo was also declared a reserve (Johnstone, 1902). These were the first reserves in Kenya. One notable fact is that they were all in areas considered Arid and Semi-Arid lands and not suitable for development.

c) THE EUROPEAN SETTLEMENT

The real impact on wildlife situation started with the intensive European settlement. That was the beginning of killing animals because they competed

for grass, breaking fences, and the carnivores like Lions killing and eating the settlers' cattle. The urban settlements and farming - cultivation activities starting replacing the wildlife in their former areas. The Athi Plains and the Nairobi area which ranked as some of the finest game country in East Africa upto 1903, started loosing them due to the rapidly grown railway town of Nairobi and constant shooting of game.

It became easier to enter in inaccessible parts of the country. The motor car era came in. By the middle of this century a number of settlers had taken land in British East Africa. But even by as early as 1906, much of the Kenya highlands and the Rift Valley were under European settlement. Areas like Naivasha, which had high concentrations of wild animals in Rift Valley were rapidly being occupied by the settlers. Today not even a single zebra can be seen roaming in these areas. Yet, before areas such as Uasin Gishu Plateau were settled by the Boers particularly to the south of the Nzoia river, there were plenty of Impala. In all these areas, pressure for land started by the European settlers. It was therefore just time that conservationists had to stress for National Parks establishments. As a result, the society for the preservation of the fauna of the Empire was founded.

d) PRESSURE FOR AND ESTABLISHMENT OF THE NATIONAL
PARKS AND GAME RESERVES:

In 1903, the society for the preservation of the fauna of the Empire was founded. It later came to be known as the Kenya Wildlife Society in 1955. In 1905, the delegation saw the Secretary for colonies, Alfred Lyttelton and drew his attention to the deterioration of the wildlife situation in East Africa. (Kenya Wildlife Society 1957).

They emphasised the role of wildlife and the need to establish adequate game reserves before the country was settled up. They also considered that parks should cover migratory routes of animals and that boundaries should be drawn up to include these routes. They also stressed the importance of well defined parks administration.

As a result, in 1906, Mr. F.J. Jackson - Deputy Commissioner, decided that an adequately and properly organized Game Rangers Department should be established without further delay with a view to preserving the game from extinction within the next one or two decades, more particularly the Kudu, Rhinoceros, Roan and Sable Antelopes, the Buffalo and Eland all which

had steadily decreased in numbers through advance of "civilization".

The reserves boundaries were described in detail but the enactments contained only authority for the protection or regulated hunting of wild animals. The reserves were officially regarded as sanctuaries, in which shooting was carefully regulated according to prevailing conditions, but that outside the reserves the preservation of wildlife must not be allowed to stand in the way of economic development of the country. No other authority was provided, such as to control human use of the land.

After this, followed the period of the two world wars. During these wars, wildlife was used as cheap protein for prisoners and troops. However, this did not reduce the wildlife numbers beyond recognition. The wildlife was still abundant.

After the wars, Kenya set-off for agricultural development. Kinangop, for example, had new land broken for cereals. The existence of Game was therefore threatened. This is where the Game Department came in.

The main function of this department was to control the numbers of animals in areas where they conflicted with agricultural development.

THE FIRST NATIONAL PARKS:

In 1930, the society for the preservation of the fauna of the Empire, with the approval of the Secretary of State for the colonies, sent Major R.W.C. Hingston to Kenya to investigate the game situation and to make recommendations. As a result, three National Parks, embodying the national reserves, part of the Abedares and a region lying to the north of the Sabaki situated between the Giriama and Kamba Reserves were established. And after hearing evidence from Ritchie, the 1933 Carter Land Commission supported his recommendation that the greater part of the Nairobi Commonage should become a National Park. Meanwhile, the International Convention, held in London in the same year - laid down principles upon which National Parks and other sanctuaries were to be established.

In 1939, the Kenya Government appointed a Game Policy Committee under Cecil Hoey as Chairman "to consider and make recommendations concerning the institution in the colony of a National Game Park

including their location, extent, constitution, control and management". The National Parks Ordinance, came up in 1945 and provided the National Park Trustees with authority to acquire land for National Parks and enforce total control over wildlife, people and land use. Provisions are also made whereby the National Park Trustees can receive limited jurisdiction from land authorities to regulate the protection and use (or viewing) of wildlife but not over land use. The first National Park - Nairobi National Park was therefore declared in December 1946.

National Parks were established in conformity with the definition of the 1933 International Convention - in which they are seen as:

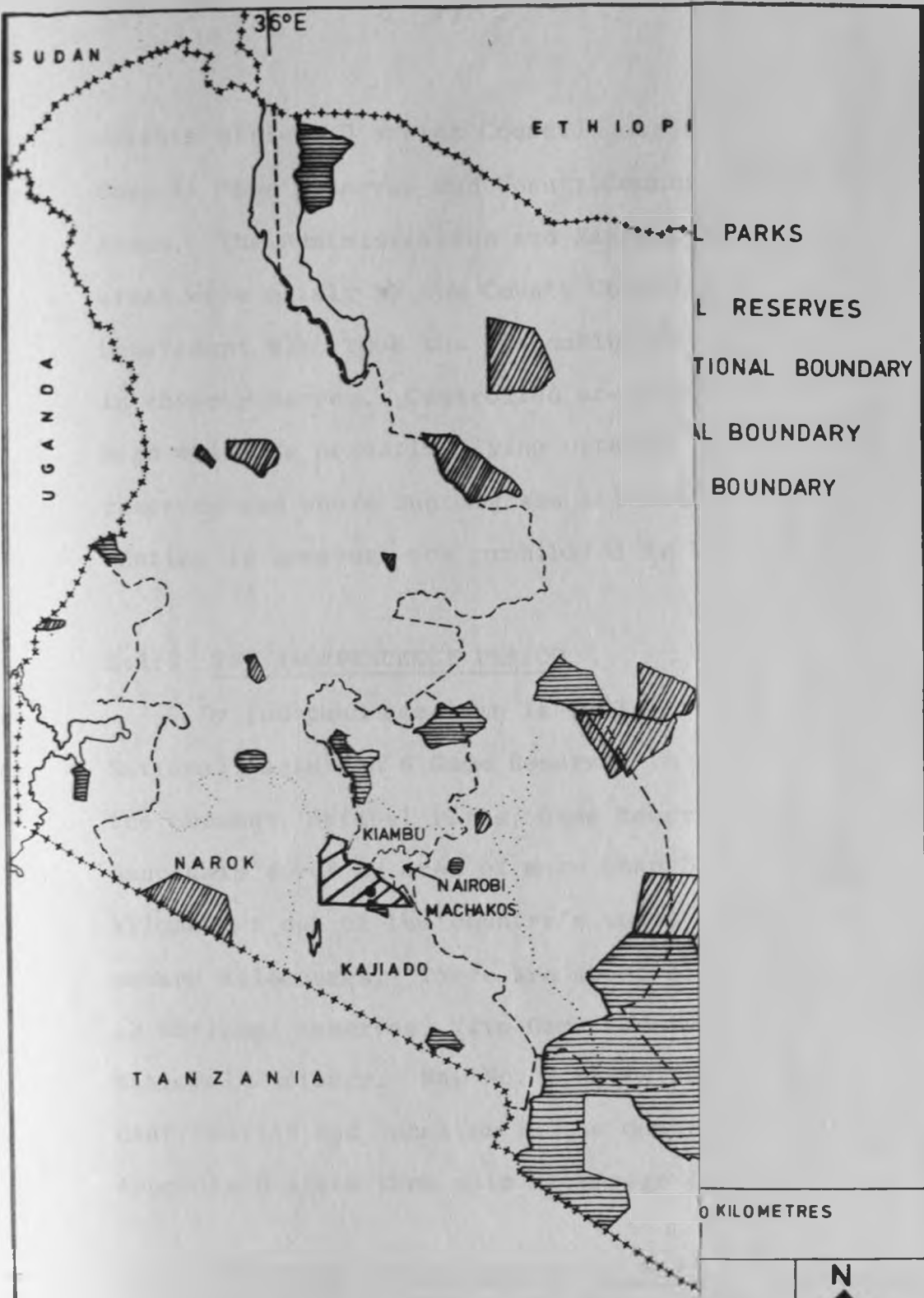
- a) A place under public control, the boundaries of which shall not be altered or any portion be capable of alienation except by the competent legislative authority.
- b) set aside for the propagation, protection and preservation of wild animal life and wild vegetation, and for the preservation of objects of aesthetic, geological, pre-historic, historic,

archeological, or other scientific interests for the benefit, advantage and enjoyment of the general public.

- c) in which the hunting, killing or capturing of fauna and destruction or collection of flora is prohibited except by or under the direction and control of the parks' authorities.

In National Parks therefore wildlife took precedence over every other consideration. Their administration was put under a body of Trustees whose members were private citizens appointed by Governor.

On the other hand, National Reserves were regions of high faunal interest originally referred to as "park adjuncts". Here, the preservation of wildlife was only possible so long as it did not interfere with the needs and rights of human inhabitants. Under Ordinance 12, 1950, African District Councils had authority to prescribe specific uses and make regulations for management of Trust Lands under their jurisdiction. Under this authority



- NATIONAL PARKS
- - - RESERVES
- INTERNATIONAL BOUNDARY
- · - · NATIONAL BOUNDARY
- BOUNDARY

100 KILOMETRES

EXISTING NATIONAL PARKS AND NATURAL RESERVES
IN KENYA

PREPARED BY
S. M. M. AND
M. J. M.
MARCH 1984

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various African District Councils established County Council Game Reserves and County Council Conservation Areas. The Administration and Management of these areas were mainly by the County Councils. Game Department also took the responsibility for Wildlife in these reserves. Controlled areas were areas of high wildlife potential lying outside parks and reserves and where hunting was allowed on permit. Hunting is however, now prohibited in Kenya by law.

2:2:3 THE INDEPENDENCE PERIOD

By independence time in 1963, there were 4 National Parks and 6 Game Reserves in Kenya. At the present, National Parks, Game Reserves and Sanctuary cover an area of more than 36,000 square kilometres out of the country's total area of 596,252 square kilometres. There are about 15 National Parks, 13 National Reserves, five Game Reserves and 1 National Sanctuary. Map No. 5 shows their spatial distribution and location in the country while Appendix D lists them with hactarage coverage.

a) GOVERNMENT POLICY REGARDING NATIONAL PARKS

The Kenya government policy regarding National Parks and Game Reserves is clearly specified in the past legislation, the sessional Paper No. 3 of 1976

as well as the National Development Plans. The policy has been changing ever in response to changing cultural, social, economic, ecological and political aspects. For that matter, different documents regarding National Parks and Game Reserves policies correspond to the prevailing situations when they were prepared. For instance, early policies were aimed at merely wildlife preservations. Later, wildlife was to be preserved for tourists attraction. Much later, it was conservation for education and benefits for future generations. At the present, situation dictates that wildlife must pay itself if it has to be conserved. These changes in policies are quite clear particularly in the National Development Plans. As such, we have presented the documents regarding policies of National Parks here sequentially to show the changes.

Early legislation for protection and controlled hunting of wild animals in East Africa then was enacted as early as 1898. These regulations also described the boundaries of Game Reserves - established for wild animals protection. These regulations later proved less protective. As a result, a task force known as Game Policy Committee was appointed in 1938

to make recommendations to the government on the selection and establishment of a system of National Parks in Kenya. In 1945, the report came up and was accepted by Ordinance No. 9 of 1945, and authority was established for a Board of Trustees to administer areas of land designated as National Parks and Reserves for the preservation of wild fauna. This was cited as the National Park Ordinance by which Nairobi National Park was established. This Ordinance later changed title to "Royal National Parks of Kenya" and much later to "National Parks of Kenya Act, Chapter 377 of the laws of Kenya through L.N. 2 of 1964. This was immediately after independence. Following this are the government policies concerning National Parks as stated in National Development Plan.

i) THE FIRST NATIONAL DEVELOPMENT PLAN (1964-1970)⁹

In this plan, the main policy was to maintain Kenya's wildlife as a basis for the tourist industry. There was to be a continuation of the general policy pursued since 1945 for the protection of game and exploitation of its tourists value. The government was to protect wildlife from poaching, maintain controlled game areas and issue hunting licences for the parks and reserves. Education to all Kenyans with

respect to the importance of tourism and the necessity of maintaining wildlife was to be encouraged.

Inconnection to this, a Zoological Park and research centre was to be established on the land adjacent to the main gate of Nairobi National Park.

The policy stated in this plan with regard to National Park did not take into account aspects in the areas surrounding the park. The local inhabitants were not included in any programme of the parks. The emphasis was only on the preservation of wildlife for foreign tourists' attraction. The public was to be informed about wildlife maintenance for tourism not as an important land use for their own benefit. This instilled in people the view that parks are for foreign tourists. The importance of a park was evaluated in terms of the number of visitors it attracted. However, the necessity for dispersal areas was realized particularly with regard to Nairobi National Park. Page 216 of this plan states with reference to Nairobi Park that: "Because of its location, this park is an invaluable asset, attracting 120,000 visitors annually. Its present area is 44 square miles. The Kenya Meat Commission is willing to exchange with the Trustees approximately 7,000 -

acres of cattle holding ground adjoining the park's south-eastern corner on condition that an equivalent acreage would be purchased by the National Parks Trustees and given to the Kenya Meat Commission in exchange. Purchase of this land is essential for the Park's Development."

ii) THE SECOND NATIONAL DEVELOPMENT PLAN (1970-74)¹⁰

In this plan, apart from the programmes mentioned in the first Development Plan, the following were added:

- to see that parks become as nearly as possible self-contained ecological units and to manage these units so that unnatural disturbance to the ecological systems is minimized.

- that parks must be developed and managed in away which conforms to the tourist development programmes by providing sufficient sites for accommodation in or, especially near the parks, by providing access to the natural wonders and wildlife of the parks by building viewing stands and by providing guiding and interpretive services that will enhance the visitor's experience.

- that activities of the parks authority to include organized poaching patrols, establishing firebreaks and construction of ditches and game proof fences.

- to assume the management of all County Council Game reserves by the end of this Plan Period, 1973.

In this plan, more awareness of the relationships between the park and its ecosystem was being expressed. The need for a research station to provide a sufficient information for the formulation of a sound management policy for entire park system was sought. For Nairobi National Park, it was stated that there was a Plan to acquire a large tract of land south of it. This land was needed to safeguard the animals herds of the park and to provide sites for a tourist lodge and other developments. It was not stated how this was going to happen. Who was going to acquire it. Everything was still vague. This proposal also failed.

iii) THE THIRD DEVELOPMENT (1974-78)¹¹

During this plan period, the human population and their aspirations had increased tremendously.

There was the problem of people versus wildlife land conflicts. As a result, the overall government objective regarding wildlife was, to see that wherever conflict exists in the form of "people versus animals", land was used in those ways that would yield the greatest benefits and that those benefits are equitably distributed among competing groups. A Land Use Committee was given the duty to define the criteria for land use, to arbitrate disputes and ensure that the best uses are in fact employed." There was the introduction of a wildlife conservation and management service to merge the responsibilities of the Game Department and Kenya National Parks through a bill in the National Assembly. A wildlife Fund was established by Trustees, to solicit and receive donations for approved projects.

There was a general shift emphasis from preservation of wildlife to its rational exploitation by ranchers. But most importantly, the need for dispersal areas was stressed. It was stated in the plan that: "Most Parks and Reserves depend critically upon the continued survival of wildlife in dispersal areas outside their boundaries (pp. 398). That Mara Wildlife disperses in the wet season into an area of

over 4,000 square kilometres. Nairobi National Park animals move to 1,850 sq. km." It was stated that people living in these areas therefore must be compensated. There was the provision of a compensation system under the Wildlife Conservation and Management Act No.1 of 1976. This plan started the protection of public interests through compensation guidelines and the resolutions of land use conflicts by the land use committee. The government came up with the guidelines for future wildlife policy in Kenya. According to the sessional Paper No.3 of 1975, "Statement on Future Wildlife Management Policy in Kenya", the government's fundamental goal with respect to wildlife is to optimize the returns from its resource taking account of returns from other forms of land use".

iv) THE FOURTH DEVELOPMENT PLAN (1979 - 1983)¹²

The emphasis in this plan is on maximising net returns from wildlife subject to social, cultural and environmental constraints. The stress is on the establishment of the wildlife and tourism infrastructure within and around the parks and reserves. These services should serve not only tourists but also the local population in these areas adjacent to the park. It suggested establishment of hunting quota after

banning hunting and trophy sales in 1977 and 1978 respectively.

This plan presents an awareness of difficulties of conserving wildlife given the land pressure and high population increases. It indicates that benefits from wildlife should not be for tourists alone but also to the local population in adjacent areas.

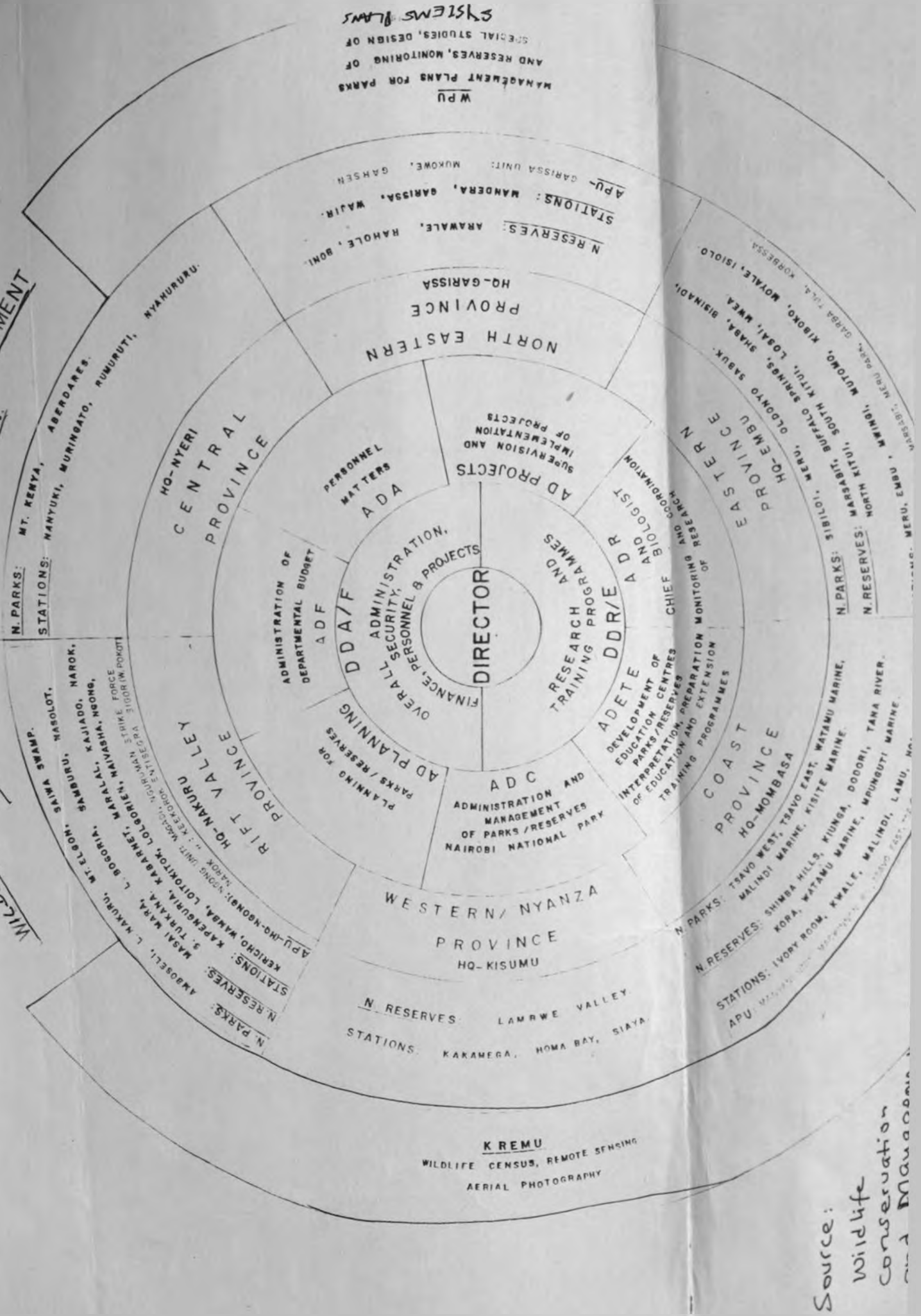
b) INSTITUTIONS RESPONSIBLE FOR NATIONAL PARKS AND RESERVES MANAGEMENT PLANS

At National level, the Ministry of Tourism and Wildlife is the one concerned with the management and planning of National Parks and Reserves as means of wildlife conservation and management. The department concerned is wildlife conservation and management.

(i) WILDLIFE CONSERVATION AND MANAGEMENT DEPARTMENT:

This department came into operation on 13th February, 1976. The objective of the department is to conserve and manage wildlife for the benefit of Kenya and the whole world. Its policies and functions are spelt out in the wildlife conservation and management Act, 1976. Figure (1) shows the functional

WILDLIFE CONSERVATION AND MANAGEMENT DEPARTMENT
STRUCTURE AND FUNCTIONS CHART



WPU
 MANAGEMENT PLANS FOR PARKS AND RESERVES, MONITORING OF SPECIAL STUDIES, DESIGN OF SYSTEMS PLANS

KREMU
 WILDLIFE CENSUS, REMOTE SENSING
 AERIAL PHOTOGRAPHY

Source:
 Wildlife Conservation
 and Management

structural organization of the department to ensure its responsibilities.

(ii) WILDLIFE PLANNING UNIT:

With the establishment of a Rangeland Ecological Monitoring Unit (KREMU) and with pressure on Existing Parks and Reserves from a rapidly growing human population, it became clear to the Kenyan government that a planning unit was required to undertake all planning in tourism and wildlife. As a result, Wildlife Planning Unit was established within the Ministry of Tourism and Wildlife in July 1979, as a co-operate venture between the Canadian and the Kenya governments. Under an agreement, 2,750,000' and a multi-disciplinary team of 6 planners were provided by the Canadian government for 5 years (1979-1983).

The Specific Objectives of the Wildlife Planning Unit include the following:

- (i) Completion of a reporting system that examines and organizes data gathered from research organizations: this data will be used to allow Wildlife Planning Unit to assist in negotiating agreements with County Councils and Landowners,

to form the basis for formulation of management strategies and decision making;

- (2) to help set financial, ecological, economic and tourism objectives for each of Kenya's Parks and Reserves.
- 3) to prepare management plans for all parks and reserves;
- 4) identification of Wildlife Planning Unit priorities for the Wildlife and Trustees to assist in their development of proposals for financial support of wildlife and tourism projects;
- 5) to train Kenyan professional and technical staff to fill the key Wildlife Planning Unit positions.

Since its establishment in 1979, the Unit has prepared management plans for the Amboseli National Park, and is working on Masai Mara Reserve, Malindi/Watamu Marine National Reserve and Lake Bogoria National Reserve. The aim of introducing a park management plan system is based on the view that:

"In the world over, the field of management of protected areas is changing and maturing. Approaches to park management should be a formalized, systematic and professional. Park Management Plan is therefore defined as the skillful usage of human and natural resources of an area including the functions of planning, administration, protection and maintenance to provide for sustained benefits to the users of the park. Management Plan is a document which guides and controls the management of the resources and users of a park or reserve and directs the design of subsequent programmes of management and development. The plan should define the type, character and locale of developments.¹³

In addition to management planning of parks, the unit prepares a system plan for the parks and reserves. The system plan is based on the view that: "The parks and reserves of Kenya were chosen because of their intrinsic and individual values in wildlife, vegetation, scenic, and tourism resources. The sites represented what was still essentially an undisturbed area or a site for which no other use was forecast. No long-range planning strategy or deliberate attempt to analyze an "ideal" protected area system guided the evolution of most park systems. With increasing competition

for land, and as the profession of park and resource planning matures; it is now necessary to alter what heretofore has been an ad hoc piecemeal approach. This involves planning on a more comprehensive and systematic basis where all parks and reserves can be evaluated from a national perspective. We therefore, must analyse and design comprehensive protected area systems as part of growing concern for the environment and more orderly allocation of wildland resources".¹⁴

A park systems plan can be defined as a document which provides a comprehensive national assessment of the objectives, rationale, and future direction for the evolving network of protected areas in a country. It provides means to ensure that national conservation objectives of the park system can be achieved across the entire country. Figure 2 shows variables that have to be considered when preparing a system plan. To ensure these plans, the Wildlife Planning Unit has the following departments (figure 3).

In addition to the above mentioned government based organisations, there are several other government institution responsible for wildlife and park systems. The Kenya Rangeland Ecological Monitoring Unit make recommendations and harmonize the use of rangeland

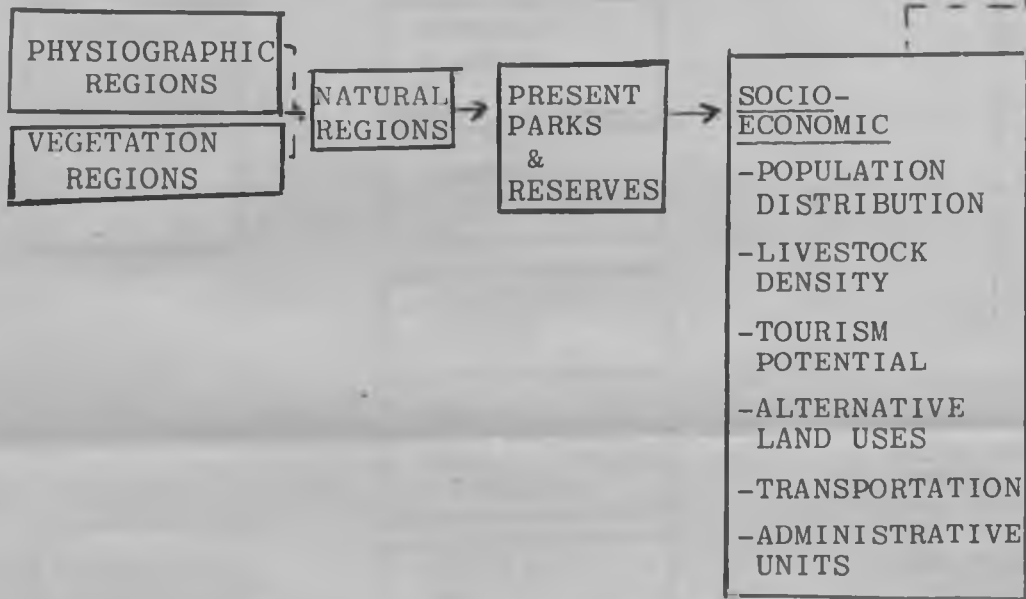
between Livestock and Wildlife. The Ministry of Agriculture (Wildlife Diseases Section Kabete) also analyses the livestock and wildlife diseases.

There are other non-governmental institutions which contribute to the conservation of wildlife. The East African Wildlife Society has contributed to the establishment of parks and reserves. It finances projects in National Parks and provide links with other international organizations. It provides also educational facilities of wildlife conservation, mobilize wildlife conservation awareness through publications and establishments of wildlife clubs.

A part from these bodies, a great deal of positive developments in wildlife conservation in Kenya has been to a large extent due to international assistance and direct or indirect pressures. The World Wildlife Fund provide donations for approved projects. The Food Agricultural Organization (FAO), the International Union of Conservation of Natural Resources (IUCN), the Africa Wildlife Leadership Foundation and many other numerous donors, financial assistance, provision of experts for various wildlife projects in Kenya come as foreign aid. The remarkable foreign aid

Figure 2:

SYSTEM PLAN
FLOW DIAGRAM



+ RE: = Rare and Endangered.

Source: Wildlife Planning Unit, 22nd September, 1981.

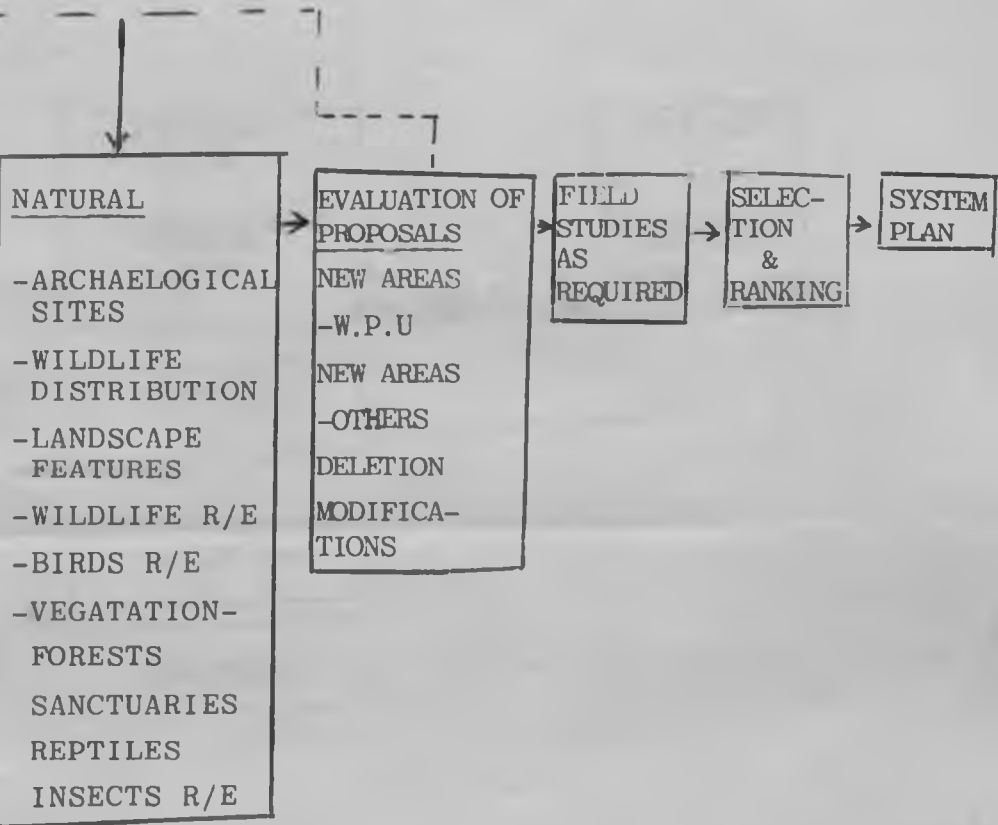
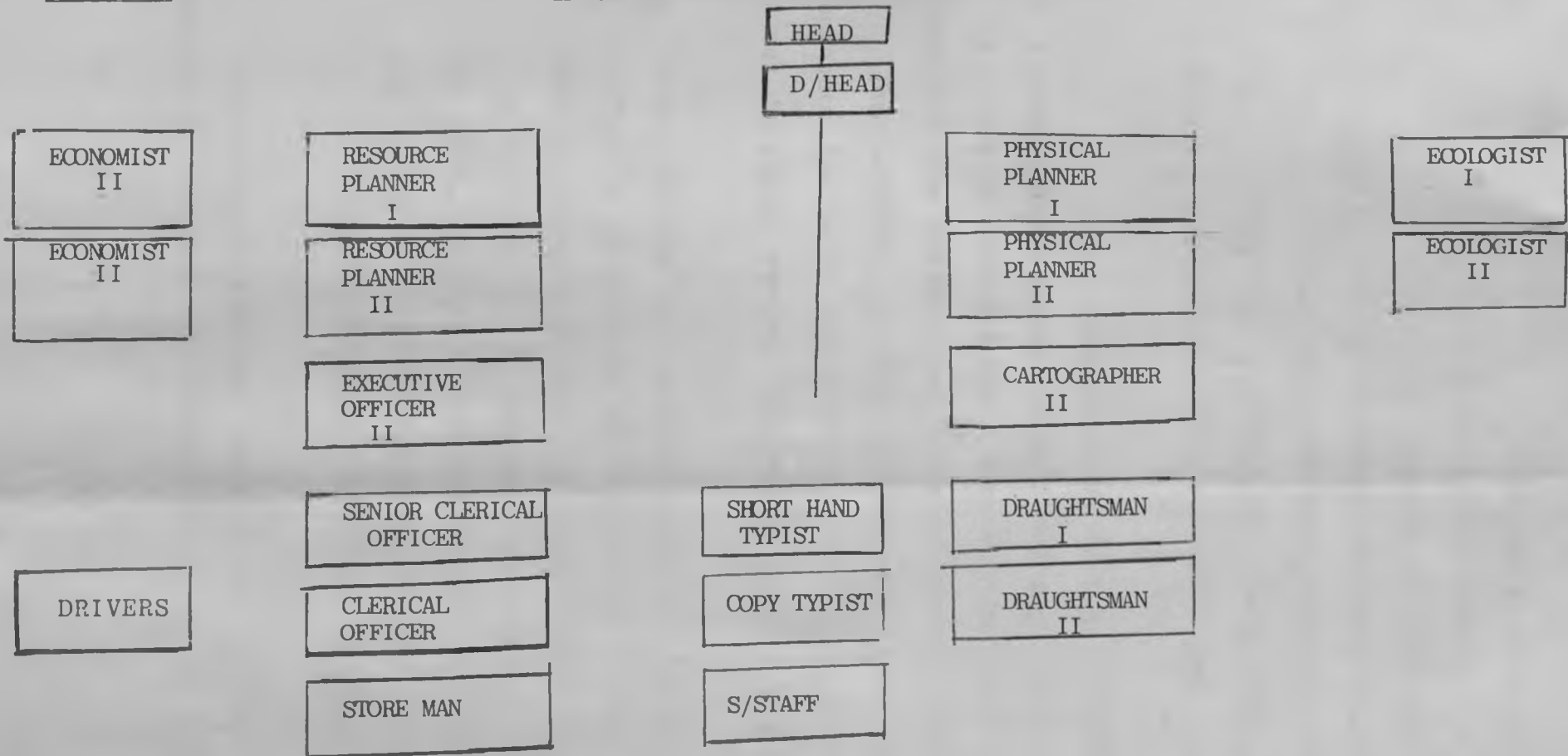


Figure 3:

FUNCTIONAL STRUCTURE OF W.P.U



Source: Wildlife Planning Unit 1980.

contribution is now the Canadian International Development Agency (CIDA) - the Wildlife Planning Unit Project.

c) MANAGEMENT OF NAIROBI NATIONAL PARK:

After considering institutions responsible for management and administration of National Parks and Reserves in the whole country, it is important to consider, specifically the case of Nairobi National Park. This will show how the management is largely concerned with internal aspects than external ones.

Like all other parks and reserves in Kenya, the management of Nairobi National Park is mainly concerned with the administration of the park's business and maintenance of the physical developments and equipments for tourists' utilization. The function of the administration of the park is around the personnel, finance and all park installations.

The park's administrative building is located at the Main Gate. Incidentally, the Wildlife Conservation and Management Department (Headquarters), the Animal Orphanage, Education Centre, and some staff quarters are located at the main entrance. Plate No. 1 Shows the main entrance and the administrative building of the park.



Plate 1. Administrative building at the Main Gate of Nairobi National Park.

To carry out the administration of the park, the personnel is organized as shown in Figure 4

They are:

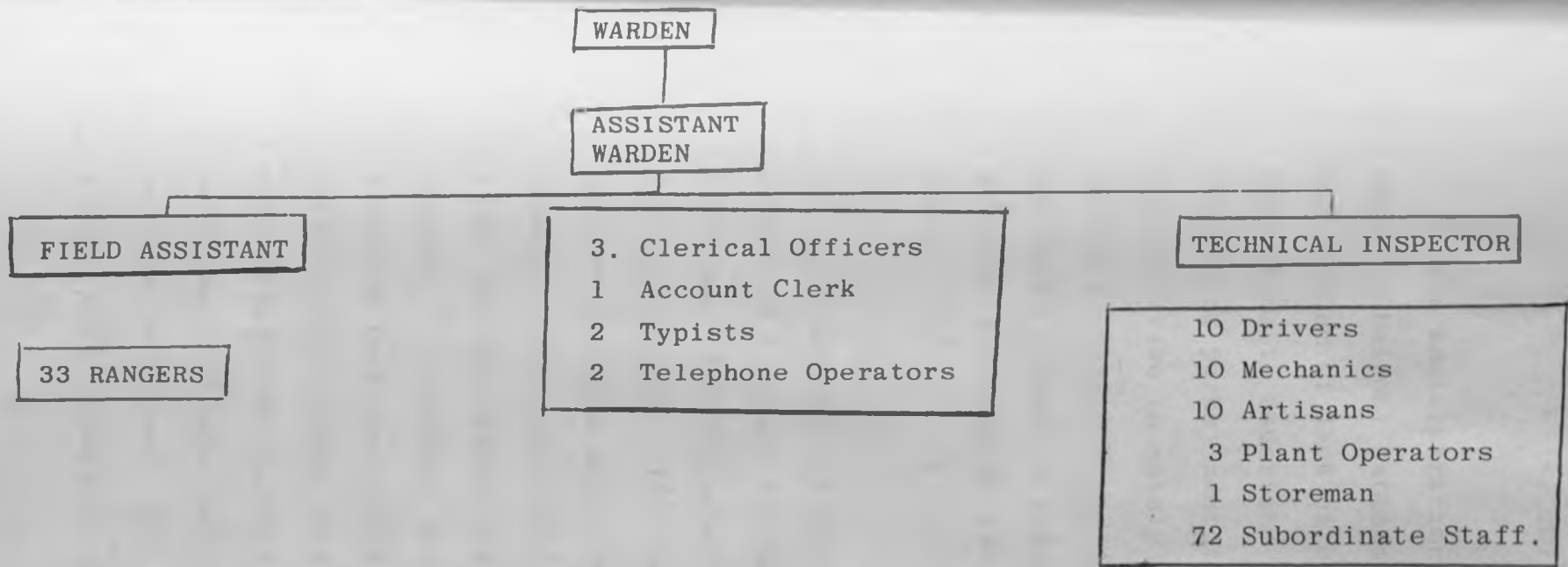
i) Warden:

The warden is the Director of the Park. He is responsible for the integration, co-ordination and stimulation of the activities regarding the administration of the park. He ensures the security of wildlife in the park through intensive patrols and anti-poaching campaigns. He maintains order and discipline in the entire unit. He maintains the

good public relations and finances of the park. The Warden is assisted by two people - one field assistant.

ii) Rangers:

Rangers are concerned with policing the park and park visitors. They collect gate fees from park visitors and tip visitors of where to see certain animals of interests to visitors. They also police on the off-road driving by visitors inside the park. Off-road driving normally occurs when visitors want to take a closer watch at certain species particularly the cats such as Lions, Cheetahs and Leopards. This off-road driving results in destroying the vegetation and degrades the landscape. The park administration therefore tries to over-come the problem by installing warning posts and the rangers to keep on check. The other group of park's rangers are concerned with repairs and maintenance of park's facilities and equipments such as roads, fences and vehicles. The rangers also keep a watch on poachers and livestock grazing encroachment inside the park. In some cases the rangers assist in organizing the wild animals inside the park as a process of management. This is rare and only happens after research by the wildlife conservation and management.



Source: Park Wardens Office.

The administration organisation and functional chart of Nairobi National Park shows very clearly the problem of lack of expert in our conserved ecosystems to undertake researches. It also shows the concern of parks' administration is largely internal. The objective is mainly to maintain and police the wildlife, visitors and facilities for visitors inside the park. There is very little concern with the problems that may be facing the park from the adjacent areas.

In summary, this section of the chapter has attempted to trace the development of National Parks in Kenya. We have observed that before the coming of the Europeans, the concept of National Parks was unknown in Kenya and other East African Countries. However, the history between man and wildlife was known through trades and other uses such as food and clothes. Throughout the pre-colonial period the existing land uses could not threaten wildlife. Threats on wildlife started with the European settlement. This necessitated the beginning of wildlife preservation which matured into establishments of National Parks and Game Reserves. The first reserves in Kenya came around 1902. However, the first National Park -

Nairobi National Park was established in 1946. This park was established in conformity with the definition of the 1933 which was based on the views that were considered during the establishment of Yellowstone National Park in 1872. Since the establishment of Nairobi National Park, several others have been established in the country.

We have also observed, that the policy regarding the management of National Parks was largely protective. Later it was conservation of wildlife. At the moment through the National Development Plans, particularly those after 1976, the policy has stressed on the exploitation of consumptive use of wildlife. It has stressed on the need of cropping and ranching game for their proteins. However, the policies do not stress on the management of the parks inco-ordination with the adjacent areas. Hence, the institutions concerned with the management of National Parks have tended to deal mostly with the internal management issues of the park. The case of the management of Nairobi was looked into as an example.

2.3 PRESSURE ON NATIONAL PARKS AND RESERVES:

The survival of National Parks, nature reserves and the wildlife in them depends largely on the pressures arising from the needs and demands of the local population around them. "In Africa, there is an ever-increasing pressure on land near the borders of all African Parks. In East Africa, many of the problems facing the parks now originate from outside them. And most parks in East Africa, can now be considered "Ecological islands," subject to direct or indirect modifications by activities and conditions in the surrounding areas."¹⁵ In Kenya, a number of parks and reserves are already threatened. Already increasing population pressure on the north-western flank of the Tsavo National Park, with the growth of the subsistence agriculture and clearing for charcoal burning, have inhibited the eastern side. The free movement of wildlife between the park and the Chyulu Hills, and onto rangelands - which until recently unoccupied - lying to the north - east of the Chyulu Range, stretching from the foothills to the railwayline is now rapidly being curtailed by land use practices. This area now bustles with human activity, itself having obvious repercussions on wildlife and the park. In addition, a certain

increase in poaching and shooting in defence of crops has drastically reduced game populations around and in the park (Lusigi 1978).

A large part of Nakuru Lake forest situated in the southern part of the world famous Lake Nakuru National Park has already been lost to settlement. A super highway is earmarked to pass through the park. All these activities, a part from taking off large piece of land area will destroy the grassland habitat in the park.

The situation around the Masai Mara Game Reserves is equally threatened. There is the mushrooming settlements and agricultural encroachment on the land surrounding it. This threatens the remnants of the herds of wildebeeste, buffaloes and giraffes of this reserve.

The proposed irrigation schemes in Kimana area around Amboseli Park will have remarkable impact on wildlife and the park.

The case of Nairobi National Park is worst, there is the mushrooming urban settlements,

industrial development across the Athi River Plains. There is cultivation on the Ngong Hills and numerous infrastructural developments around the park. All these will very soon completely cut off the migration routes of the wild animals to and from the park. Already, a lot of conflicts between man, his livestock, and the wild animals is experienced in the area southward of the park.

These situations have caught up with virtually all parks and reserves in Kenya. While until fairly recently, there was relatively little pressure on the land surrounding the parks. This problem is bound to get worse.

However, the situation can still be averted by policies based on scientific findings. A number of government officers and experts that I discussed with during the field work maintained that the situation can be controlled. And with the formation of the Wildlife Planning Unit, these pressures can easily be checked. Through the system plans and integrated parks and reserves management plans, our parks and reserves can be maintained. Land Use Development Plans for the surrounding areas including controlled hunting areas,

game ranching areas, but excluding further intensive incompatible land uses to wildlife conservation can be prepared by the Wildlife Planning Units in conjunction with the District Development Committees.

It should be realized that pressures on National Parks started as early as the establishments of many parks. Even for Yellowstone - the first National Park to be established in the world, it should be noted that just after the centennial in 1973 a band of Oglala Sioux and other Indians seized and held the town called Wounded Knee South of Dakota for many months in a dramatic protests against treaty violations. They were asking among other things, that the lands that had been guaranteed to them by solemn treaties with the U.S.A. government, be in fact given back to them. Some of these lands are in the National Park (Lusigi 1978). All over the world, such threats have been experienced. Parks' lands are treated as wastes amongst important land uses. The proper management plans of National Parks therefore should aim at creating positive attitudes towards the park. Parks should be managed in an integrated manner with other land uses.

In brief it has been generally indicated that almost all National Parks and reserves in Kenya are being pressurized and threatened with encroachment by adjacent areas land use changes. This trend is expected to increase in the near future. Something therefore must be done to save the future of these very important land uses.

2.4 SUMMARY:

This chapter has attempted to review in general, the development of the idea and the concept of National Parks in selected parts of the world, namely, America, European countries, Japan and other Asian countries and Africa. The aim with this was to consider issues and prevailing situations when the National Parks in these countries were established. It was observed that parks of United States, Canada and Japan were established in large tracts of land on the premises of conserving, protecting and preserving the natural fauna and flora. The areas which were set aside were generally marginal lands. They were areas with relatively few human settlements and activities. In cases where people had occupied the lands they were removed either by force or by dubious treaties. So often those who were removed settled in areas just

around the parks. The parks' idea was perceived largely by a few people. The policing of the parks was done by the authority. This is comparable to the situation that prevailed when parks were established in African countries. But with the general human population increase, new developments have started in these areas of marginality. People are now moving to these areas which were considered marginal - where parks were established with ease. These changes are now causing threats to National Parks.

On the other hand, in countries such as Germany and most of the European countries, parks were established in already intensively used landscape. There was lack of large tracts of virgin land. Hence, National Parks of Yellowstone type are seldom. Because of differences in prevailing situations the management approach adopted was different. Attempts had been made in these countries to plan National Parks as other land uses.

In Kenya, we have observed that the concept came with the Europeans who adopted it from the Yellowstone type viewpoint. They were established in uneconomic areas. The policy adopted was

preservation oriented. With the changes in human population, threats are now being realized on all National Parks and Game Reserves in the country. In the case of Nairobi National Park it is observed that being within a metropolitan area, it is now being cut-off from the only dispersal areas on the south. The trend is expected to increase in the near future given the rapidly increasing human population.

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CHAPTER THREE

NAIROBI NATIONAL PARK AND ITS SURROUNDINGS:

3.0 INTRODUCTION:

It is the purpose of this chapter to provide an overview of the natural resources of the study area, and to evaluate them for the understanding of land use changes, impacts of land use changes and possible alternative land use systems. The first section examines the historical factors that illustrates the interrelationships between the park, the Athi-Kaputei Plains (Kitengela area) and Ngong Hills areas. The second section examines the Nairobi National Park Ecosystem. The remaining sections are on biophysical or natural resources of the park ecosystem.

3.1 HISTORY OF THE AREA:

To understand the present situation, evaluation of the past must be undertaken. For identification and, analysis of changes in land use, their impacts and possible alternative solutions, understanding the past condition is a pre-requisite.

Nairobi ecosystem has along history of animal and human use. Before the arrival of the Uganda-Kenya

railway line in 1895, at the present site of Nairobi City, it was a wild country. The land was used mainly by the roaming wildlife and the nomadic Masai pastoralists. The Masaais used the area largely during the draught period for watering their livestock, possibly, in Mbagathi and Nairobi rivers. They called the site "enkare Nairobi" meaning the place of cold water which the Masaai used as a "watering place". There were no permanent human settlements. However, the Masaais seasonally, constructed their nomadic Mannyattas. The livestock grazing was also seasonal²¹⁴ only during the dry periods. The Nairobi area, particularly, the present site of the park acted as a watering point during draughts for the wildlife too. Game herds from the Ngong-hills and Athi-Kapiti Plains flocked here during dry weather. Buffalos, for instance, occasionally, came down from the Ngong hills to visit the site of the park. The park which is part of the Athi-Kapiti Plains and, Ngong Hills acted as one ecosystem. The wild cats such as Lions, Leopards and Cheetahs occasionally went to Ngong-hills and back to the present site of the park. The plain animals such as Impalas, Kongoni, Wildebeests, Zebras, and Eland could roam all the way to Amboseli but eventually come back to the present site of the

Nairobi National Park particularly during the droughts.

The Nairobi National Park site was even part of the 27,700 km² southern reserve created in 1900 by the government of the then British East Africa for wildlife conservation in Kenya. This included not only all of what are now Narok and Kajiado Districts, but also Nairobi and Kiambu. Within it lay also the present Amboseli National Park. "Although nominally a Game Reserve, due to its large size, it could not be effectively policed and hunting and poaching was still practiced."¹ Close to Nairobi, the European settlers and visitors openly shot game of the Athi Plains. At about the same time, around 1900, some Somali families were allowed to settle with their livestock within the Nairobi commonage as a reward for their services in various military campaigns. The commonage which the park was part of, was also used during both world wars for military purposes. During first world war, a camp and firing range were established and the routes to the front went through the present park site. During the second world war troops were again encamped in the park and part of it was used as a bombing range. Peace brought many demands for the commonage to be used for a variety

of purposes including native settlements, cattle holding ground, but the recommendation of the game committee prevailed.² Somali cattle were removed, roads constructed and dams and salt licks installed to attract game in the park.³ It was then proclaimed a park in December 1946; although cap 215 of 1948 (Laws of Kenya) suggests its status was not legalized until 1948. Three years after the inception of Nairobi National Park the Ngong National Reserve was gazetted in September 1949. It covered an area of 512 km² of Kajiado and included the Kitengela area contiguous to Nairobi Park's Southern boundary, westwards to the Ngong-Hills. This area was felt to be of primary importance as a game reservoir and migrational area for the animals of Nairobi National Park. The Director of the Royal National Parks of Kenya, Col. M.H. Cowie, considered that:

"the preservation of game in this area as an absolutely essential factor for the future security of Nairobi National Park" (Anon 1951).⁵

This reserve was part of the Masai land and parts of it were being farmed by the Kikuyu. Increasing concern was expressed over this Reserve as early as 1952. It was predicted that the existence of Nairobi

National Park was threatened unless some better arrangement could be achieved in the adjoining Ngong National Reserve (i.e. cultivation should be stopped).⁶ However, by 1960, a lot of development had already started on Ngong-Hills area. The 1959 - 1960 report on the Nairobi Royal National Park reporter Lamented:

"I feel sure the day will come when future generations will express their regrets at the form of development which has occurred in the slopes of the Ngong Hills. Many years ago when I used to roam this area there were no resident cultivators, and game had freedom of movement up and down the slopes and across the plains (Kitengela area) below. There has now been very intensive cultivation in the Kikuyu style in a section of the Masaai Reserve. It is not surprising that the buffalo herds, which normally shelter in the thickets of the Ngong Hills, come down at night to steal some succulent maize or other planted crops."⁷

Nevertheless, at this stage of the development of the Ngong Hills (1960), a number of wild species could still be observed in the area. The then Assistant Warden Mr. Woodleys of Ngong Reserve could still count five different herds of buffalos numbering 67, 55, 35, 21 and 15. He could also see rhino, bushback, reedbuck, eland, waterbuck, lion and other species including colobus monkeys. Many years before, giant forest hogs could be seen on the hills, but by 1960, there was no evidence that these animals still survived.

The Athi Kapiti Plains (the Kitengela area) has until relatively recently been used solely by the Masaai as a grazing area for their cattle; sheep and goats. It was also declared a conservation area immediately the Nairobi National Park was established. Before this time, the plains had uncountable wild animal species. Thompson (1887), who traversed the region in middle of 1883, said of the area:

"A grand expanse of undulating country lay before us, the hollows knee-deep, in rich and succulent pastarage ---". "The open spaces were the haunts of large herds of buffalo, and the feeding ground for numerous elephants and rhinoceroses, while in the grassy reaches could be seen vast numbers of elands, hartebeasts, zebras and ostriches".⁸

Since that time and far after the establishment of the park, there has been no settled form of land use in the plains. But in the last 20 years, a more settled form of land use is now appearing in the better-watered areas, while the increasing human - and therefore domestic stock populations, already necessitate the search for alternative land uses. The area immediately south and east of the Ngong-hills has been extensively settled and is now virtually inaccessible to large wildlife species. This development has moved south east and has almost cut the Ngong Hills

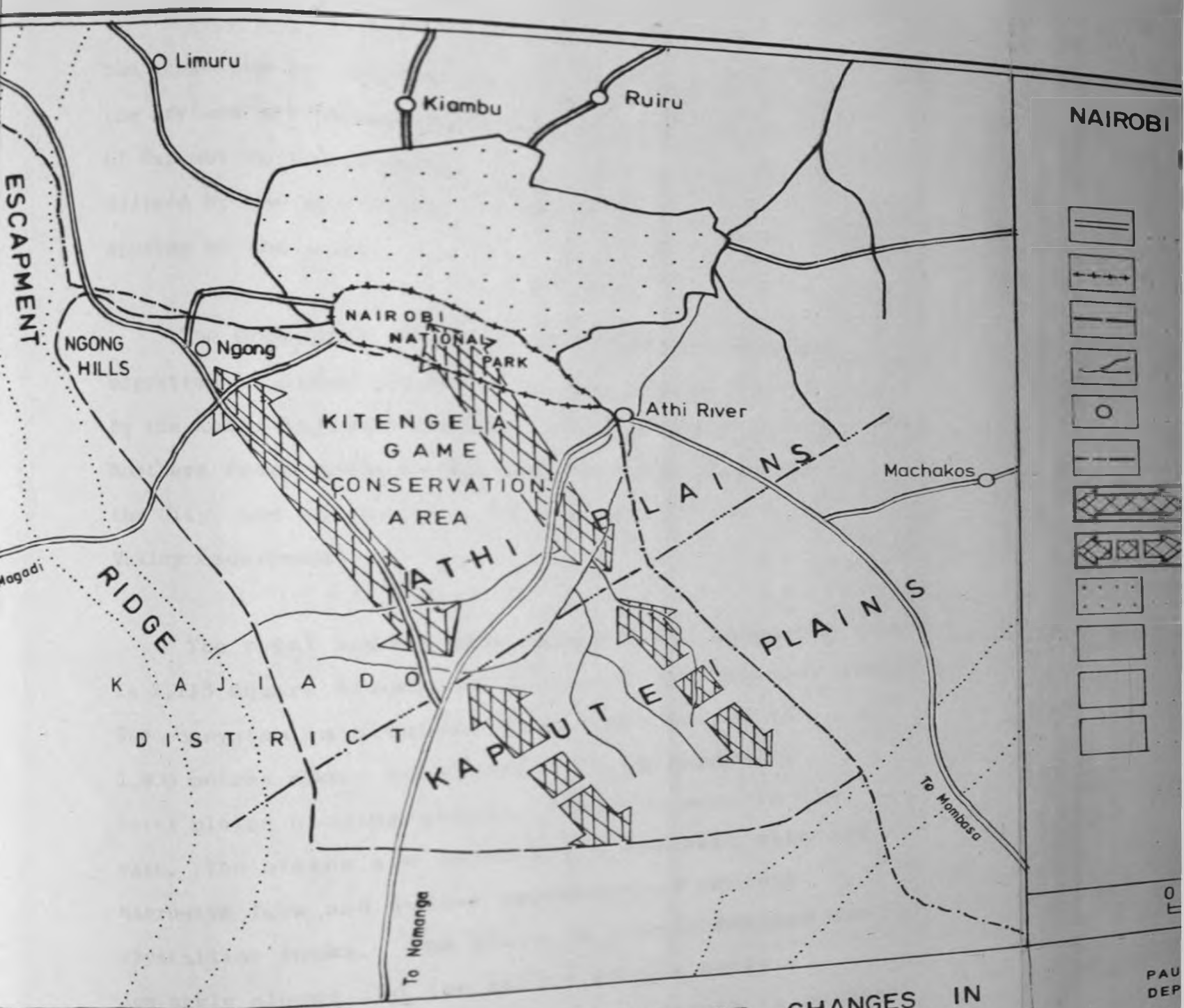
off from the plains as far as the movement of large herbivores is concerned. Large fenced ranches have developed. But as already seen the park cannot survive without the adjacent plains and Ngong Hills.

3.2 THE PARK ECOSYSTEM:

The administrative boundaries of the Park are based on political, cultural and economic considerations. Hence, administratively, the Nairobi National Park is within the Nairobi City Boundary and falls under Nairobi Provincial area. The Ngong Hills and Athi-Kipiti Plains fall under the Rift-Valley Province Kajiado district.

However, another definition based on biophysical criteria delimits Nairobi National Park's ecosystem boundaries differently. It is this boundary definition that is used in this study when explaining the resources—both natural and human of the study area.

These park ecosystem boundaries have been assessed in various reports of F.A.O. (1978), Peterson and Casebeer (1972), Lusigi (1978), Owaga (1975), Hillmann (1979) and Njoka (1979). Basically the



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the ecosystem is defined as the area encompassing the dry and wet season wildlife dispersal areas of Nairobi National Park. The ecosystem is thus defined by the migratory limits of the major wildlife species of the area.

The ecosystem boundary as defined by animal migration as given in Map 6 is bounded on the south by the Konza-Kajiado Railway, to the north by the Northern fence between Nairobi National Park and the City; and on the west by the rim of the Rift Valley escarpment.

The total approximate area of the Ecosystem thus is 2,115 square kilometre (Peterson and Casebeer 1972). The ecosystem is situated from 1,500 metres to 1,800 metres above sea-level. It is generally level plains sloping gently from the west to the east. The plains are essentially volcanic with old extrusive lava and lesser exposures of ancient crystalline rocks. The plain is poorly drained due to low angle slopes and the nature of the soils - predominantly black cotton type. Rainfall is between 500 mm. to 800 mm. annual averages. There are two rainy seasons with peaks occurring in April and November. The main vegetation is *Themeda triandra*

(Forsk) grassland with *Harpachune Schimperii* (Hochst) abundant on eroded hillsides and poorly drained "Black cotton" soils of the valleys. *Acacia drepanolobium* (Harms riverine strips (Hillmann 1979).

A basic limiting factor in the Ecosystem is the distribution of permanent water. There are two permanent water-courses - river Mbagathi and Athi. The swamps and dams, found in Nairobi Park also constitute the primary water sources in the ecosystem and are totally dependent on watershed management of Ngong Hills areas. Pools of water are also found scattered in the Kitengela Plains but mostly during the rainy periods. Also forms of wells and boreholes have been introduced in the area.

The reasons for and the stimulus for wildlife and livestock movement has been deemed to be related to water sources and nutritional factors. It is known that this is an arid area and the water sources are seasonal except in the park area - the Mbagathi river. It is also known that the protein level of grasses is higher in the dispersal areas (during the rainy periods) and in the park (during the dry period) (Njoka personal communication). All these

factors necessitate the definition of the ecosystem and the need to allow the free movement of wildlife and livestock in the ecosystem. Artificial creation of water supply may not change much.

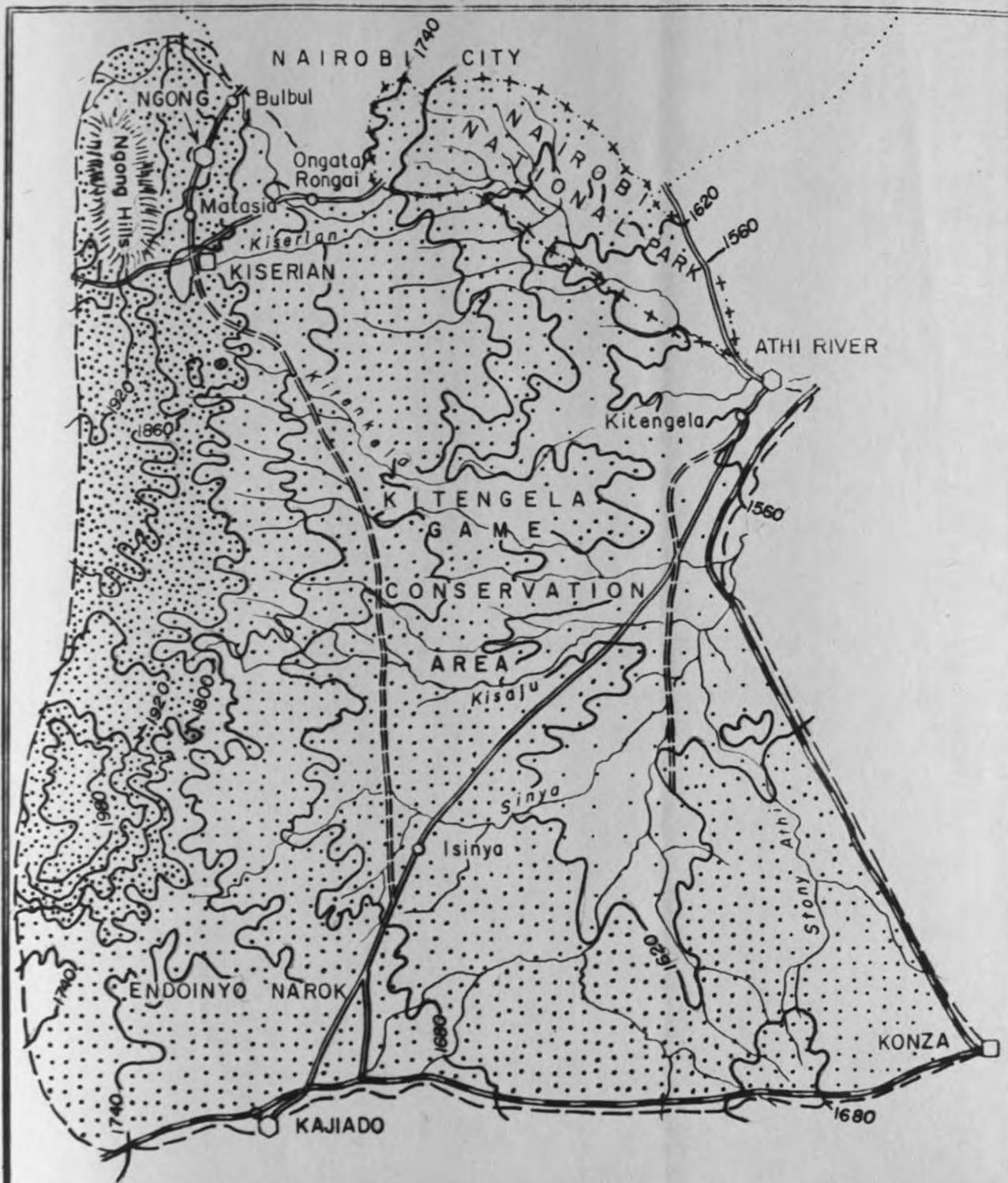
However, from a visitor's point of view it is noted that not all species emigrate from the park. Such species as rhino, ostriches and now giraffes, remain present in the park.

In summary, the park ecosystem includes the Nairobi National Park itself, the Ngong-hills and the Athi-Kapiti Plains (Kitengela area). The following details in this chapter therefore are examined with regard to this spatial definition of the ecosystem.

3.3 PHYSICAL ENVIRONMENT:

a) TOPOGRAPHY:

Much of the study area consists of gently undulating open grass plains sloping gently from the west to the east.⁹ It is topographically bounded by the top of the Rift Valley escarpment dropping 300 m. on the west. The south and east of the plains give way to different rock and soil types with some low hills, supporting a closed acacia and



TOPOGRAPHY

LEGEND

- [Symbol: Dotted pattern]
- [Symbol: Dashed line]
- [Symbol: Solid line]
- [Symbol: Wavy line]
- [Symbol: Circle]
- [Symbol: Square]
- [Symbol: Circle]
- [Symbol: Dashed line]
- [Symbol: Crosses]
- [Symbol: Square]
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IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

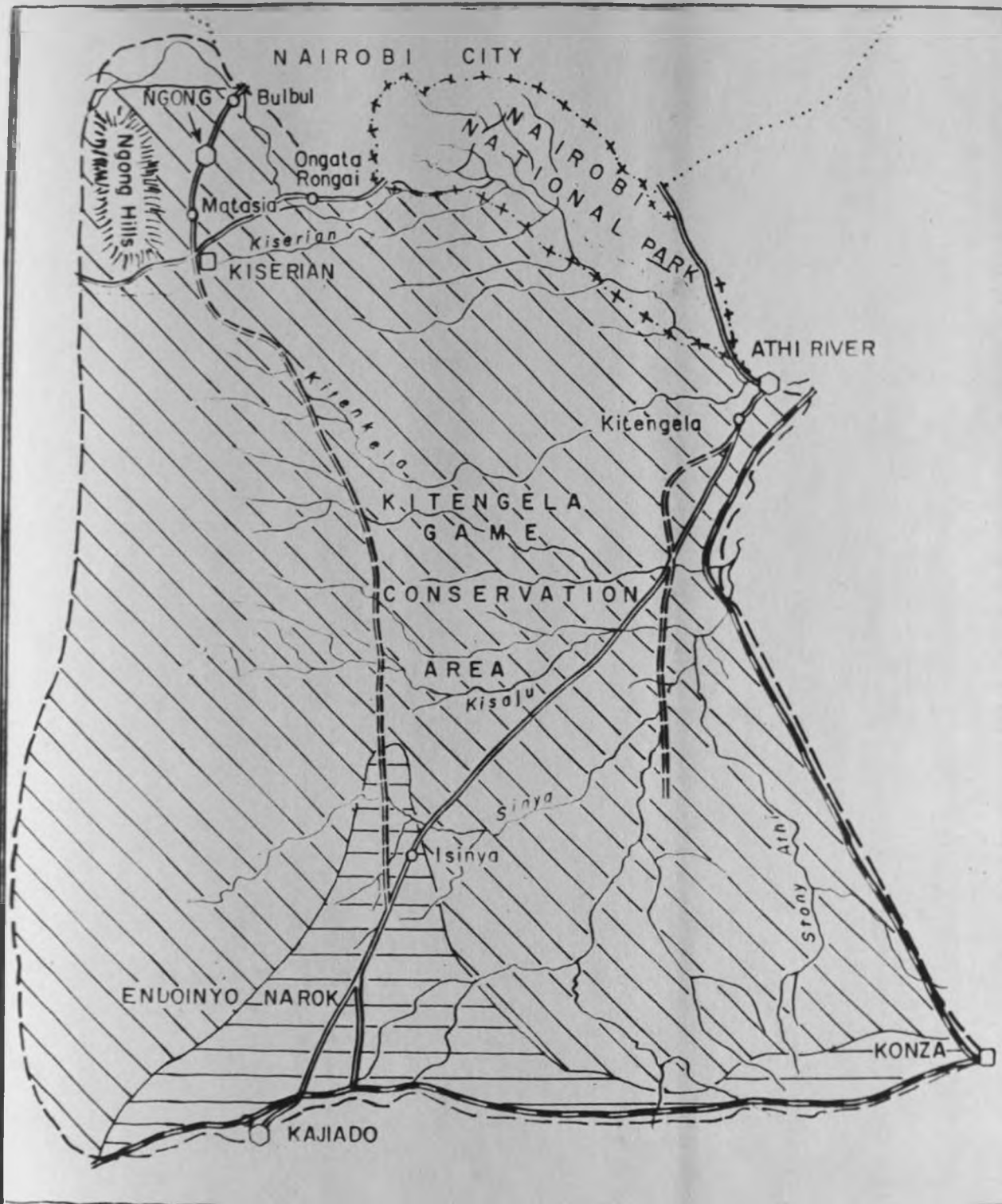
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commiphora bush vegetation. Generally, the whole area rises from 1,500 m. at Athi in the east to 1,900 m. in the west on the Rift edge, and to nearly 2,500 m. at the top of the Ngong Hills in the north-west corner of the area. This change in altitude occurs in a series of steps, each marked by an escarpment where an ash or lava flow stopped. Map No. 7 shows the topography of the study area.

b) GEOLOGY

The geology of the area has been described by Matheson (1964), Gregory (1921) and Saggerson (1959). It is considered that Lava flowed south eastwards from the edge of the Rift Valley over the Kaputei covering the basement system rock in the area.¹⁰ This formed what is now called the Kapiti Phonolite, and is generally about 15-30 m. (50-100 ft.), and occasionally 91 m. (300 ft.) thick. The Kapiti Plains in the east are slightly higher than the Athi Plains and are formed of these phonolites.

The Nairobi phonolite, which is a counterpart of the Kapiti Phonolite, underlies a large part of the Athi Plains attaining upto about 122 m. (390 ft.) in some areas. Here, soft tuffs were deposited on



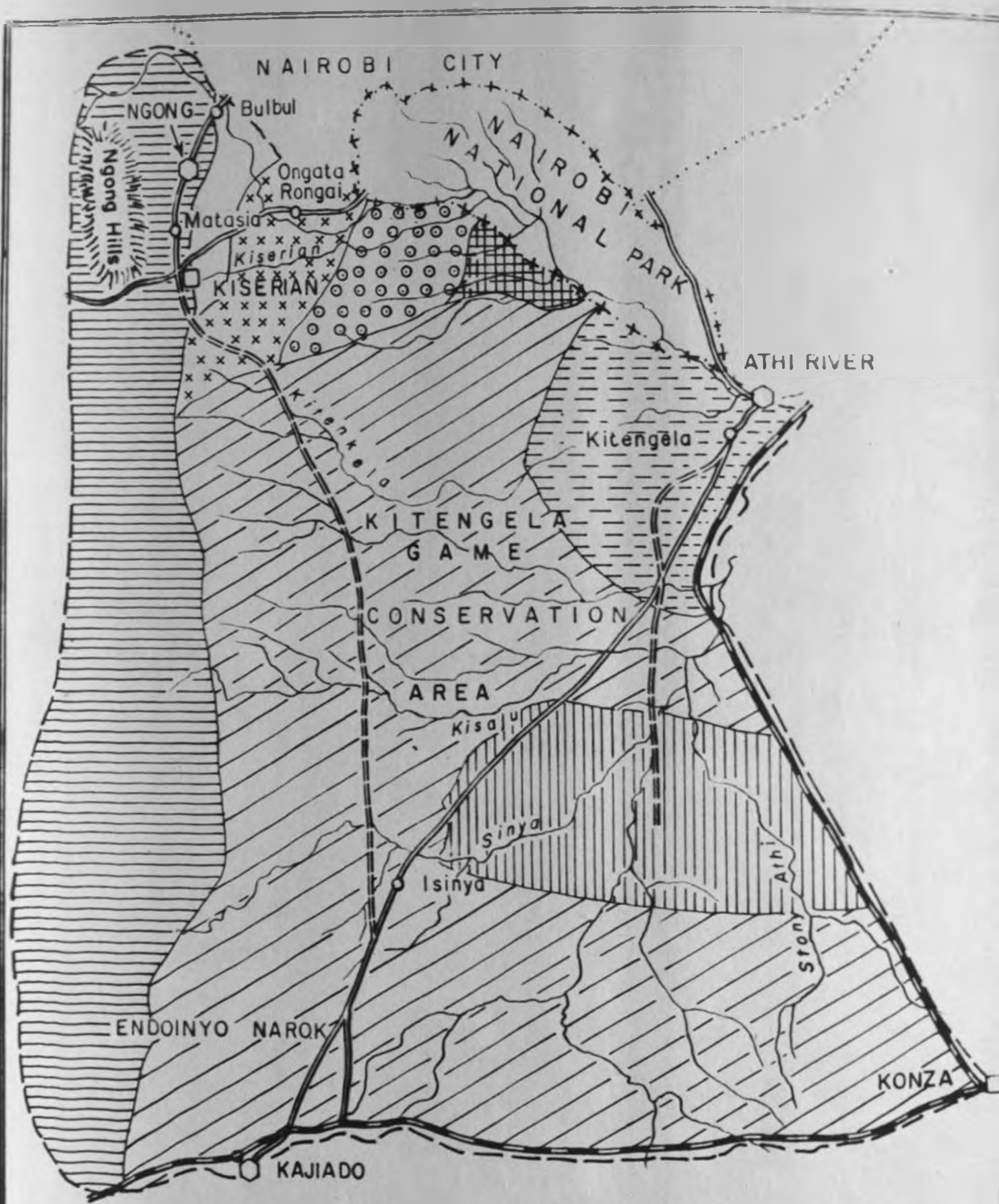
IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

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c). SOILS:

Soils types serves to illustrate the basis for vegetation and land uses in the area. Generally the soils of the study area form a catenary gradient governed by the parent rock.

The most recently exposed and closer to the parent rock are red friable clay soils found on the tops of the ridges and along exposed escarpments and drainage line edges. The red friable clays are moderately humic. They are not very deep and support dry forest. The shallow brown to yellow red friable clays can support scrub grass. The shallow stony soils with rock outcrops occur on the main valley sides, and are extremely steep. These soils are very shallow and occur mainly in the pockets on slight shelves and between boulders.

The poorly drained soils on the floors of the broad valleys are the black cotton soils. These are clay soils that become easily water-logged in the wet conditions and crack very deeply in the dry season. It occupies large part of the plains. The soils have all uniform depth of 3-4 metres. They carry a different species of grass in some areas that seem



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more palatable to the animals. During rainy season there is a tendency for animals to concentrate on these mounds to avoid their hooves getting clogged up with mud of the black clays.

Because of low and poorly distributed rainfall, the area is entirely devoted to ranching. The dominant soils are difficult to work. They are sticky during wet period and dry periods make them hard and massive and difficult to break. The rainfall is very low and unreliable in the area hence makes it uneconomical for other uses except for ranching and wildlife/tourism. Map No. 9 shows the different soil types of the area.

d) RAINFALL

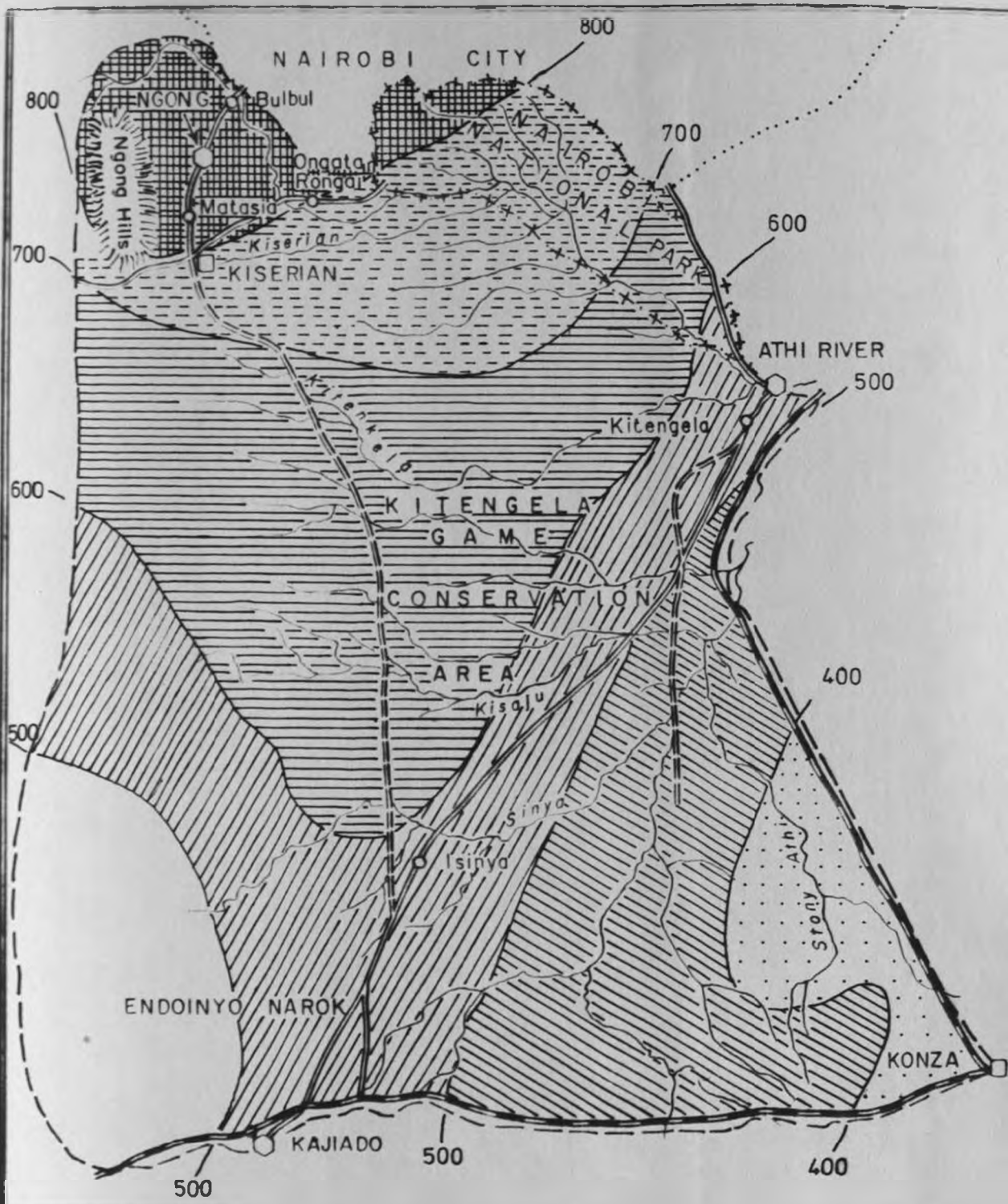
The study area as common to most semi-arid areas, is poorly served with rainfall. Hence, the climatic conditions are characterized by low annual rainfall that are irregular in both time and distribution. The annual means are only about 500 mm. Generally the pattern is two rainy seasons, and two dry seasons in a year. Long rains occur in March - May, sometimes continuing to June. These originate from the north easterly and south easterly winds. They are followed by a dry spell, then the short rains come in about

October - November from the north-easterly monsoon winds, after which another dry season sets in.

Norton Griffiths (1977)¹² investigating the climate of Kajiado found that there is a strong relationship between attitude and rainfall distribution. In the study area, high-rainfall areas are found around Ngong-hills-particularly in April and May. Ngong-hills areas receive a rainfall of about 800 millimetres per year. As Modha (1969) observed, the rainfall decreases in amount as one goes southwards, e.g. in 1967, Nairobi received 855 mm. Athi River 52 mm. and Kajiado received 485 mm. Rainfall distribution is largely influenced by altitude.

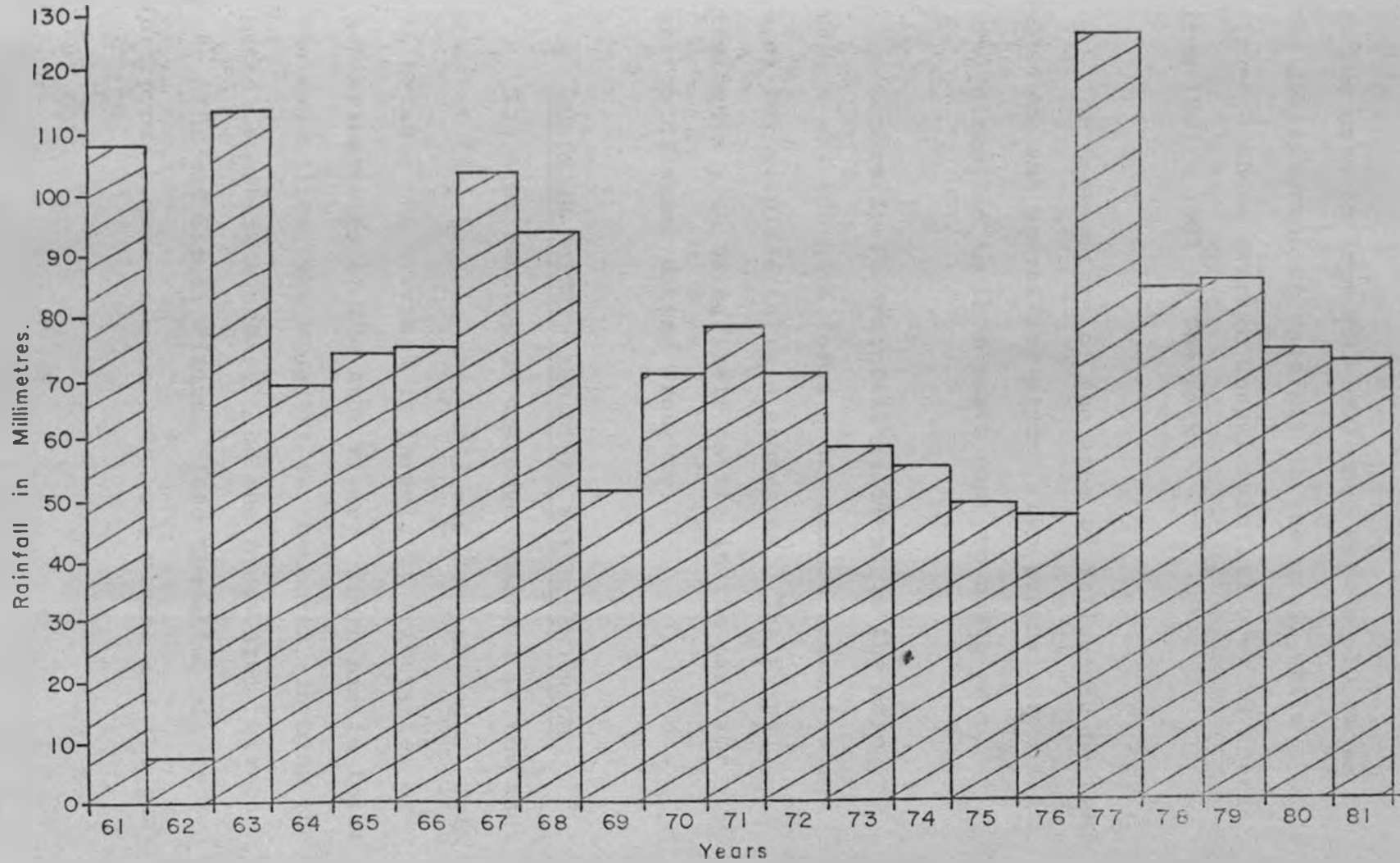
The rains however, do not always keep the same pattern. Long droughts, or outburst of rains at times other than the stated periods are quite frequent. In 1982, for example, long rains more or less failed. But in October and November same year, there was heavy rainfall in the whole area.

The rainfall in the park also varies with topography. The north and west receive highest amount of annual rainfall. The average rainfall recorded in



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

FIG. NO.5 AVERAGE ANNUAL RAINFALL IN THE PARK FOR 20 YEARS 1961—1981.



in the area is from 750-1000 mms. Map No. 10 shows the distribution of rainfall in the area, while figure 5 shows average annual rainfall over 20 years from 1961 - 1981 in the park.

The temperature of the area is influenced by the altitude and prevailing winds. The general prevailing wind direction is from south east to north west.

Generally the rainfall gradient is the main reason why the park forms a dry season concentration area for wildlife in this ecosystem. The Masaai residents also bring their cattle in the park for search of water during droughts.

3.4 DRAINAGE PATTERN AND OTHER WATER RESOURCES

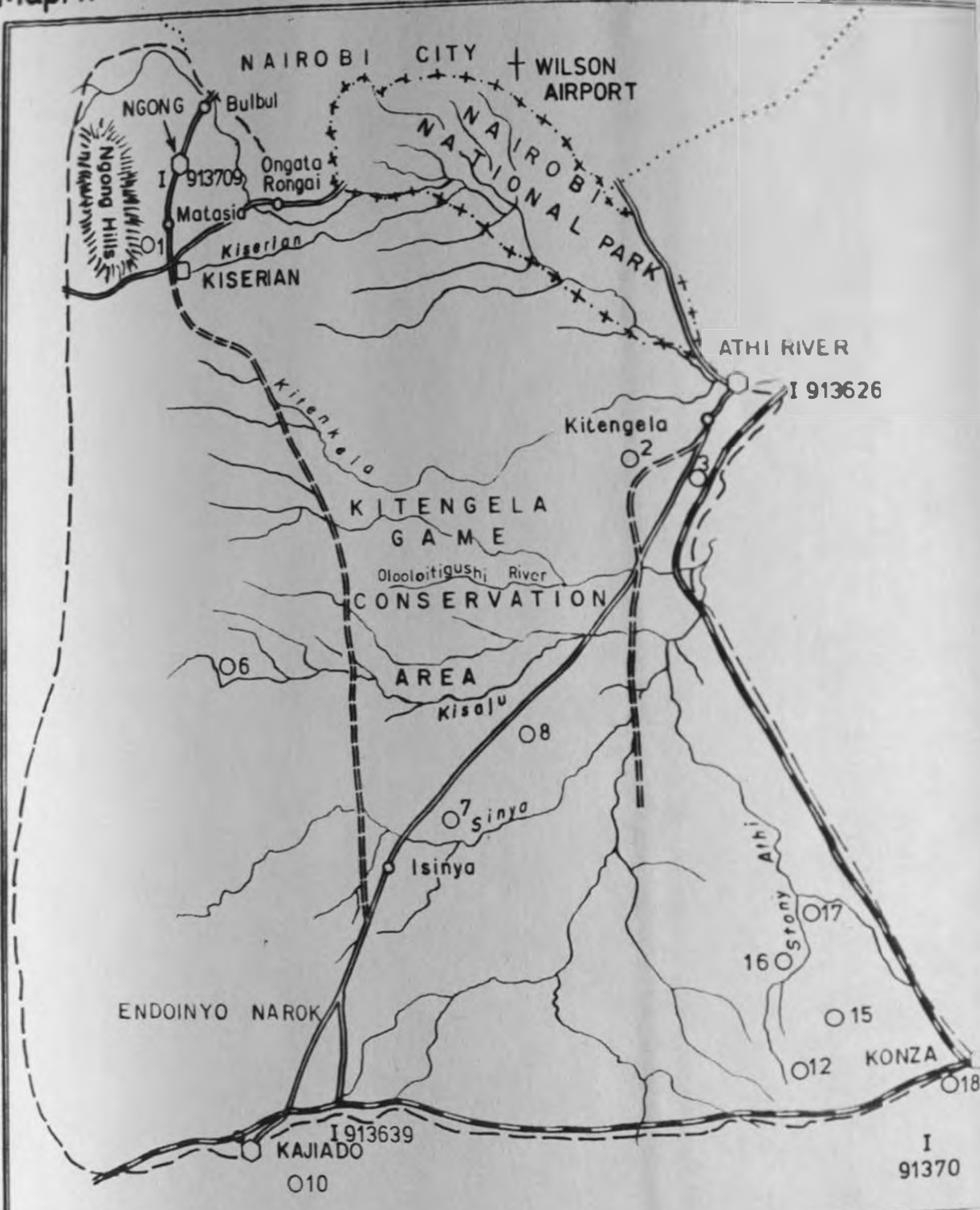
The area density of drainage channels is low and many of the channels are small and discontinuous. This is because the drainage is largely by tributaries or sub-tributaries of the Athi river. There are in total two main lines, the Mbagathi in the north, forming the parks' southern boundary, and the stony Athi between the Athi and Kapiti Plains. Into these two rivers drain other watercourses from both plains and the park.

The main sub-tributaries are Senya and Kisaju in the south. These streams drain into stony Athi river. In the south east of the study area are the Kitengela and Kiserian that drain the Central and northern parts of the area.

The streams are often tree lines and meandering. Where they cross the escarpments and erode back the edge, they form deep rocky gorges that often contain perennial pools of water that can be used by wildlife. Upstream they are merely shallow drainage channels in the black cotton soils, with occasional large trees. The perennial pools act as dry weather water sources for wildlife and livestock.

However, the streams are normally dry during the dry period. This means that the animals in the area must have alternative supplies of water during such times. Hence, they have to move to other areas during these periods. Land uses must allow for this movement. This is one of the reasons for the frequent seasonal local migrations among water dependent wild animals which have to keep moving closer to the more permanent water sources. The domestic stock are usually watered at boreholes during dry periods and prolonged droughts.

Map. 11 DRAINAGE PATTERN AND BOLEHOLE DISTRIBUTION



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

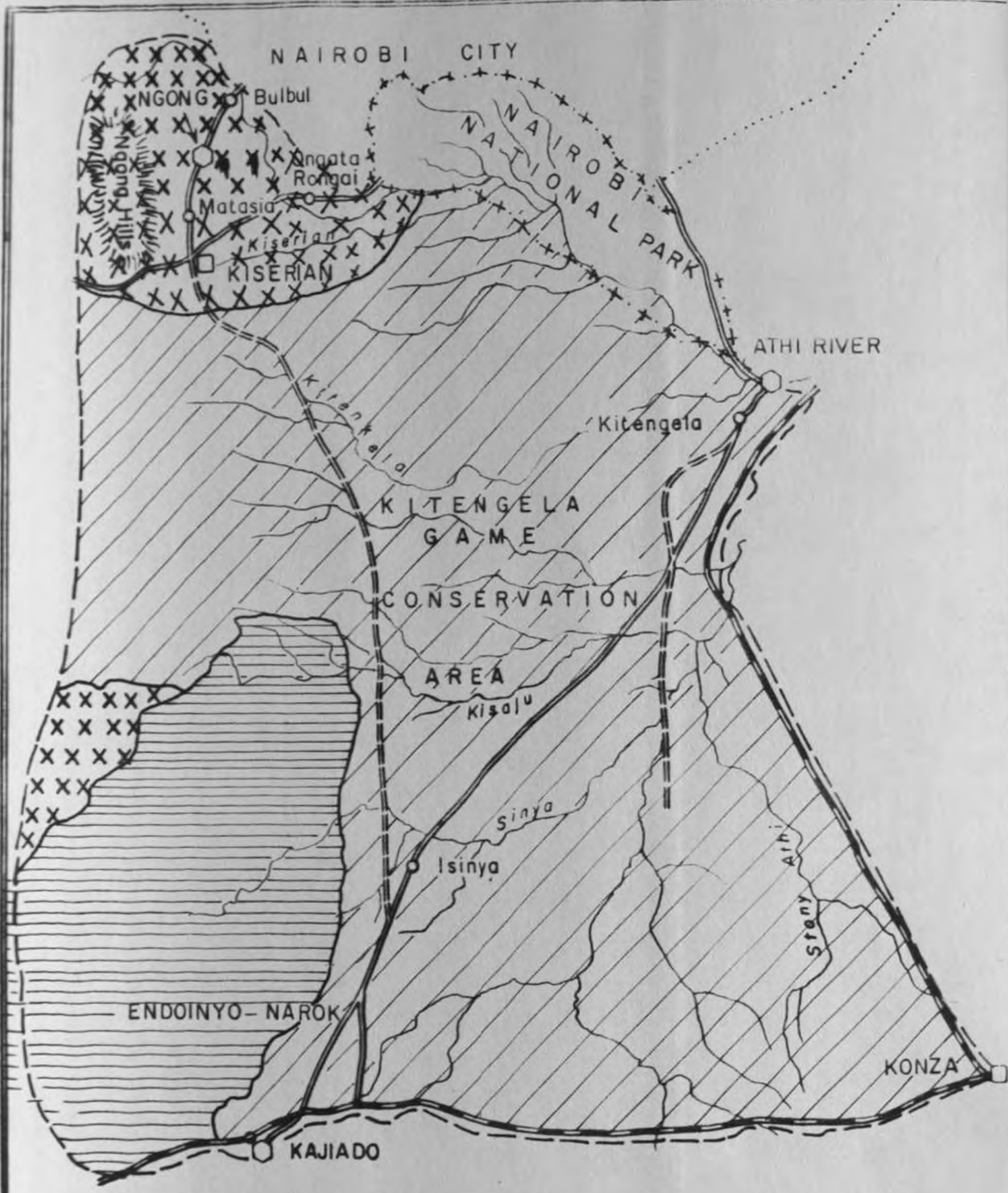
Water in the study area is consumed by human, domestic animal and wildlife mainly. The water supply schemes include the Nolturesh Pipeline Scheme (which is under Kenya Railways Corporation) and Ngong. Other water supply system are from boreholes. By 1979, it was estimated that less than 4% of the total district population was served with clean treated water. The study area has no irrigation scheme. There are about 67 boreholes in the whole district. The study area has about 11 of these. Map No. 11 shows the Drainage pattern and Boreholes distribution in the study area.

The study area suffers from scarcity of surface permanent water - Kiserian rivers supplies Ngong township with water-hence ceases to flow below the point of extraction. Lack of water therefore is a big constraint for development in the area.

e) AGRLO-CLIMATIC ZONE

According to the classification of east African Rangelands by pratt et al (1968), the study area falls under ecological zones, IV, V and VI (Map. No. 12). This classification is based on the above analysed climatic factors, land use potentials and physiognomic characteristics on the other hand.

MAP 12 Agro-Climatic Zones.



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

Zone IV.

This zone is characterized by very high to medium agricultural potentials. It covers Ngong-Hills areas of the study area. Rainfall is high in this zone as already been explained above. The soil is good and can support arable agriculture. Already such crops like cabbages, English potatoes, maize, beans and even coffee is being grown in this zone. The land can support agriculture without irrigation. More land is expected to be cultivated in this zone.

Zone V.

This is a zone of low to medium rainfall hence is marginally potential. It is good mostly for ranching but cultivation can also be done with little irrigation. This zone covers most of the Kitengela area - mostly on the northern part. This zone includes also the Nairobi National Park. The zone includes also Ongata Rongai area and some parts of Sultan Hamud.

Zone ~~VI~~

This zone covers only a small section of the study area towards the southern end. This is a zone of low potential and can only support ranching.

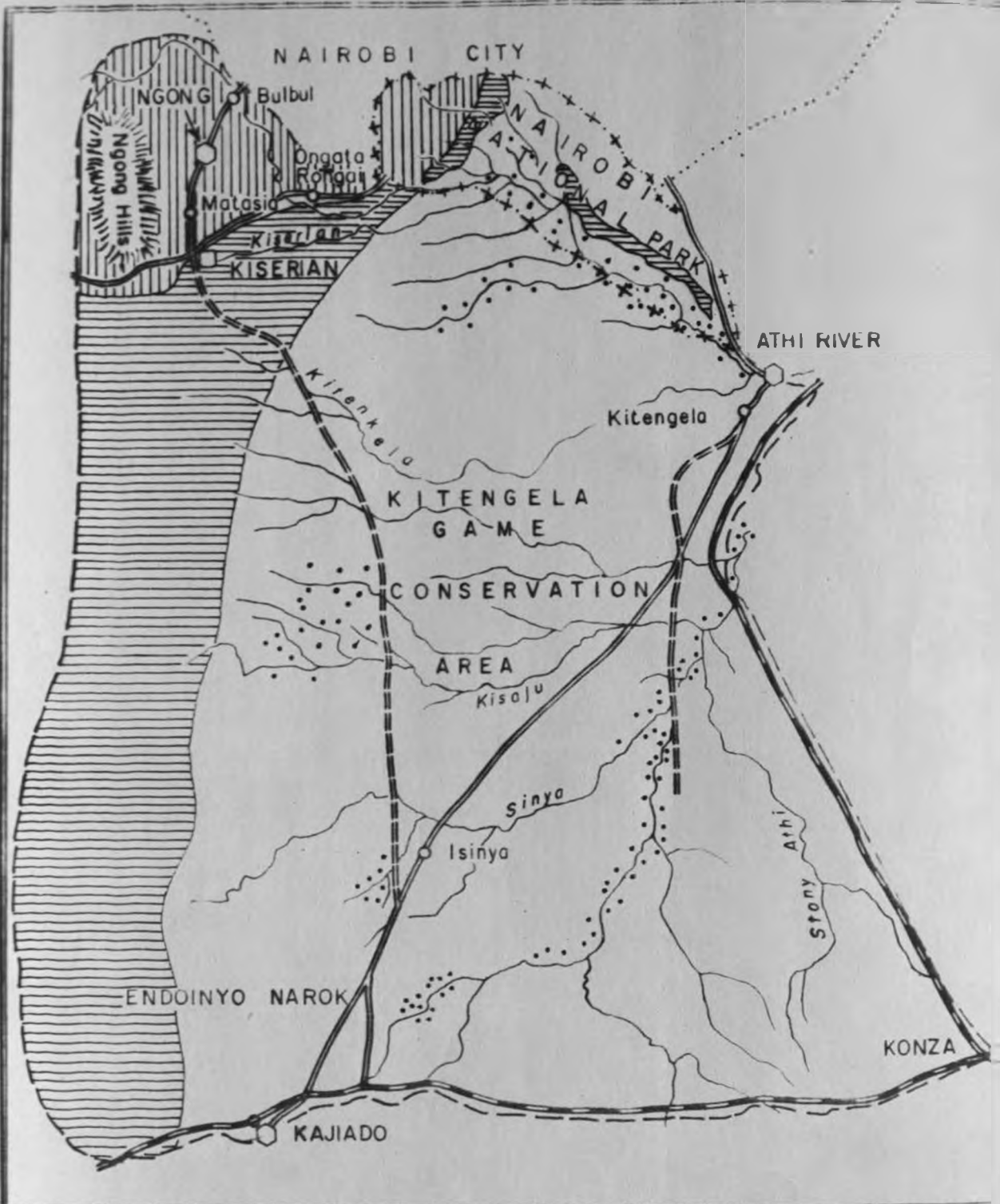
On the basis of these zones, we can assess the potential land use changes. In Ngong areas (Zone IV), there is agricultural potential. Hence, more cultivation can be expected. Cultivation is also possible in northern Kitengela, although with little irrigation.

3.5 VEGETATION:

Vegetation is an important aid in land-use planning of wildlife management. It is the home and food for most wildlife. It was therefore necessary to divide the study area into areas of different vegetation types to determine the use, changes and impacts by wildlife and man.

No attempt was made to undertake a detailed botanical description of the study area. However, we used detailed works of Mumiakha (1976), Lusigi (1978) and Hillman (1979) that have been made in the study area. In addition field - observation with assistance of Dr. Theuri Njoka was carried out.

The study area can be divided into six main categories of vegetation. These are:



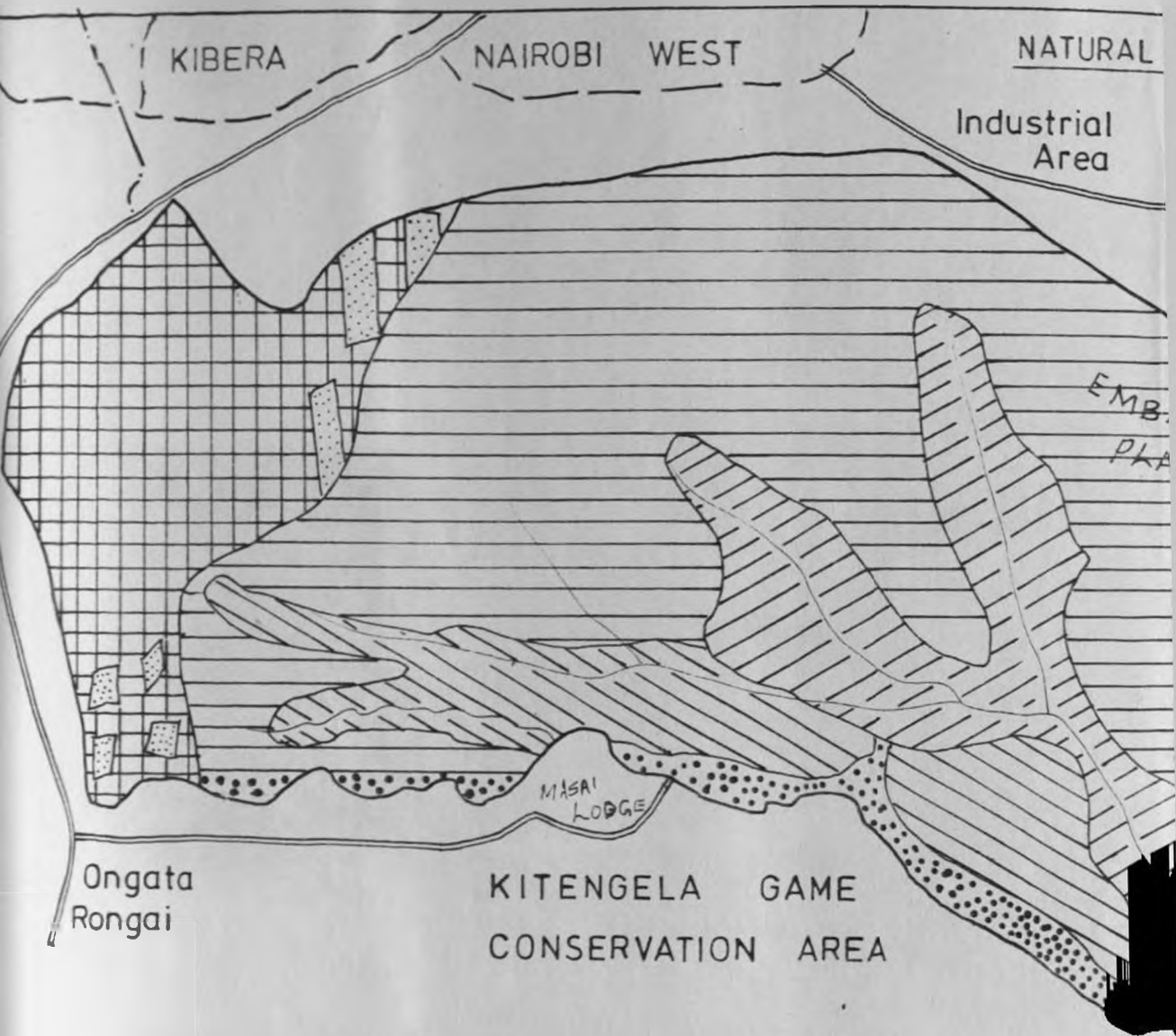
IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

1. Open grassland
2. Acacia drepanalobium grassland
3. Aspilla Plurisetia grassland
4. Bush areas
5. Swamps
6. Forest areas.

These types are described here and their distribution is shown in Map No. 13. The areas covered by each type, and as a percentage of the total area are given in Table 4. Map No. 14 shows the situation in the park but the grassland in the plains has not been sub-divided as in the park, since the areas of the three types mentioned above were not as discrete in the plains.

Grassland

The dominant scenery of the study area particularly in the Athi Kapiti Plains is the grass land. However, there is a strong successional force towards woody vegetation and woodland could be considered to be the potential climax vegetation. Grassland generally occur on the black cotton and grey soils and on flat or gently undulating topography. The drainage is poor or retarded and rock outcrops are rare. The



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Plate 2. *Acacia derepanalobium* grassland:
in the park adjoining riverine forest.



Plate 3. *Aspilia* grassland. Riverine forest
can be seen far behind.

The vegetation here exceed not more than one metre in height except where trees occurred.

The dominant grass species are Themeda triandra and setaria sphacelata. Grassland in this area can be sub-divided further into 3 types.

i) The dwarf Acacia drepanolobium tree, or whistling thorn. This is generally on flat and poorly drained black cotton soil.

In the Athi Plains including the park, these areas are on the tops of very broad flat-topped ridges. The trees form dense thicket hence difficult to move through. They are about 1 or 1½ metres in height. There are isolated trees although generally there is a distance of about 2 metres between the trees.

In the Kapiti Plains, acacia drepanolobium occurs as stands of the dwarf form in the boulder-filled beds of drainage lines and the broad ridge tops. (Plate 2).

In the Ngong Hills area, acacia drepanolobium is absent.

ii) Aspilia Pluriseta

These are found in broad river valleys and also on black cotton soil. Most of these areas are between the Loitigoshi escarpment and the Stony Athi river, including the Athi basin area of the park. They are generally woody, scabrid-leaved composite herb (Plate 3).

On the Ngong Hills, the plant takes on a bush-like growth forming upto 2m. high, usually in bush areas. In the plains the plant rarely reaches more than 50 cm. high due to browsing pressure.

iii) The third type of grassland is called open grassland owing to an almost total lack of permanent woody dicotyledonous plants. However, isolated Balanites aegyptiaca Acacia gerrardii, A Seyal, and Acokanthera friesiarum trees occurs in these areas in the Athi Plains, while termitaria supported a few small bushes of Hibiscus flavifolious and the woody Herb Solanum incanum.

In Ngong Hills, open grassland covers most of the lower slopes on ridges and in valleys. Here the grass is very coarse and cover a metre high owing to the higher rainfall and low herbivore numbers.



Plate 4: Open Grassland outside the park in the Kitengela area.



Plate 5: Open grassland with sparsely woody species inside the park.

The types of grassland describe above support large numbers of soft, herbaceous dicotyledons, or wild flowers in the wet periods of the year. But this is normally eaten down or dies in the dry periods and many species survived as woody rootstocks below ground level. Plate 4 shows open grassland in the Kitengela area. The situation within the park is also similar. Plate 5 shows open grassland with sparsed woody species inside the park.

Bushland

In the park the bush-land forms about 15 percent of the park area Table 3 and Plate 6. However, generally, most areas of bush vegetation occur in red or grey soils with exposed bedrock on the edges of and in drainage lines. In these areas, the bush vegetation is dominated mainly by an association of croton megalocarpus and psidia arabica. In the Athi Plains the bush vegetation occur along the edge of the stony Athi river and lower reaches of Mbagathi (Plate 7).

Forest Vegetation

In the park, the higher and wetter Nairobi trachyte stratum in the west of the park support dry highland forest. This accounts for 5% of



Plate 6: Riverine Forest showing the last section of Mbagathi river towards Athi River Town. Masaai's livestock can be seen through the forest outside the park.



Plate 7: A common species of the riverine bush within the park.

the park area (Table 4 and Plate 8). It is the remnant of the former forest region and results from the higher precipitation on this elevated ground. Plate 9 shows forest as can be seen from the main entrance of the park. It is also characteristic of much of the area outside the park to the west and north west. It is interspersed by open grassland meadows so that the actual forest covers just about 350 ha., while rocky valley edges within it contain bush species similar to those in the gorge edges in the plains.;

In the Ngong-hills, forest patches are much wetter than in the park being supported by the atmospheric daily moisture. A few bamboo thickets (*arundinaria Alpina*) also occur in the forest. However the dominant tree species are Croton Megalocarpus Schrebera Alata, Brachyaena Shrubs.

The forest area is an important habitat for several animals and birds. It deserves careful treatment in planning and managing this ecosystem.



Plate 8: The forest vegetation inside the park towards the main gate.



Plate 9: Forest vegetation as can be seen from the main entrance of the park.

TABLE 4 THE COVERAGE OF DIFFERENT VEGETATION
TYPES IN THE STUDY AREA

Sub-Areas	Vegetation Type	Area Covered (Km ²)	Percentage Total
1. Nairobi National Park	<u>Grassland</u>		
	Acacia grassland	31.4	28.1
	Aspilia grassland	15.1	13.7
	Open grassland	41.6	37.2
	Total grassland	88.3	79.0
	Bushland	17.2	15.4
	Forest	5.6	5.0
	Swamp	0.6	0.5
	Total	111.7Km. ²	99.9
2. Athi Kapiti Plains + Ngong	<u>Grassland</u>	1,334.2	78.4
	Bush	351.7	20.8
	Forest (Ngong Hills)	5.1	0.3
	Total	1,691.0Km. ²	100.0

NOTE: Further analysis of vegetation of the Ecosystems - National Park - Athi Kapiti Plains and Ngong area can be summarized under six sub-units:

- a. Short grass ridge tops.
- b. Acacia/grass areas mostly flat
- c. Stony localities - stony shrubland with very little grass - mainly tall grass.
- d. Riverine thicket and woodland.
- e. Large depressions mainly of black cotton soils and supporting typical vegetation types.
- f. Ridge slopes of short to medium grass.

Wildlife prefer different vegetation types. The browsers like giraffe tend to confine themselves to thicket areas. Grazers spend much of their time in areas on open grassland. Mixed feeders such as Eland, Grant's Gazelles and Impala generally use both bushland and open grassland.

In summary, one of the most important environmental factors determining the type of vegetation in this area is the availability of moisture. This area is semi-arid. This implies that animals have to move according to the vegetation changes which is directly dependent on rainfall-hence the seasonal migration. If the open grassland is overgrazed or over utilized in any way is succeeded with woody vegetation. This may influence the feeding habits of the herbivores. As such the importance of vegetation and the maintenance of the grazing climax should not be over-looked in this area.

3.6 WILDLIFE:

The term wildlife applies correctly to both plants and animals but here it is used to refer to wild fauna as is the common practice in Kenya. Before looking at the present wild animal distribution and densities of the area, we describe the historical condition of wildlife.

a) GAME MOVEMENT IN THE STUDY AREA:

The undulating plains of Masaaï land (which our study area is part) contained the largest concentrations of wild animals than anywhere in East Africa.¹⁴ The wildlife used to roam in these plains through to Tanzania. It is very difficult to determine the extent of movement of game in this area especially in 1900 and before. Perhaps that was one of the factors that the British East African government considered when it established the Southern Reserves in the study area and Nairobi National Park in particular, were included. The reserve was established in 1900.

In 1946 when the park was established, the wildlife of the Athi-Kapiti Plains used to migrate in the dry season to the permanent water of the park, the Ngong Hills, and the north-east towards Thika. Cowie (1951) believed that - the Ngong National Reserve was essential to the Nairobi National Park as a reservoir of animals and for migrations. Also Stewart and Stewart (1963) Hillman and Hillman (1977), Croze (1978), Lusigi (1978) and Hillman (1979) among many, have maintained that the Nairobi National Park was a part of the Athi-Kapiti ecosystem. Petersen and Casebeer's (1972) data show that during their



Plate 10: Common wildlife species - both inside and outside the park. This shows a herd of impallas.



Plate 11: An example of the woodland wildlife species (zebra) inside the park.

counts and reconnaissances not more than 5% of the total Athi-Kapiti-Nairobi Park Wildebeest were in the park, even in a dry season, and that not more than 30% of the Zebra used it. Hillman (1979) quoting Stanley-price (1974) and the Kenya National Parks data for the period 1960-1974 wrote:

"In many normal years Wildebeest and Zebra do not even entre the park in significant numbers and Kongoni do not move at all."¹⁵

However, Ecosystem (1982) believe that the park was actually a reservoir for the Wildlife during the dry weather. But now, the park which was only a small part of the "plain system" which existed in 1900, is unlikely to exercise any critical ecological importance to the "Athi-Kapiti Ecosystem."

For the purpose of this study, the extent of migration of the animals out of and into the Athi-Kapiti forms the ecosystem of the park (Map. 6), we maintain that the park is an integral part of the "Athi-Kapiti Ecosystem".

b) WILDLIFE POPULATION

Table 5 gives a summary of animals of the study area between 1962-66 adopted from Hillmann (1979).



Plate 12: Cattle - on the boarderline of the park.
The herdsman is not visible.



Plate 13: Ostriches inside the park. They hardly
go outside the park.

At the present, it is evident that the numerically dominant wild herbivores are Wildebeest, Kongoni and common or Burchell's Zebra, followed by Grant's Gazelle and, Thomson's Gazelle. Much lower numbers occur of Warthog, Waterbuck, Bush Buck, Buffalo, Reedbuck, Dikdik, Steinbuck, Klipspringer, Grey Duicker and Kongoni. The Rhino and a variety of smaller species are present in the park but are less frequently visible. A variety of carnivores of various sizes exist. The largest of these are Lions, Leopards, Cheetah and Spotted Hyena. Lion and Cheetah are common in the park but scarce outside. They are also very difficult to see in the park. In addition Man (*Homo sapiens* and his domestic stock-cattle (*Bos indicus*) sheep (*Ovis aries*) and goat (*Capra hircus*) occur in the plains outside the park boundary.

Plates 10 and 11 show some of the animals that are seen most frequently in the park and outside in the Kitengela area. Cattle are very common in the Kitengela area. Plate 12 shows a herd of cattle in the Kitengela. This is very close to the boundary of the park.

There is also an abundant bird species which are normally found near the water surfaces (dams) in

the park. Some are also found in the forest areas of the park. However Ostriches are found almost in all parts of the grassland within the park (Plate 13)

TABLE 5: ANIMALS OF THE STUDY AREA 1962-66

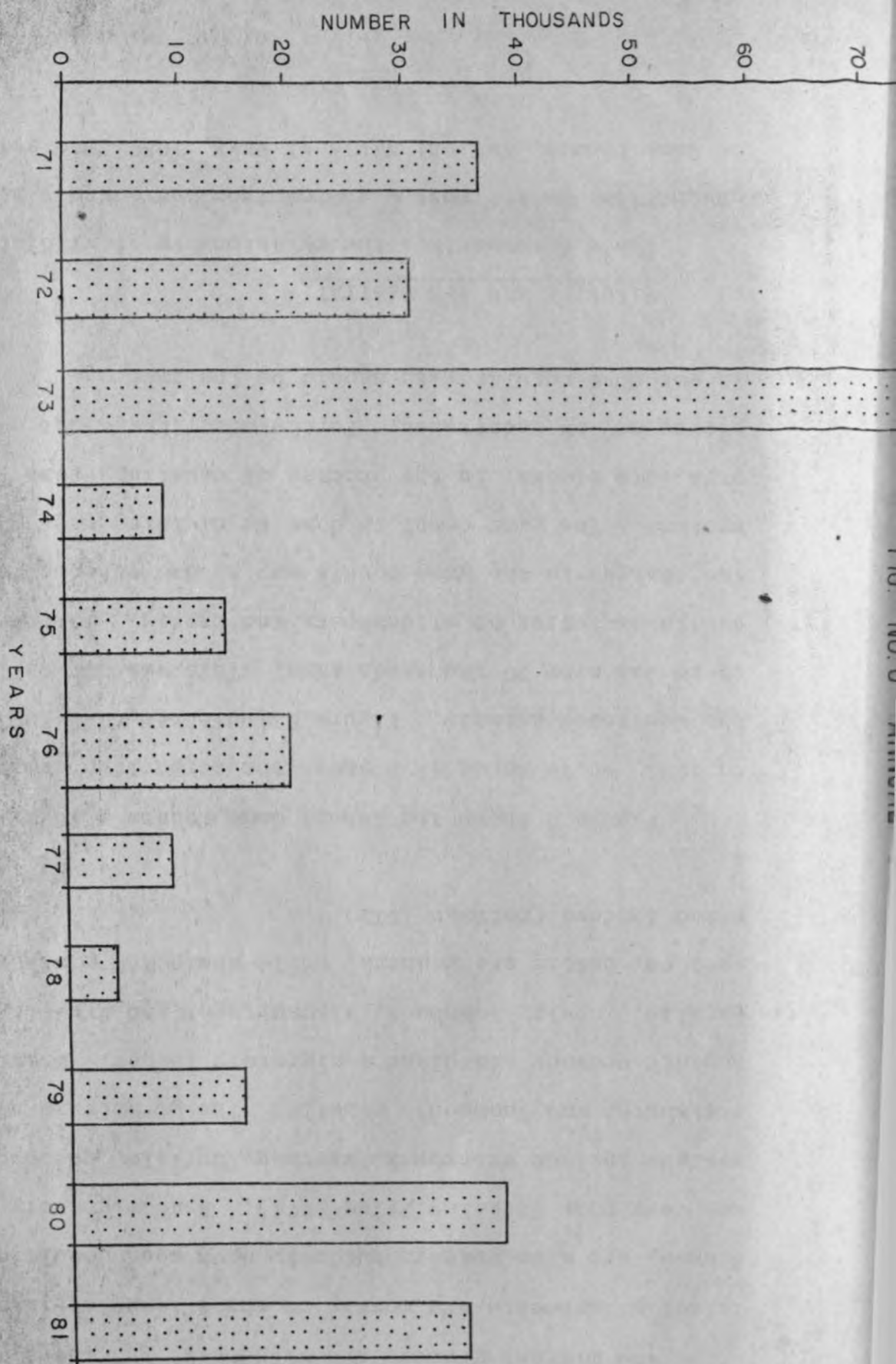
Species	Mean number	
	Nairobi National Park	Athi Kapiti Plains**
Eland	126	1,452
Gazelle Grant's	393	15,464
Gazelle Thomson's	201	5,854
Giraffe	88	857
Impala	591	3,919
Kongoni	1,924	10,598
Warthog	146	not counted
Water buck	133	"
Wildebeest	1,737	33,140
Zebra	1,030	10,472
Cattle	absent	80,607
Shoat	"	38,767

NOTE: * Kenya National Parks (1968-1976), n = 77 counts

* Saridge (1973-1975), n= 7 counts.

Cattle and Shoat n = 1 count

Shoat = Sheep and Goats.



The migrant grazers are wildebeest and zebra, infact wildebeests are mostly in the Kitengela Plains. Kongoni are also grazers but only move when conditions are very poor (Stanley Price 1974). None migratory grazers include waterbuck, warthog, buffalo, reedbuck, steinburck and Thomson's gazelle. The giraffe is a nomadic browser and eland a migratory feeder. Grant's gazelle, impala, bushbuck, klipspringer and dik-dik species, cattle are grazers, while sheep and goats are mixed feeders (Hoffman 1973).

Figure 6 shows the Annual Game Counts - 1971 to 1981, while Appendix E shows the scientific names of the mentioned animals. Figure 6 indicates that 1973 there was over 70 thousands game. This was basically due to an influx of wildebeests and zebras. However, the changes in the game counts may be due to counting systems. The game count is done by dividing the park into blocks, in the process of counting, some errors may be undertaken. Furthermore, the count is not done regularly as should be the case.

c) WILDLIFE AND ITS HABITAT:

Table 6 summarizes the relationship of wildlife and habitat in the park - quoted from the monthly report on Game Counts, Nairobi National Park, 1980. The study

area in all has over 80 recorded mammalian species which occupy varying habitats found in the park and outside the park. Any change in these habitats will therefore affect mostly the relevant species.

The plains are the habitat of Thomson's and Grant's gazelle, Kongoni, Wildebeest, Eland, Zebra and Masai Giraffe. There are also the Masai Ostriches. The Giraffes inhabit the acacia *Drapanalobium* grassland and browse on leaves and twigs of trees especially acacia and Dalanites. Plains is also stocked with Masai cattle, sheep and goats. Domestic livestock although now are outside the park, were allowed inside upto as late as 1967 when they were completely removed.

The wooded watercourses are inhabited by bushbuck and reedbuck. Lions also lie up in the shade of the drainage line thicket during the day and hunt in the plains in the evening. Waterbuck and Leopard are also seen here. Rock faces and outcrops harbour the rock, hyrax, baboon, snakes, cabras and pythons. The riverrine forest also inhabits monkeys and forest buffalos, rhinos, bush bigs and even lions and giraffes. Hyena, Jackal, serral cat, and wild dogs roam in search of prey, while giraffes browse the Trees and bushes.

The park also has in river Mbagathi; several aquatic species such as hippopotamus, tortois, crocodiles, fish and a variety of frogs (Plates 14 and 15).

TABLE NO. 6 RELATIONSHIP OF WILDLIFE AND HABITAT

Animal Species	Habitat Description
Impala	Moderately steep slopes - Tall Grass with Bushes.
Grant's Gazelle	Moderately steep slopes - Medium to short grass.
Thomson's Gazelle	Moderately steep slopes - Short grass.
Reed-back	Rock moderately steep slopes - Dense bushes.
Giraffe	Gentle slopes.
Eland	Riverine Forests and acacia - Drepanolobium.
Worthog	Flat-short grass.
Waterbuck	Rock slopes - short grass.
Steinbuck	Flat-Medium Height; green grass.
Buffalo	Flat to Gently slopes - Medium to tall grass.
Rhino	Riverine bushes.
Kongoni	Flat-short grass.
Dik Dik	Stony Soils, bush, trees, shurbs.



Plate 14: Hippopotamus - one of the common aquatic species inside the park in Mbagathi river.



Plate 15: Water tortois: one of the many aquatic species in the park.

The freedom of migration is the birth right of every animal for use in the event of its environment becoming uninhabitable or limiting in any factor. If an animal or group of animals is forced to remain in one area, the population is liable to cause progressive deterioration of the habitat. Unfortunately, this is exactly what is happening in this ecosystem. Wildlife should be allowed to relate freely with their habitat. This will naturally regulate the carrying capacity of the habitat. Carrying capacity is here defined as the upper stocking which can be supported in the long term without damage to the habitat.

3.7 SUMMARY:

This chapter has presented an overview of the natural resources of the study area. It has shown that Nairobi National Park only forms a small portion on the northern end of an ecosystem that stretches down to Kajiado township and includes Ngong-hills. Basically the ecosystem is defined as the area encompassing the dry and wet season wildlife dispersal areas of Nairobi National Park. The ecosystem is thus defined by the migratory limits of the major wildlife species of the area.

Historically, this has been an area of abundant wild animal species. It formed a watering and grazing area for both the wildlife and the nomadic Masaai pastoralists during droughts. The topography is generally gently undulating open grass plains sloping from the west to the east. The study area is of recent geologic periods. Soil types is predominantly "black-cotton", particularly in the plains. The area has only two permanent river courses hence suffers scarcity of surface water source. The vegetation types and distribution is dependent on rainfall distribution. The rainfall is quite low and seasonal.

Given that the climatic factors and ecological variables are what determine what use to make in an area, this area has been devoted entirely to ranching and wildlife conservation. However, due to socio-economic needs, there is now rapid land use changes leading to threat on wildlife and the park. There is urgent need for proper land use plan and resource management for this area. Such a plan must consider the interrelationships of its natural resources in the past and at the present.

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CHAPTER FOUR

CHANGES IN LAND USE AROUND NAIROBI NATIONAL PARK

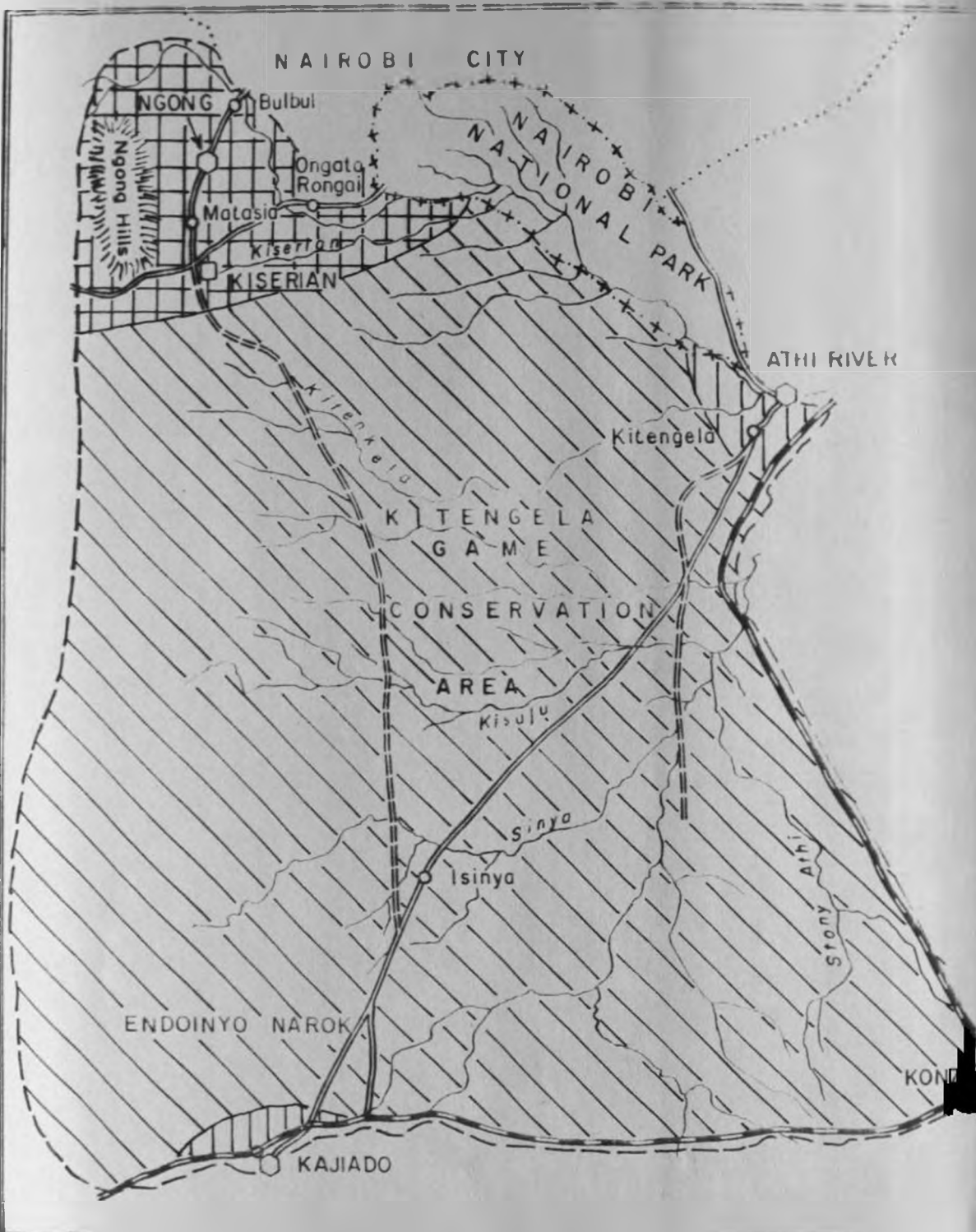
4.0. INTRODUCTION:

Changes in land use have been taking place for many years around the Nairobi National Park since its establishment. However, the pace of change has been increasing rapidly, especially, since independence in 1963. Thus, there is significant difference between the periods 1943-1963 (which includes 1946 when the park was established) and 1963-1983. The former is characterized by low pace of land use changes while the latter experienced rapid changes. The trend is expected to continue and it is anticipated that all aspects of land use in the study area will be dominated by human increase within the period 1983-2003 A.D., unless there is a check. The purpose of this chapter is to identify and analyse the changes in land use in the adjacent areas of Nairobi National Park since its establishment in 1946. The chapter identifies and, analyses eight significant areas of changes, namely; changes in population, changes in land tenure, livestock production, crop production, urban settlement, rural settlement, physical infrastructure, conservation and others.

4.1 POPULATION CHANGES

The numbers and distribution of people have expanded continuously over the past four decades and this has had a profound influence upon the ecology of the study area and the pattern of land use within it. Population has intensified and expanded in the whole study area but mostly in the following parts; the Ngong-hills area including Ongata Rongai and Kiserian, the Athi River town area including areas towards Kitengela market and northern part of the Kitengela, and the Kajiado town area. Nairobi City area, although not within the study area, has had great influence in the expansion of population, particularly, the urban settlement in Ngong and Ongata Rongai areas and Athi-River town.

In Ngong areas, the area of high population density (274 km^2) has expanded until the gap between Ngong town, Bulbul and Nairobi City has been almost completely bridged. Furthermore, population at medium densities has expanded to the south-east towards Ongata Rongai through lower Matasia and Kiserian Centres. This has filled the previously empty area between the Ngong hills and the Nairobi National Park



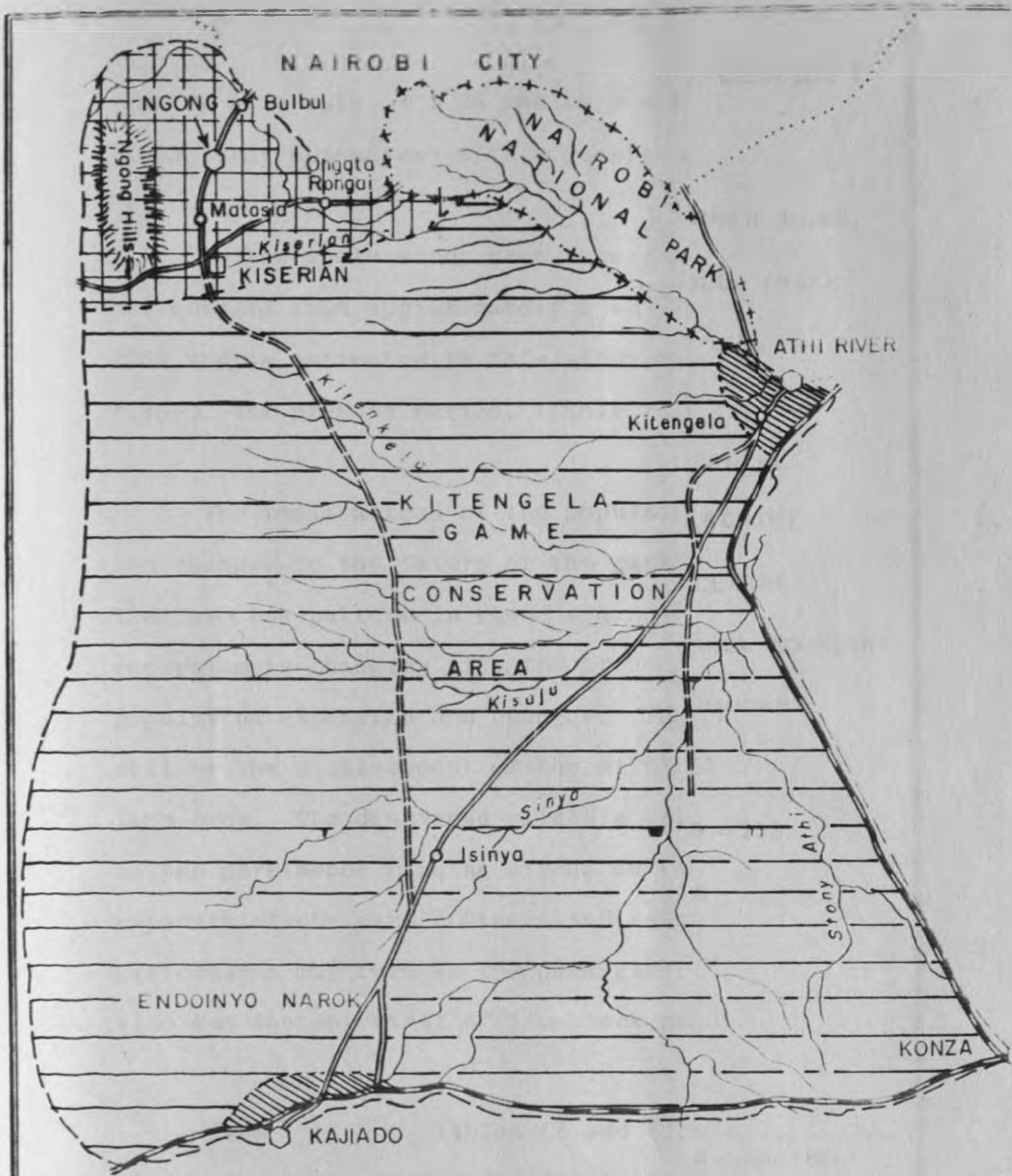
IMPACT ON NAIROBI NATIONAL PARK OF CHANGES
LAND USE IN ADJACENT AREAS.

cutting the two areas almost completely from each other. From the foothills of Ngong hills, population has increased in density and has spread south-eastwards towards Isenya centre.

In Athi River town area, with a population of 12,600 people, the development has expanded towards Kitengela market centre and around the south-eastern part of the park. This threatens to cut the migratory routes of wildlife from the park down to Athi Kapiti Plains.

Striking population changes have occurred too on the northern part of the Kitengela area, which, during the period 1943-1963, had no permanent human settlements. The density which was 4 km^2 according to 1969 population census is now 11 km^2 (Table 7) and (Map15 and 16). This area was declared a conservation area for wildlife immediately the Nairobi National Park was established in 1946. With the increasing human population density, wildlife will be displaced.

Kajiado town area shows a very striking change , with high densities of population spreading northwards to Isenya centre. Kajiado town itself is



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growing at a rate of 7.2% and is now 4,653 people (1983 study estimates) with a density of 221 km².

In the whole study area, the population density has changed from approximately 1 km², to 14 km² in 1969 and is estimated in this study to be 33 km² (1983), the present period. (Table 7).

The implications of the population expansion and changes to the future of the park is pretty clear. The land use pattern in these areas of the park's ecosystem is changing with the trend of the human population expansion and changes. The result is/or will be the displacement of the wildlife and other land uses. The displaced wildlife will take refuge in the park-hence causing stress on the carrying capacity of the park. Other land uses such as pastoralism may turn to the park given that the park also has the potential of livestock grazing.

From tables (7 and 8), it is evident that population changes and densities differ from one part of the study area to the other. This

TABLE 7:

POPULATION CHANGES IN THE STUDY AREA

AREA PERIOD	1943 - 1963			1963 - 1983						
	1947	1962	% change	1969	% change	1979	% change	1983	%	Growth Rate
1. Ngong Division	-	-	-	15,931	-	30,044	88.5	38,650	28.6	6.5
2. North Kaputei	-	-	-	7,559	-	13,739	81.7	17,410	26.7	6.1
3. Study Area	-	-	-	23,490	-	43,783	86.4	56,114	28.1	6.4
4. Kajiado District	28,987	68,441	136	85,093	24	149,005	75	185,994	24.8	5.7

Source: Research Data.

N/B.

* We have used the growth rate between 1969 and 1979 of different areas to calculate the present population (1983) of the study area in the different zones of the study.

* North Kaputei includes the Kitengela area which together with Ngong and the park form the Park Ecosystem.

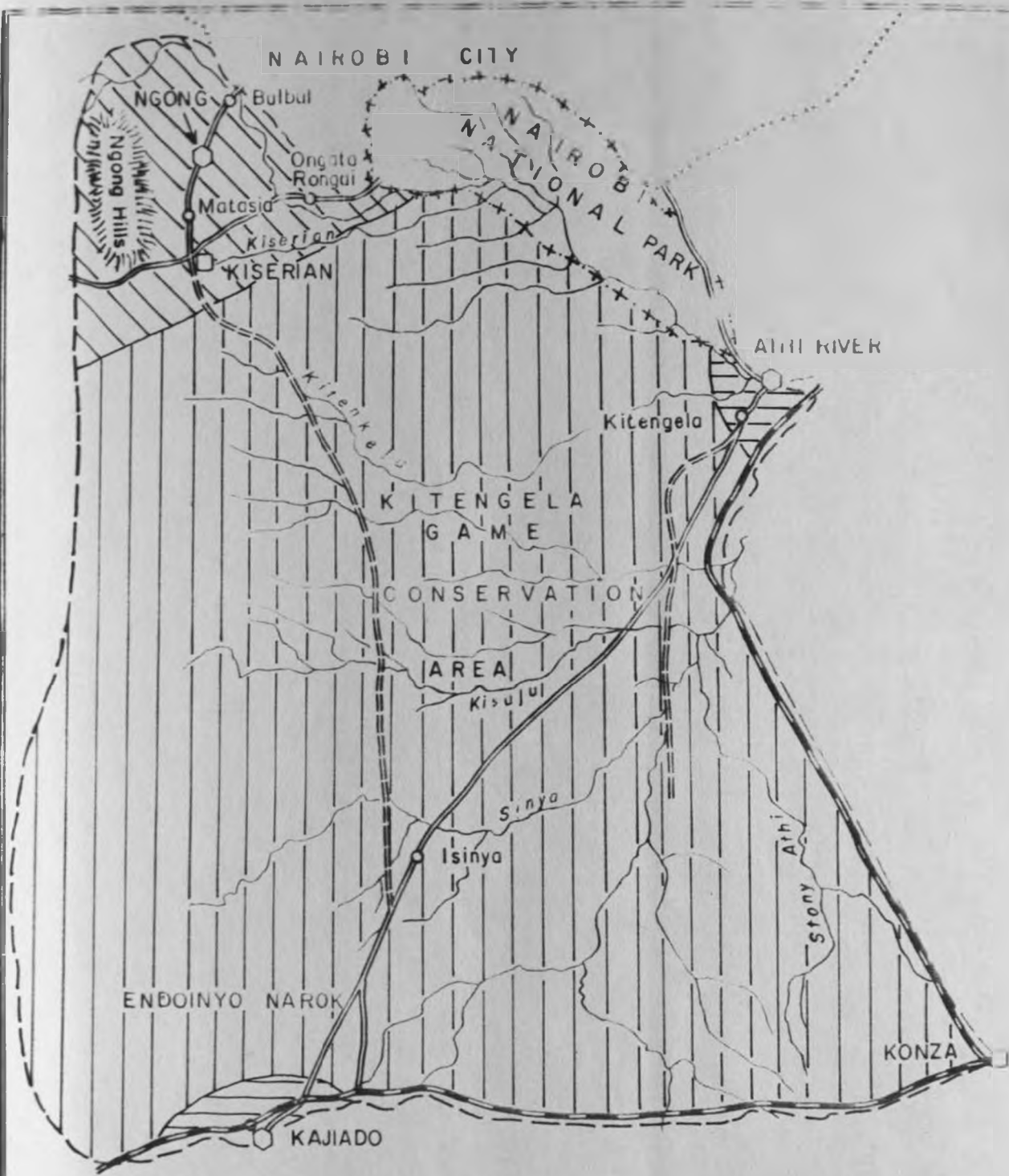
TABLE 8: DISTRIBUTION OF POPULATION DENSITY BY AREAS
(KM² PERSONS)

Year	Ngong Area	North Kaputei	Study Area	Kajiado District
1948	-	-	-	1
1962	-	-	-	2
1969	112	4	14	4
1979	212	9	26	7
1983	274	11	33	9

Source: Research data.

difference is directly related to the land use potentials that we have analysed above in chapter 3, by the three agro-climatic zones. The Ngong area has had very high densities compared to the North Kaputei. For example, in 1969, Ngong area had 112 km² density while North Kaputei had only 4 km² (Table 8).

Over the whole study area and the entire district, the increase in population density has been lower in the period 1943-1963- than in the present period. This shows the accelerating rate of population increase in the study area.



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

ii) POPULATION PROJECTIONS:

Table 9 and Map 17 show our expected population changes and expansions, and densities by the year 2003, 20 years from the study period. We have estimated the mean annual growth rates (natural increase plus migration) in 20 years. The whole of the study area will have 194,045 by the year 2003 while Kajiado district growing at the rate of 5.7 will be 563,635 people.

In summary, the trends towards accelerating human population and widening distribution in the ecosystem of Nairobi National Park, are evidence of increasing pressure on the land. Leaving alone the question of the capacity of the land, there is a danger of deterioration of the ecosystem without serious considerations of wildlife management. This will make the park to suffer or completely destroy it.

TABLE 9 POPULATION GROWTH PROJECTIONS FOR STUDY
AREA - 2003

Area Period	1983	2003	Density Km ²	Growth Rate %
-Ngong Area	38,650	136,188	965	6.5
-North Kaputei	17,410	56,899	37	6.1
-Study Area	56,114	194,045	117	6.4
-Kajiado District	185,994	563,635	28	5.7

Source: Research data.

Note: Assuming constant growth rates upto 2003, we have used the estimates of 1983 during field study to estimate and calculate the population in the year 2003.

4.2 CHANGES IN LAND TENURE:

The dominant influence in the study area and the whole of Kajiado District over land is the growth in human numbers. The above going analysis of population changes has indicated rapid population increase in the study area, particularly, from 1969. In 1969, the area had a population of 23,490 with

a density of 14 km². In 1979, it was 43,783 with a density of 26. Now (1983), it is 56,114 with a density of 33 km².

The most important consequence of this population increase is the change in land tenure from public or communal holdings to private individual ownerships. In Kenya, we have three categories of land ownerships, namely, Government land, trust land and private land.

Government land includes all urban land within municipalities and townships. National parks are also government land. Before independence, the government land was called crown land.

Trust land comprises all the land which, prior to independence was known as special areas or special reserves, settled areas and the former northern province. It also includes urban land which were known as native lands. The study area falls under this category.

Private owner freehold land includes former crown land in respect of which freehold interest was granted by the crown in the early years before 1920's

or converted to freehold in 1961 under the "conversion of leases regulations, 1961." It also includes agricultural trust land in respect of which individual claims have been fully adjudicated under "land adjudication act" and freehold interest in the land registered under the "land act."

Since 1965, the programme for land consolidation and adjudication has been taking place all over the country. The object is to regroup individual holdings of land that previously consisted of small uneconomical fragments, thus providing land owner with a parcel of economic size. Other areas where fragmentation had not taken place, the rights of ownership is determined. Freehold registered titles to the land are then issued to owners.

The same process of land ownership pattern has been taking place in the study area. At the moment, the trust land has been adjudicated into private group or individual ranches. Formerly, the land was communally owned. The trend indicates that land ownership will be under private individual.

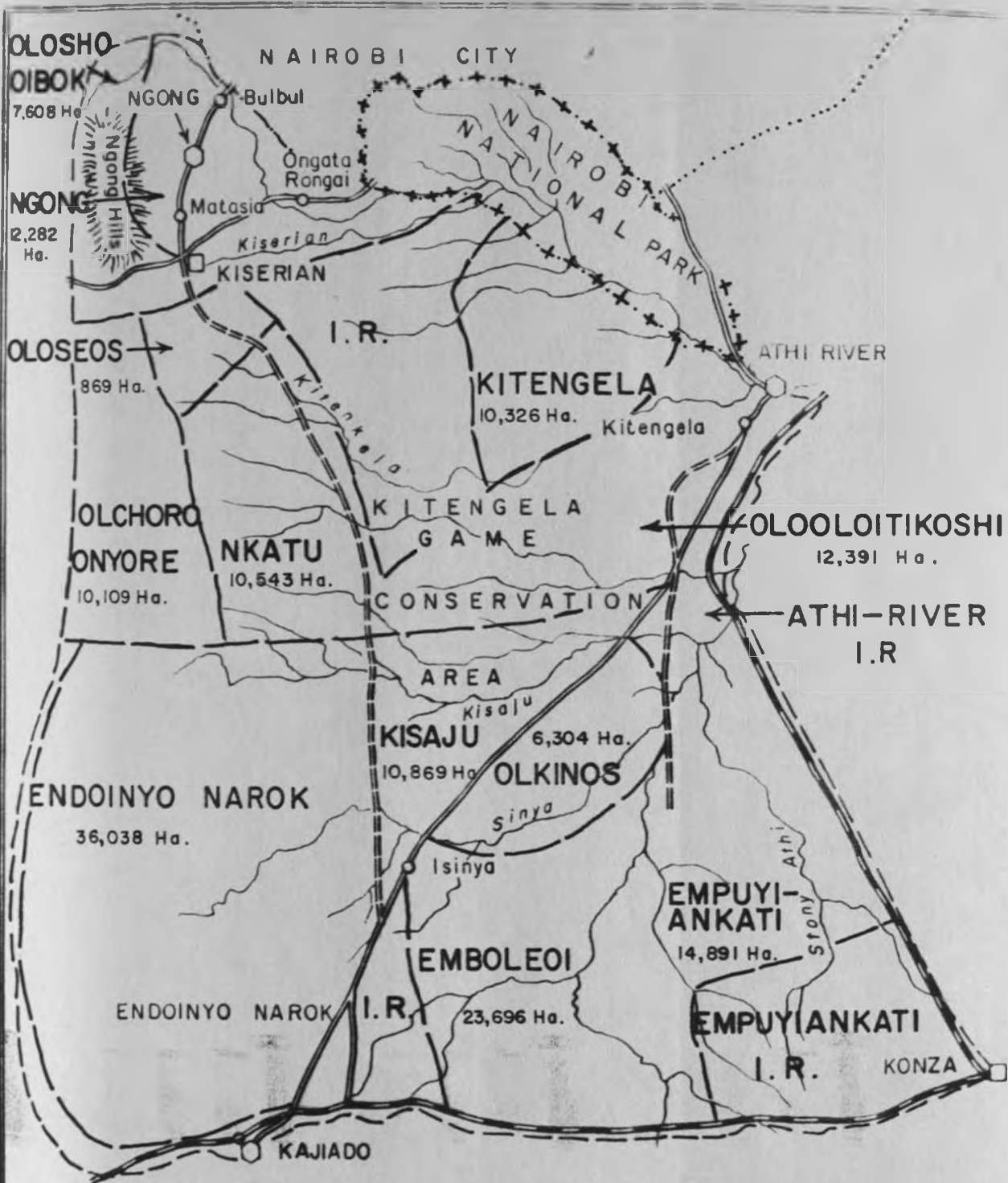
The question of change in land tenure in the study area first came up in 1950s. Before this period, the colonial government had sought to determine which land was suitable for the nomadic Masaais. Eventually, the Masaais were moved enmass to southern reserve which our study area is part of. The colonial government then sought to determine what sort of land tenure was suitable for the peculiar kind of life of the Masaais. As a result, they introduced the "sehemu plans". Under this plan, large tracks of land, specified by the colonial administration, were set aside for demonstration purposes. People were forcibly removed from such areas and left unused for one year. This plan failed largely because of the nature of life style of the Masaais and due to the fact that they did not understand it. However, it was a plan that ensured seasonal grazing hence would effect very little impact on wildlife conservation in the area.

Then came the period of struggle for independence in Kenya. As independence approached, there were fears that the Masaais' land would be taken over by the agrarian societies such as the Kamba and the Kikuyus. This threat of external encroachment led to another change in land tenure system in the study area. However,

this was not realized until later after independence. This was largely due to consideration that was given to wildlife conservation in this area. In 1967, for instance, the Kenya Cabinet had directed that land adjudication in the Kitengela should be delayed until potential conflicts between wildlife-tourism and the other land uses had been resolved. The area, was however, declared for adjudication in April 1973. By January 1977, proposals by local people to adjudicate the Kitengela and adjacent group ranch area into 60 private holdings had been submitted. Map 18 shows the study area adjudicated into individuals and group land ownerships.

The group ranch land ownership came up as a government policy to develop the study area by converting it to a series of group and individual ranches. It was meant to convert the previous subsistence pastoralism to commercial livestock production enterprises. Security of land tenure was guaranteed and schools and other amenities of settled population was to be provided.

The land had to be adjudicated and registered in the name of group representatives. Under the group



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representative Act of 1968, each individual retains ownership of his livestock. If the group wishes to register as a co-operative in the interest of production efficiency, the government policy was to encourage such a change. The group ranch participant holds title to land through his group representatives. He must abide by articles of the bill and constitutions of group ranch committee and with government departments on negotiations of loans. He must participate in group ranch activity as he may be directed by his committee. This involves such items as adjusting of the number or class of stock he is permitted to graze, grazing practices, dipping frequency or other management practices.

However, not all parts of the study area were registered under group ranches. A section of Kitengela, Konza and Kajiado town that border the Machakos district were registered to act as a "Buffer Zone" to the possible encroachment of the Kambas. The individual ranches were to prevent the Kamba possible infiltration. There was also the fears that some areas of Kaputei would be declared as a game reserve which would mean a further reduction of grazing grounds. As a result, land in this area was adjudicated to turn

the former tribal form of land from common property to private individual or groups.

The group ranches appeared to be compatible with wildlife conservation since the predominant land use is grazing. However, at the moment, the study area seems to be following the same trend as elsewhere in Kenya. It is turning over to private ownership with private title deeds as the order. Even the remaining group ranches in the area have applied to the District Commissioner's office for land-division to individual ownerships (Kajiado District Commissioner, 1983: Personal Communications).

The respondents interviewed revealed that most members would prefer individual landownership. They observed that in future all the land would be individually owned. 100 percent (38) respondents interviewed projected that all land will be individually owned by the year 2003. Yet 89.5% (34) of these respondents were on communal land (trust land) in 1960s. 10.5% (4) were on government land. Table 10 shows the changes in the pattern of land ownership as stated by the 38 local residents.

TABLE 10 THE PATTERN OF LAND OWNERSHIP

LAND TENURE / PERIOD	1943-1963		1963-1983		1983-2003	
	No. of Respondent	%	No. of Respondent	%	No. of Respondent	%
Communal	34	89.5	0	0	0	0
Government	4	10.5	0	0	0	0
Group Ranches	0	0	8	20	0	0
Individual land	0	0	30	80	38	100
Others	0	0	0	0	0	0
Total	38	100.0	38	100.0	38	100.0

Source: Research data.

The implication of the changes in land tenure to wildlife conservation has been and will continue to be disastrous. The private landowner is by nature of land use policy in Kenya, free to decide for himself what wildlife, if any, he wishes to have on his land. This means that conservation policy must adapt to the land use practices that individual landowners will undertake.

4.3 LIVESTOCK PRODUCTION

Livestock production as a system of land use has been changing overtime in the study area. Firstly, before the creation of Nairobi National Park and, during the 1943-1963 period, the dominant system was nomadic pastoralism. According to this system, the Masaais with their herds of livestock spent dry and wet seasons within grazing distance of permanent water and pastures that were otherwise available. It was a seasonal migratory nomadic settlements that followed largely the seasonal rainfall, hence, pastures change. Given the nature of climate of the study area and the entire Masailand, this was a less restrictive system in terms of space. It also had little effects on wildlife conservation since there were no demarcation and delineation of land by fences.

However, this system of nomadic pastoralism has changed through the creation of private individual and group ranches. This was as a result of an attempt to try and get the Masaai to abandon their nomadic pastoral regime in favour of cash-oriented ranching. It was also seen by the Government as a way of ensuring steady administration of the nomadic Masaais. This change has had a problem in its implementation.

The group ranches are, relatively, too small and traditional ranching movements go beyond their boundaries. This makes the increased number of livestock cause over-grazing of the group ranches. Secondly, although the figures showing the livestock numbers, densities and distribution in the whole Kajiado district, hence, the study area fluctuate, it is clear that livestock numbers and densities have increased. In 1933, there were approximately 300,000 in entire Kajiado district (Ecosystem 1982). In 1960, there were about 757,000 cattle. These figures exclude sheep, goats and donkeys. Table 11 shows the number of cattle from 1963-1983, according to the District Development Office (1983). We were not able to get data on numbers and densities of livestock in the period of 1943-1963 for comparison. It was also not possible to get data specifically for the study area. However, from our respondents interviewed, we confirmed that there has been an increase in livestock numbers and densities over time.

The respondents were asked whether they kept livestock. Livestock here included cattle, sheep, goats, donkeys and chicken. Table 12 shows the response of the residents interviewed. All the residents interviewed

said that they kept more livestock than before. However, it was not easy to estimate how many since during the period 1943-1963, the livestock was owned by a clan and could not be evaluated in terms of an individual. 63% of the respondents kept cattle. Of these, only 12% kept grade cattle. 20% kept goats, 5.3% kept sheep and about 13% fall in the category of others. Others included those who kept livestock such as donkeys and chickens. Concerning the future, all the 38 respondents interviewed said they would like to increase the number of livestock they have. This implies that more land will be required for grazing. Given the increase in human population which also implies more livestock, wildlife will be in danger as competition for space intensifies. Similarly, the livestock will also be in danger as they will be in excess of the stock carrying capacity. The carrying capacity may be defined as the upper stocking which can be supported in the long term without damage to the habitat. The excess stocking capacity is calculated when maximum numbers of fattening steers are on the ranches.

Another change in land use related to changes in pastoralism system is the provision of artificial sources

TABLE 11: CATTLE POPULATION CHANGE KAJIADO DISTRICT
1963 - 1983

Year	Number of Cattle	Estimates	Herd Growth Rate %
1963	NK	299,000	24.7
1965	NK	373,000	15.0
1966	NK	429,000	14.9
1967	NK	493,000	8.1
1968	600,000	533,000	7.5
1969	640,000	573,000	8.4
1970	690,000	621,000	7.9
1971	700,000	670,000	7.5
1972	NK	720,000	5.1
1973	NK	757,000	5.5
1974	807,000	799,000	0.6
1975	800,000	794,000	16.9
1976	650,000	660,000	23.8
1977	500,000	548,000	9.0
1978	540,000	600,000	7.7
1979	580,000	640,000	10.9
1980	619,255	710,000	7.0
1981	653,319	760,000	1.6
1982	691,398	748,000	5.9
1983	732,460	792,000	

* NK = Not known

Source: Kajiado District Livestock Development (Range Management) office.

TABLE 12: LIVESTOCK KEPT

Livestock Period	1943 - 1963		1963-1983		1983-2003	
	No. of Respondents	%	N.O	%	N.O	%
Cattle	N/A	N/A				
Native	N/A	N/A	20	12		
			23	63.2		
			23	63.2		
Grade	N/A	N/A	3	78		
Sheep	N/A	N/A		2		5.3
Goats	N/A	N/A		8		20.0
Others	N/A	N/A		5		13.0
Total				38		101.6
					38	100

Source: Research data.

* N/A = Not Applicable. The respondents could not state how many livestock they owned during the 1943-1963 period. During this period the livestock belonged to the whole clan.

of water. To reduce vulnerability to climate in the area, the government has provided boreholes and dams in the group ranches. In addition, dips are also provided. Normally, these artificial amenities are fenced hence affect wildlife movements.

In addition to these changes in livestock pastoral system is the introduction of grade cattle. This is a system of land use in that grade cattle cannot be grazed as native cattle. They normally graze in stalls and paddocks which lead to fencing of plots. It was estimated by 1979, that there were about 600,000 cattle of which 1000 were of exotic breed in the whole district. However, of the respondents interviewed only 12% kept grade cattle. Nevertheless, there is a general attempt to introduce exotic cattle for commercial purposes. This attempt is supported by the government.

In short, this section on changes in livestock production has determined that:

1. there has been a change from nomadic pastoralism system to group ranching system.

2. There is an increase in livestock numbers and densities in the whole district, study area included. As a result, the pastoral carrying capacity is reduced and the herds will have to seek survival elsewhere including the park.
3. As a result of the change in pastoral system, artificial sources of water such as boreholes, dams are constructed. These are unconducive to the free movement of wildlife in the area.
4. The change from Native Cattle to grade cattle carry along with it a change of grazing system leading possibly to fencing of stalls. This affects wildlife free movement.

The implication of these changes in livestock development is that effectively no land around the park boundaries remains unused by livestock illicit grazing in the park becomes common. Observations revealed that Masaais in the pretext of watering livestock in Mbagathi river graze on the southern part of the park. This is expected to continue, hence, more threats to the viability of the park.

4.4 CROP PRODUCTION:

Crop production as a system of land use in the study area is a recent phenomena and is still restricted only to some areas with higher rainfall such as Ngong-hills. Although there has been no overall measurement of current crop production changes in the study area, numerous sources indicate that it has been taking place. Kajiado District Development Plan (1980) indicates that production of maize, beans, potatoes, onions, cotton, coffee, tomatoes and bananas are taking place in Ngong-hills areas.

However, during the period 1943-1963, crop production was unknown. The nomadic pastoralism was never accompanied with land cultivation. Even in Ngong-hills areas where the Kikuyus and Kambas settled as early as 1920, few areas were under cultivation.

At the moment, crop production has increased. Through 1960s and 1970s, crop production expansion to the West of Nairobi continued at an accelerating rate. By 1970, it had rolled southward along the whole eastern base of the Ngong-hills as far as the Kiserian river. And in the following decade it spread along the southern boundary of the park threatening its viability.

In Ngong-hills, for example, the number of farmers have increased to such an extent that today, only the western slopes of the hills remain uncultivated. Most lands of higher potential is under crops and farmers are extending to the slopes as far as the Isenya area. In Ngong-hills, out of its 45,600 ha. agricultural arable land, coffee takes 20 hectares, maize takes 1,000 and beans 1,400 (Table 13).

In the northern fringe of the Athi Kaputei Plains where the land is owned by individual ranches, attempts to cultivate the land is rapid. In Kaputei and Senya area, the involvement of the Masaais in crop production is increasing. Personal communication with the Agricultural Officer of Kajiado District revealed that some members of group ranches have resorted to cultivation after failing in livestock husbandry. Some of them cultivate in some areas of Ngong-hills but stay within the group ranches. The Agricultural officer believed that many more members of the group ranches will follow suit.

Of the 38 respondents interviewed, 80.4% stated that they now cultivate at least a piece of their lands. The rest 19.6% (6) are pastoralists and ranchers.

Table 14 shows the respondents' views. Most of those who said they are still pastoralists, indicated the interest of cultivating in future. Of the 80.4% (32) who are cultivating, it was observed that most of them are in Ngong-hills areas and individual ranches in the northern region of Kitengela. The 21.0% who were already cultivating were all amongst the respondents in Ngong-hills.

However, even in the Athi-Kaputei plains which used to be predominantly pasture lands, cultivation is widely noticeable. There are presence of small patches of cultivation around the homesteads, particularly, those homes where one sex is of Kikuyu or Kamba tribe.

As, has been pointed out earlier, expansion of cultivation in areas such as Ngong is unavoidable given the human increase in the area. More land will have to be brought under cultivation. The pasture lands will be affected but mostly, wildlife conservation will not have rooms in cultivated areas.

TABLE 13: LAND UTILIZATION FOR CROP PRODUCTION OVER THE 1974-1983 PERIOD IN NGONG DIVISION

Crops Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Cabbages	30	40	50	60	60	-	-	-	-	-
English Potatoes	400	425	450	475	500	550	550	600	660	750
Coffee	-	-	-	-	-	-	10	10	10	10
Maize	-	-	-	-	-	900	1,000	1,000	1,800	1,000
Beans	-	-	-	-	-	-	1,400	1,700	2,100	2,500
Bananas	-	-	-	-	-	-	-	20	20	20
	430	465	500	535	570	1,450	2,960	3,900	4,590	5,280

Source: Agricultural District Office (1983).

Note : Some of the estimates were not available.

TABLE 14:

RESPONDENTS WHO CULTIVATE

Crop Production	1943-1963		1963-1983		2003	
	No	%	No	%	No	%
Cultivated	8	21.0	32	80.4	38	100
Not Cultivated	30	79.0	6	19	0	0
Total	38	100	38	100	38	100

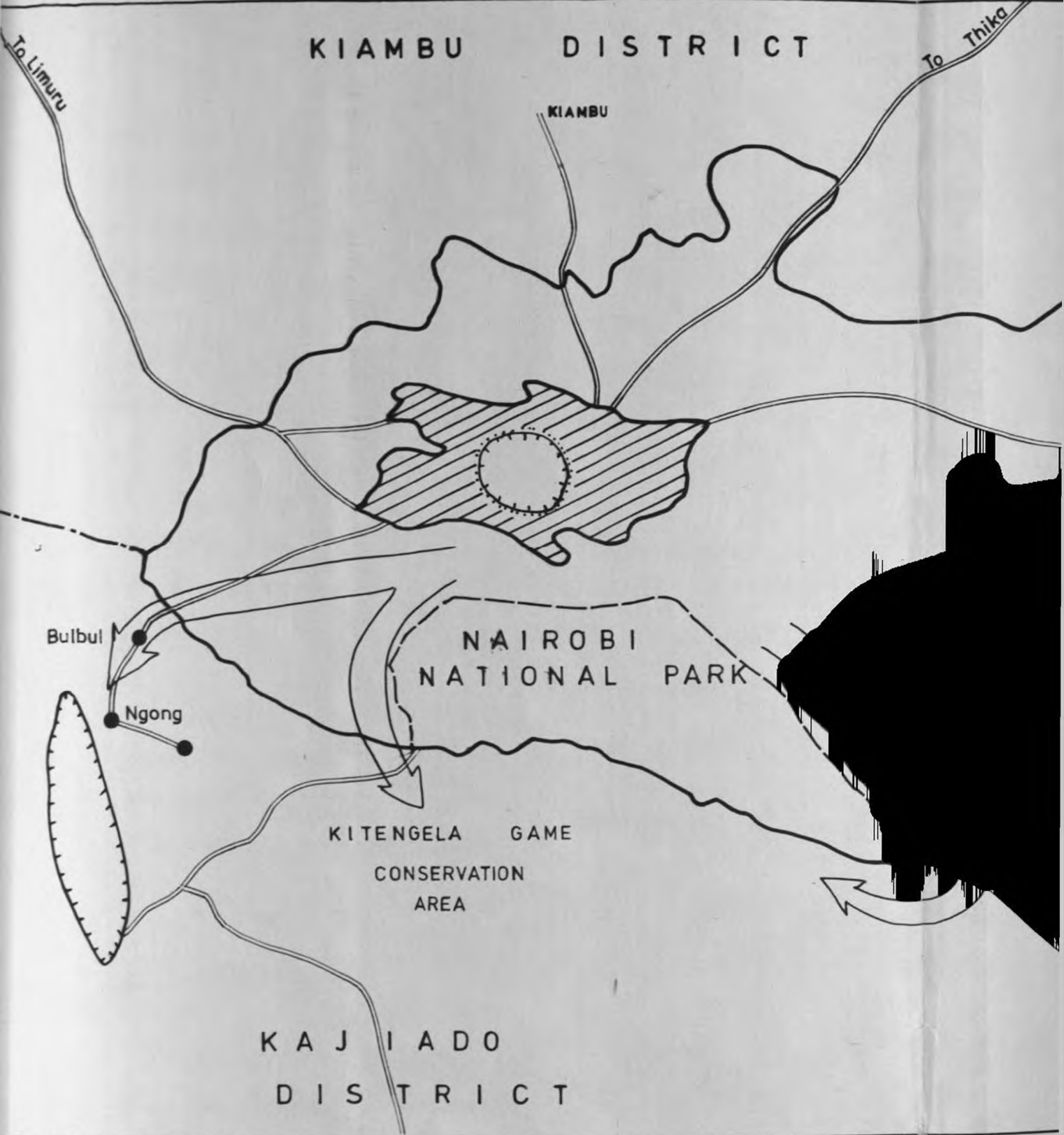
Source: Research Data.

4.5 URBAN SETTLEMENT:

Urban settlement has been an important land use in the areas around Nairobi National Park. The Park, as we stated earlier, was created in a situation of urban development. Since its establishment, urban development has been engulfing the park from the north spreading on both sides to the east and west. Changes in urban settlement has been taking place around the park in both space and in terms of new developments and human population.

The main urban development that threatens the park most is Nairobi City within which the park is situated. From its establishment as a railway depot in 1899 to the present, Nairobi City has grown and developed into a metropolitan area. Between the period 1899-1919, the town had an arbitrary circular boundary of $1\frac{1}{2}$ miles radius. At this stage, the site of the Nairobi National Park was far much out of the effect of the town development. It was, actually, 8 kilometres from Nairobi on the south. Wildlife could still possibly move upto river Nairobi. The park had not even been established.

KIAMBU DISTRICT



The period between 1920-1927, saw Nairobi town becoming a Municipality in 1919. The initial circular boundary was changed to include some of the residential esidential estates such as Parklands. Further boundary changes were made in 1926 to absorb most of the low density European residential areas such as Muthaiga. The new boundary change encompassed the urban area only 32 square miles extending 6 miles east-west and 5 miles north-south. However, the extension north-south was more to the north than south (Map 19). The site of the National Park was still far from the urban influence. Nairobi population at this stage was 29,864 people.

From 1928 to independence period in 1963, the boundary of Nairobi urban area remained substantially the same. However, through incremental areas, peri-urban low density residential areas developed and this was encouraged due to lack of universal land use control. But still the site of the park had not been affected.

In 1946 when the park was finally established, Nairobi urban growth and development had started causing worries. As a result, in 1947-48, a first colonial urban plan in Africa was prepared for Nairobi.

This realized the creation of the Nairobi Industrial area to the south-east-closeby to the park. Most likely, the extent of the migrating wildlife species must have been disturbed.

And just five years before the 1963 major Nairobi urban expansion, the Nairobi Airport was officially opened to commercial air traffic on 10th March 1958. The road to the airport demonstrated the impacts on the Nairobi National Park when fatal accidents occurred almost every night (Royal National Parks Report 1956-1960).

In 1963, after independence, the new independent administration of the city decided to expand the city boundary with apparent intention of including adequate land for residential and commercial development and to absorb the peri-urban and dormitory areas occupied by people depending on the city for their employment. The boundary expansion was from 90 square kilometres (35 square miles) to 690 square kilometres (266 square miles). This boundary expansion enclosed the park inside the city boundary, as it were. And with this expansion a number of development began spreading towards the southern part of the city increasingly surrounding the park.



Plate No. 16: Fences on the northern side of the Park that borders the Nairobi City.



Plate No. 17: Continuation of the fence on the Langata side that extends down to the river towards Ongata Rongai.

Of significance are the Mombasa road, Langata road, the Langata Barracks and its residential quarters, numerous estates such as Kibera, Otiende, Ngei and most recent ones such as Onyonka, Rubia and Ojiambo. The development of Kibera and Jamhuri Park cut the corridors of the wild cats to and from former Ngong forests. This was realized when Lions were frequently seen in the Kibera Estates trying to reach the forests to no avail. Other developments include, the Wilson and Jomo Kenyatta International Airports, the industrial area and the Belle-view Cinema. All these developments led to eventual fencing of the park on the city side (Plate 16 and 17).

Projecting the development of Nairobi metropolitan area, we would not be surprised to see Ongata Rongai, Bulbul and even Ngong town and Athi River declared peri-urban and dormitory areas occupied by people depending on the city for their employment. Not only that, these areas are already acting as satellites to the Nairobi Metropolitan area. Table 15 and Map 19 indicate how Nairobi urban development growth has been since 1899 and the projected situation to the year 2003 A.D.

Most of the other urban development changes that threatens the future of the park such as Athi River Town, Ngong Town, Ongata Rongai and small centres such as Bulbul, Kiserian and Kitengela are largely due to the metropolitan area - Nairobi City. Except Kajiado town.

Athi River Town is situated approximately 30 km. south east of Nairobi (and the park) along the main A 109 Nairobi Mombasa road, and is at the Junction of the main A 104 road which leads to Namanga. The route of the Kenya railway from Nairobi to Mombasa passes through Athi River, which includes a main stopping point at Athi River Station. This location makes Athi River town and environs eminently suitable for development as an industrial satellite town for Nairobi, the latter's growth being severely constrained with its industrial area suffering from acute congestion. "The potential of the town industrially has been recognised by the private sector and a part from existing industries numerous applications for industrial plots are being processed by the Council" (Rofe Kennard and Lapworth, 1982).

The Athi River town had a population of 12600 which was estimated to rise to 63000 in 2005. In 1969, the population of the town was 5343 (National Population Census 1969). In 1979, it was 10,012. This shows a growth rate of 6.48%. The reasons for this rapid increase is largely due to its industrial potential which is expanding towards the Athi-Kaputei Plains.

The boundary of the Athi River town has recently been extended. The new Athi River town Council area (now approx. 51,400 ha.) Map 20 shows the new boundary has completely joined it to Nairobi Boundary with the park completely engulfed.

Ngong Town which is rapidly growing into a satellite of Nairobi is a recent development. It is approximately 2km^2 in size. It had 1583 people in 1969. In 1979, the population increased to 4,004. With a growth rate of 9.7% per annum, Ngong is now (1983) having 5798 people. Projected to the year 2003, it will have 36,932. The density would have increased to $18,466\text{ km}^2$. This implies that Ngong town area will increase to accommodate this population. This would mean more impact on Ngong as a water

VELOPMENT

NAIROBI DISTRICT AND CITY

CITY BOUNDARY

S BOUNDARY

UNDARY

UNDARY

NAIROBI NATIONAL PARK

NEW ATHI T AND AREA

NORTH KAPUTEI

KILOMETRES

ATHI RIVER URBAN DEVELOPMENT

N AND



DBI.

MAP NO

/ 84.

20

TABLE 15: LAND ADDITION PER BOUNDARY EXTENSION
NAIROBI CITY

Year	Area sq. miles	Area sq. km	Population	Growth Rate
1901	7.0	-	-	
1906	-	-	14,512	
1919	9.8	-	-	
1926	-	-	29,864	
1936	-		49,600	
1944	-		108,900	
1948	32.4		-	
1962	35.0	91.0	266,794	
1963	26.6	69.0	343,762	
1969	26.6	69.0	590,000	
1979	26.6	69.0	835,000	3.7%
1983	26.6	69.0	965,609	
2003	Unknown	Unknown	1,996,392	

Source: Nairobi City Council Planning Department
and Census Reports.

catchment area and the ecology will be disturbed. Even the Thick forest where some wildlife can still take refuge will be disturbed.

Kajiado town is situated right in the middle of the former migratory routes of wildlife from Nairobi National Park down to Amboseli. The town covers an area of 21 km². In 1969, it had a population of 1,765. In 1979, the population increased by 100.3% and it was 3,524, growing at 7.2% per annum. In 1983, therefore Kajiado had approximately 4,653 people. Projected to the year 2003 A.D. Kajiado would have 18,690 people. The density would be approximately 935 km². Given its location, no more wildlife would therefore pass down towards Amboseli. Already its presence has contributed to the curtailment of the migratory animals' routes.

Ongata Rongai is another urban development that is very close to the park. By the year 1946 when the park was established, Ongata Rongai had only one homestead next to the river near the bridge. Between 1973-1976, Ongata Rongai had only a few shops. The Masai Lodge itself had not even been constructed. Now, even residential areas have been established

occupied mostly by those working in Nairobi. Given the location of Ongata Rongai right at the corner of the park, the movement of wildlife outside the park will be curtailed by the urban development.

Other urban development in the area include centres such as Kitengela, Matasia, Isinya, Konza and Kiserian. Although they are still small centres, their developments are equally fast and threatening free movement of wildlife.

In general, the urban development in the whole study area is expected to increase in future. The implications of this to the future of wildlife is disastrous given that wherever urban development takes place, the free movement of wildlife is completely stopped.

4.6 RURAL SETTLEMENT

Between 1943 and 1963, there were no permanent dwellings in areas such as Kitengela. But from 70's permanent dwellings now occur all along the southern boundary. Along the western third of the boundary, settlements are dense and are accompanied by fencing,

paddocks and even by walls. Several dwellings of indigenous people noted during the field observations in the Kitengela area that is immediately around the boundary of the park. These dwellings include 8 clusters of Masais bomas, thorn fence or wood fenced huts made of mud and poles. Around the Manyatta is the intensive wood fence (Plate 18). Three permanent homesteads, a primary school and several permanent structures including the government sheep and goat offices are all very close to the park boundary - (within 1 km. to the boundary).

A long the Central section of the southern boundary permanent dwellings are widely spaced, but the land is all privately owned and likely to be developed more intensively in the immediate future.

In Ngong-hills areas, almost all households who are not within the town own homesteads. Hence, if in 1979, there were a total of 9,776 households in the division, and 1,120 were in Ngong town, leaving allowance of approximately 1,000 to be in Ongata Rongai, Kiserian and Matasia Centres, the rest nearly 7,000 households are rural based. This shows the heavy rural settlements in the division.



Plate No. 18: Fenced homestead in Kitengela area about 200 metres from the Mbagathi River (Park's boundary) (1983).

Of the 38 respondents interviewed, all have homesteads. Only 5.2%(2) had not had fenced homesteads. Asked to comment of the future situation, even the 5.2% (2) stated they will have to fence their homesteads. Table 16 shows the response of the interviewed residents regarding homestead fencing. Their main reasons for fencing is to prevent the wildlife.

The implication of homestead settlement and fencing to wildlife conservation is very significant. If the farms and grazing plots also have to be fenced, then no future for wildlife conservation in this area. Most will have to be residents of the park.

TABLE 16 : RESPONDENTS WITH FENCED HOMESTEADS

Homestead Fencing	1943 - 1967		1963 - 1983		1983-2003	
	No.	%	No	%	No.	%
Fenced	0	0	36	94.8	38	100
Unfenced	38	100	2	5.2	0	0
Total	38	100	36	100	38	100

Source: Research Data.

4.7 PHYSICAL INFRASTRUCTURE

Several physical infrastructural development have occurred since the park was established. Between 1943-1963, most of the infrastructural development were on the northern side. There is the Mombasa Road which runs along the park boundary for approximately 21 kms. It separates the industrial area and the Jomo Kenyatta International Airport. On the west runs the Langata road which runs for about 9 kms. a along the park boundary. It separates the Langata residential area and the park's boundary. There is also the Wilson Airport closeby with the highest frequencies of landing aircraft in East Africa. There is also the main Nairobi Athi-River-Namanga Road and the Senya branch on the other side of the park. There is also the Pipeline road which runs from Ngong hills through Kitengela to Kajiado and through to Konza.

A part from the roads, a number artificial water sources have been constructed mostly in the Kitengela and Ngong-hills areas. These include boreholes and wells for livestock and human use mostly. The main reasons for constructing boreholes is to cater for livestock in the group ranches. Some individual ranches have also constructed their own boreholes.

In summary, with increase in land development, more infrastructural development is unavoidable. The infrastructural development in the whole area is expected to increase. The District Development Plan 1979-1983 indicated this trend. It budgeted for construction of new artificial water sources such as boreholes in all the group ranches. It stated very clearly that one of the problems retarding development in the whole district is lack of good all-weather roads. It provided a budget to realize the provisions of these infrastructure.

To cater for the rapidly growing Athi River town, a proposal has been made to construct a series of dams along the Mbagathi river. The Ministry of water Development in May 1982 assigned a private Engineering firm to undertake a feasibility study. This proposed dam, if implemented, will have disastrous impacts on the future on the park. If it is implemented, a number of infrastructural development will go along with it. This will include creation of water points for livestock and human consumption.

The development of such infrastructure will create accessibility to resources of the area. That is positive as for the general development of the area but not to wildlife conservation. The wildlife conservation will suffer as a result.

4.2 CONSERVATION:

Conservation has been a major land use in the whole of the study area, if only they could be maintained. Nairobi National Park which is part of the study area constitutes about 114 sq. km. and is all for conservation. A part from the park, fauna and flora conservation has been pursued throughout the study area by enforcement of the game laws and forest guards against unlicensed hunting and tree cutting in Ngong-hills.. Kitengela area and Ngong-hills were declared conservation area and Game reserves respectively, immediately the park was established. Ngong-hills was declared a National game Reserve only 3 years after the gazettlement of Nairobi National Park.

Both Ngong-hills and Kitengela are no longer reserves in terms of the existing land uses. A part from the Government protected Ngong forest, no area in Ngong-hills that is under conservation. Conservation

as a land use in the area is seriously threatened by the rapid land development.

4.9 OTHER LAND USE CHANGES

The foregoing eight areas of land use changes are considered as the major ones in the study area. Others include hunting activities, industrial developments and recreation. Hunting activities has been a form of land use between man and wildlife time in memorial. However, the system, technology used and purposes have changed over time.

The traditional hunting activities by the Masaai pastoralists were mainly done to protect the domestic stock. They used the locally made Masaai spears. In some cases they could kill, say, lions to fulfill the tribal customs, such as joining the manhood group. These activities posed no real danger to wildlife population in the study area.

This system of hunting changed to commercial and sport hunting using the European Man's weapons. This was very different from the subsistence hunting that was undertaken by the Masaais. It caused

remarkable threat to the wildlife population in the study area and the entire country. Because of the threat to wildlife population, particularly, through poaching; controlled management hunting areas was introduced in Kajiado District. The study area fell under the Athi-Kapiti area which was sub-divided into Kitengela, Senya and North Kaputei Management Units. The areas as were divided, were primarily differentiated by ecological variables. To be allowed to hunting, licences had be issued and hunting fees charged. These were to be shared with the landowners. However, personal communications with the Kajiado District Wildlife Management Officer indicated that the landowners gained very little from hunting activities. It was also very difficult to determine who to be given the gain. This was partly due to the fact that at times wildlife could be shot in one area belonging to a different person and the animal will run and die on another land belonging to another person. This caused conflicts as to who to be given the share.

However, in 1977, largely due to rapid reduction of wildlife polulation through poaching, the Kenya Government officially banned hunting in the

whole country. Thus during the study period, there was no hunting as a land use activity observed. The trend in the whole country, appears to be calling upon the uplifting of the ban on hunting. This trend could benefit the landowners as it were.

The industrial development as a land use in the study area is insignificant and are mostly within the defined urban areas. However, their effects go beyond the mere urban land use ones. For instance, the Kenya Portland Cement of Athi River town is within the current boundary of Athi River Town Council, but its pollution effects on wildlife and vegetation within and outside the park is beyond the Athi River urban boundary.

There is little recreational activities in the study that require separately defined land use. Most of the available recreation facilities such as racecourse that may need large tracts of land are not in the study area.

SUMMARY

This chapter has identified and, analysed changes in land use in the study area. We found that the most dominant changes that lead to changes in other land uses in human population which has changed so rapidly in the study area. We also observed that land tenure has changed from communal land ownership to group and individual ownerships. Livestock production has changed from nomadic pastoralism to group or individual sedentary pastoralism. It has also increased in numbers and changed from native cattle to grade types. It was also revealed that crop production (cultivation) has increased in the study area taking over grazing land and leading to clearance of vegetation. The crop production has changed involving the production of cash crops such as coffee, maize and beans, particularly, in Ngong-hills areas. In some farms of Ngong-hills, farm chemicals such as fertilizers are applied as means of land use intensification practices. There has also been urban land use changes. It has also been observed that rural settlements have changed from nomadic Masaai Manyatta to Permanent fenced homesteads. Conservation areas have also been turned into other land uses.

Other land use changes include those concerning hunting activities. There has been a change from subsistence hunting to commercial sport including poaching to no hunting at all.

CHAPTER 5

5.0 IMPACTS ON WILDLIFE

Impacts on wildlife are seen to occur when the changes in the initial land condition lead to a requirement of adjustment and/or adaptation on the side of wildlife. But whatever the changes in land use, not all, individuals, groups or communities of wildlife are affected similarly. They also have varying capacity to adjust and adapt to the effects. However, it is not the intention of this study to assess the impacts on specific wildlife species, for instance, on wildebeasts or giraffe. This is left for future research. Furthermore, the impacts that such changes in land use can effect on the species feeding habits are not considered here. Rather, we consider the impacts on the general wildlife population densities, distribution and the migratory routes.

The impacts on wildlife population and their migratory routes in the study area started even before the park was established in 1946. Slight impacts started with the arrival of the Kenya-Uganda railway line in 1895 at the present site of Nairobi city which realized the establishment of the city. Before the arrival of the railway line, the main land use was nomadic Masaai pastoralism. The area was used largely for grazing and watering the Masaai livestock. Their

impacts on the environment, and wildlife in particular, was negligible, and was confined to creation of Manyattas and seasonal grazing stock. These activities could not affect significantly the wildlife population. Few incidences of killing of wild animals following attack on the Masaais livestock or for Masaais' customary norms could not affect the population of wildlife. The free movement of the mobile species were not affected.

The introduction of the European man started causing the distabilization on the environment. The settlement of the Europeans in Nairobi led to the sport hunting of game in this area. Before the establishment of the park, the European settlers used to hunt in the open grassland of the Athi-Kaputei plains (Ian Parker, Personal Communication, 1983). This hunting had effects on the population of wildlife and possibly scared some species from their usual areas.

The creation of the Nairobi urban area early this century also had a number of impacts on wildlife in this area. It curtailed the movement of wildlife to the north. Wildlife that used to migrate upto the Nairobi river had their migratory routes blocked. Those that continued to move towards the north caused conflicts with the urban activities hence were killed.

Such killings reduced the number of wildlife in the area. The creation of the Nairobi airport road in 1958 contributed quite significantly to the killings of the wildlife. There were cases of fatal accidents almost every night (Royal National Parks 1956 - 1960).

Eventually, the Nairobi urban development led to the complete fencing of the park on the northern side - naturally reducing the wildlife dispersal areas. This could have affected the feeding habits of wildlife and increased stress on the carrying capacity of the park and the southern dispersal areas.

Hence, between the period 1943 - 1963, the main impacts on wildlife conservation, hence, the park was largely due to urban development on the north. The impact reached its peak when the park was completely enclosed inside the city boundary following the city boundary expansion in 1963. This left the park open only to the south - a distance of only 22 kilometres.

Between the 1963 - 83 period, impacts on wildlife have emanated from many more causes. The population explosion that followed the independence period caused a number of land use changes that are not compatible to wildlife conservation.

1. Changes in land tenure from communal to private group or individual ownership changed the rights of land usage. The private landowner is virtually free to decide for himself what kinds of wildlife if any, he wishes on his land. He can implement his decisions by habitat modification (burning, bush clearing, ploughing, reseeding) or by limiting movements and access through fencing. Section 31 of the wildlife (conservation and management) Act, 1976 (Kenya, 1976) states that:

"....any occupier of land or any owner of stock may for the protection of his land or stock kill any game animal which is causing material damage or loss to his land or stock thereon".

The legal provision quoted appears to give the land owners the choice of permitting or denying the use of their lands to wildlife. This change in land tenure, therefore, poses a threat of unknown dimensions to the future of wildlife populations in the study area.

2. Livestock production has increased in the areas adjacent to the National Park. This has the support of the range development schemes to promote the livestock industry on the rangeland. These schemes include provision of boreholes for water, purchase of improved breeding stock and intensification of veterinary services. It was observed

that these changes in livestock are harmful for wildlife and their habitat. For example, improved disease control and the setting up of artificial watering locations to which wild game have no access have increased the number of livestock. This has resulted to diminished grass to wild herbivores due to over-grazing by livestock.

3. From our field surveys undertaken, it was observed that the expansion of crop production is taking place in some parts of the study area. These are mostly in Ngong hills areas. These areas were once important dry season grazing and watering zones for wildlife and the Masaais. These expansion of cultivation, it was observed, has curtailed grazing areas of wildlife. The wildlife movements to vital sources of food and water have been disrupted. The problems become worse as the farms get more sub divided and completely fenced.

4. Direct collisions were found to occur between wild animals and man. This is not a new interaction in the study area. The traditional struggle for survival of the Masai pastoralists

and their hunting activities aimed at protecting the domestic stock does not pose any real danger to wildlife in the study area. It was found that there are very few cases of illegal killing of wild animals; particularly, from the local inhabitants. However, it is evident that illegal hunting as a form of land use has contributed to the reduction of wildlife population particularly in the Kitengela area. No rhinos for example, were spotted during the study period in the Athi Kaputei ecosystem outside the Nairobi National Park. However, there is evidence with the case of rhinos that the status of this species, which represents extraordinary viewing attraction to tourists, is precarious.

Aerial surveys data also indicated to us disproportionately high losses in the number of ostriches in the Kitengela area. Although it was observed that they have become permanent residents of the park, illegal hunting is considered to be the main cause of the decrease in their population.

The predators such as lions and leopards were also seriously reduced in number in the adjacent areas of the park. There was not a single species in the study area (FAO 1980), it can be taken that not one of 35 lions that grew up in the Nairobi National Park and settled subsequently in the Kitengela area survived. At the moment, there are only 11 lions inside the park (Park Warden, NNP 1983, Personal Communications). From Masaaais' statements, lions still attack them. However, this appeared to be restricted to areas close to the park or to the thickest parts of Ngong forest.

5. It was observed that urban development and construction of rural permanent homesteads enclosed with fences impinge on the free movement of wildlife. The urban development such as Ngong, Athi River Town and Ongata Rongai have contributed significantly, to the impingement of the migratory routes of wildlife.

It was also observed that due to land use intensification in Ngong hills, farm chemicals such as fertilizers are being used. These have contributed to pollution of river Mbagathi. And as had been explained in Chapter 3, there are

several aquatic species such as hippopotamus, crocodiles and water tortoise in the river. In addition, several terrestrial fauna consume this water. As a result, they get polluted. Chabeda, 1983 (Personal communication) indicated that some signs of pollution have been experienced in this river.

As we observed in Chapter 4, a dam has been proposed along Mbagathi river. If the proposal is implemented, remarkable impact on wildlife species that inhabit the Mbagathi, Makoyeti and Sosiani gorges inside the park will be displaced. As a result, a number may die.

The wildlife population and their migratory routes outside the park have been remarkably affected. From the respondent's observation, there has been a general reduction in the number of wildlife. This implies that a number have been killed and the remaining have been confirmed within the park.

5.1 IMPACTS ON VEGETATION

The vegetation of the study area has been explained in detail in chapter three. Their relationships with wildlife has also been assessed. Similar to the

case of wildlife, we were not assessing the impacts on different vegetation species. The impacts on vegetation has been evaluated generally on the coverage and utilization.

Discussions with the experts revealed that human use or land use changes in the study area have remarkably influenced the vegetation. They observed that as a result of urban development, crop productions, rural settlements, livestock production and creation of roads, boreholes and wells, large areas of the study area have been cleared.

Within the park fire which was used for management purposes has affected the vegetation coverage. As a result, park management by use of fire has stopped (Kaitanny, Personal communication, 1983).

In the Kitengela Plains, due to increase in livestock numbers, over-grazing has reduced the heights of grass. Tall grass species such as Themenda Tetrahendra are quite susceptible to overgrazing. As a result, they disappear and woody species comes in succession. This affects the wildlife species' feeding habits and may make them move to other places.



Plate 19: An overbrowsed tree species inside the park by the confined giraffes.

In the open grasslands of the park, few areas could be observed having been over-grazed. As a result, the heights of the grass have reduced and formed carpet like appearance.

However, within the park, the most visible observable impacts is on the tree species. Some of the species have been over-browsed by the confined browsers such as giraffes. Due to land use changes outside the park, a number of species such as giraffes have become permanent residents of the park. This has caused stress on the carrying capacity of the park in terms of the vegetation species for the browsers.

Plate 9 shows an intensively browsed tree species inside the park by the confined giraffes. However, we observed that inside the park, there is little grazing. This could be because a number of grazers are mostly in the dispersal areas.

In general, the most direct and severe impacts on the natural vegetation in the study area is caused by cattle overgrazing and clearance for urban, agriculture and charcoal burning by the people. Clearance for charcoal burning was observed to be taking place in Ngong hills where a number of tree species have disappeared due to clearance. Most areas that showed

over-grazing are in Kitengela towards Kajiado township.

Overgrazing changes the grass from a tall type to a carpet like type. The tree densities increases and this affects the feeding habits of wildlife grazers.

Another impact on vegetation inside the park was observed to be coming as a result of the toxicity of the city pollutants. The industrial area is fairly close to the park. The pollutants from the industrial plant have settled on the leaves of some trees and this exercised an impact on wildlife feeding habits. The Athi river cement plant located only 50 metres from the boarder of the park also contributes quite significantly to the poisoning of the wildlife inside the park.

Generally, there is need to monitor the transitional changes from tall to short grassland and their effects on wildlife distribution and feeding habits. More research should be undertaken to determine the toxicity effects on the vegetation and how this in return affects wildlife.

5.2 IMPACTS ON WATER RESOURCES

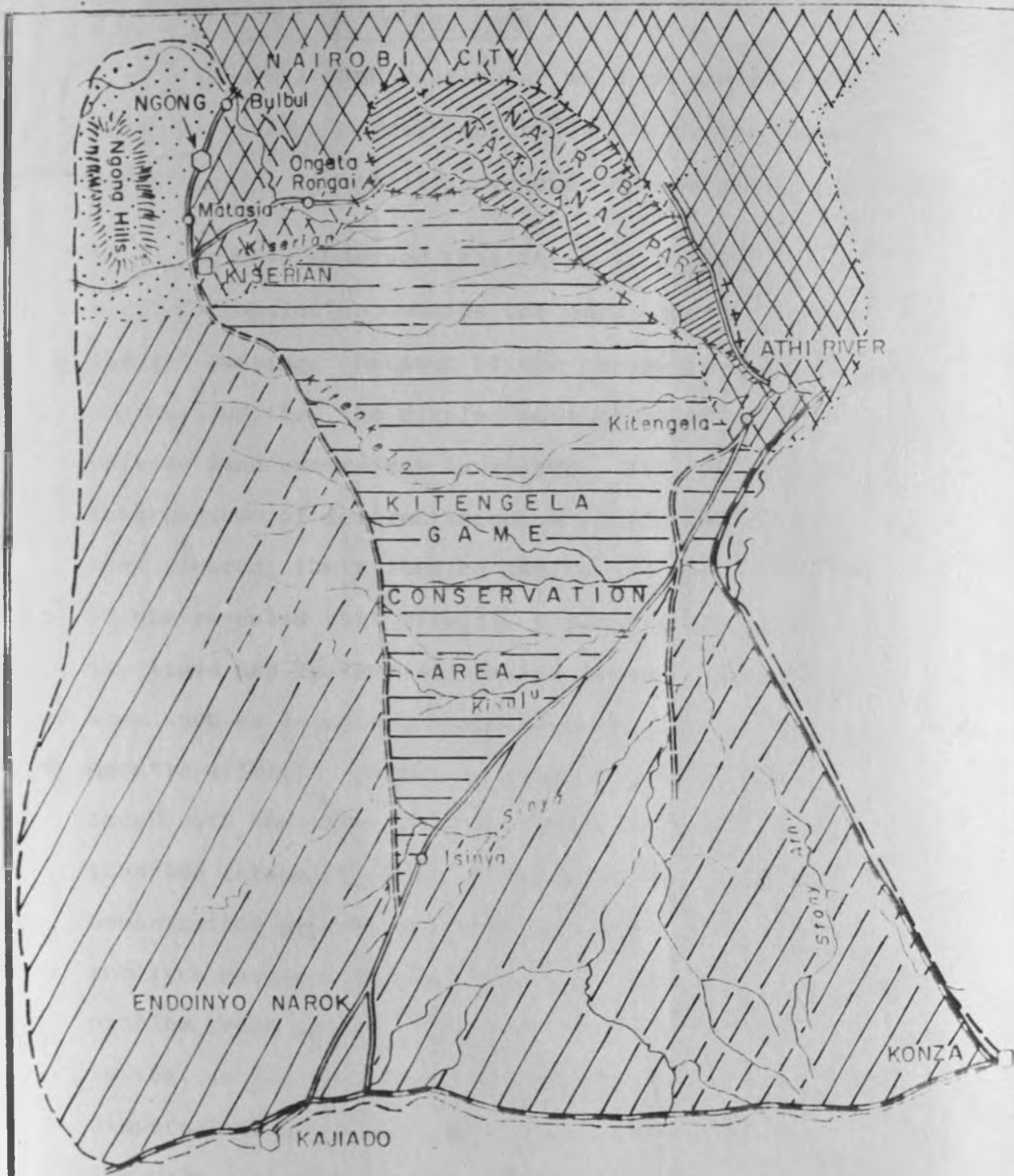
Changes in land use affect water resources in a number of ways. The clearing of forest land or bushland for annual cropping or intensive grazing in the absence of good conservation measures, can lead to much faster surface runoff, greater peak flows, erosion of stream channels and flooding and sedimentation polluting the stream.

In the study area, between the period 1943-1963, we observed that much clearance of forests land in Ngong hills areas, intensive agriculture had not taken place. Hence, most of the presently dry river valleys had flowing water. The flow volume or quality of water had not been very much affected. There was plenty of surface water although seasonal. Reaching the water sources was not limited to wildlife.

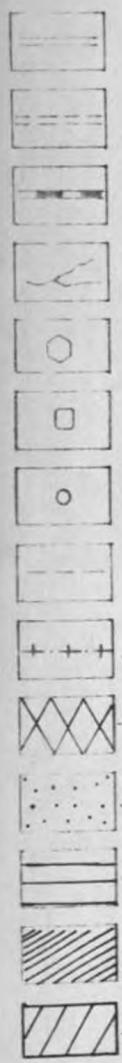
At the moment, most of the agricultural crop production take place around swamps and along river banks. These activities have contributed to water pollution, hence affected the water quality. This, as we have explained above, in return affects the health of the wildlife, particularly, the aquatic species. The temperature of water rises and makes the water inhabitable to the species.

Another effects on the water resources apart from quality is its availability. Water is used in the study area by livestock, man and wildlife. Hence, there is some level of competition. In the plains, there is hardly any water during droughts. The man and his domesticated animals resort to use of artificial water sources such as boreholes. These water sources are in most cases out of reach to wildlife. This affect wildlife in that in some areas such as in Isenya, wells were constructed in areas which used to have water pools. After construction of the wells, they have been fenced allowing only the use by livestock not most of wildlife.

The amount of flow of surface water has been affected in the study area. Due to tree clearance in Ngong hills, the rates of flow of most streams including Mbagathi river have increased. This causes flooding of the rivers and the streams. In October-November 1982, flooding was experienced in river Mbagathi. This affects a number of aquatic species and kills even the terrestrial ones. Riverine vegetation also get affected as a result of the floods.



PROBL



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS

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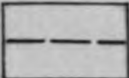
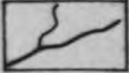
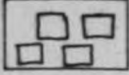

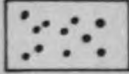
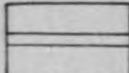
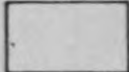
5.3 IMPLICATION TO THE PARK

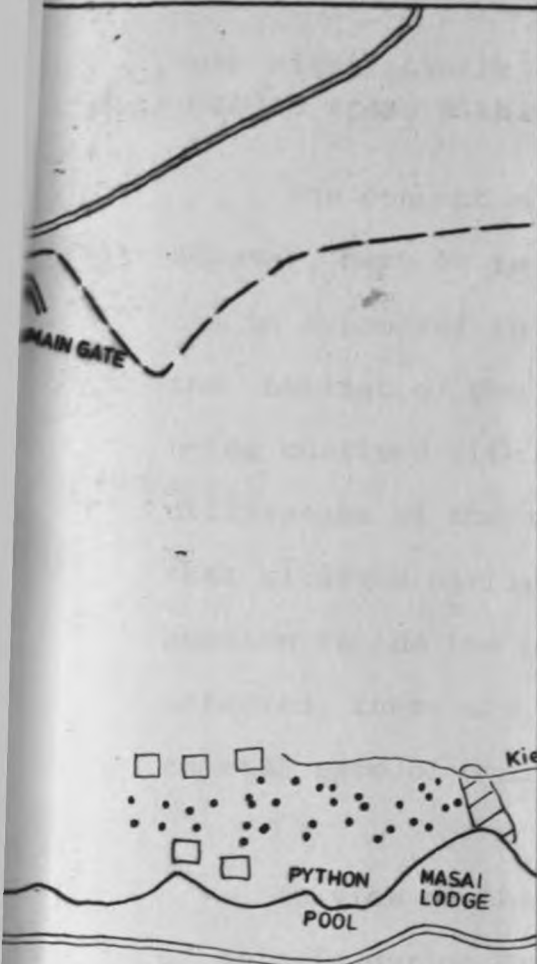
From the above analysis, we have observed that land use changes effect impacts on the environment, specifically, on wildlife, vegetation and water resources.

We have observed that there is a reduction of wildlife population outside the park, mostly due to illegal hunting. Because of the change in land tenure, we realized that the displacement of wildlife from the private land owners has increased. We also observed that because of deforestation, wildlife habitat have been cleared; their feeding habits are also affected. It was revealed that wildlife migratory routes have been impringed own by the land malpractices in the study area such as fencing of homesteads and farms. The aquatic wildlife species such as hippopotamus are faced with the effects of pollution as a result of land use intensification in Ngong-hills. The rapid urbanization process in the study area is curtailing the free movement of the wildlife. Map No. 21 shows the problem areas outside the park. The general result is that as land use changes displace wildlife in the dispersal areas of the park, they take refuge inside the park. It was observed that a number of wildlife have become permanent residents of the park. These include giraffes, rhinos, lions and ostriches. This implies that the park carrying capacity will be

PROBLEM AREAS WITHIN THE PARK

LEGEND

-  PARK BOUNDARY
-  RIVERS
-  ILLICIT LIVESTOCK GRAZING
-  OVER BROWSING
-  RIVER POLLUTION
-  ROADS
- 



scale 1:10,000

PAUL OMONDI
 DEPARTMENT OF URBAN AND
 REGIONAL PLANNING
 UNIVERSITY OF NAIROBI
 M.A PLANNING 1983/84



MAP NO

22

IMPACT ON NAIROBI N
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very significantly stressed on. Map No. 22 shows the problem areas within the park.

The concept of carrying capacity is complex. However, here it is defined as the upper stocking which can be supported in the long term without damage to the habitat of the park. In view of the species being confined within the park, there will be over-utilization of the vegetation. Already, we observed that giraffes particularly have over-browsed some tree species inside the park. Although grazing is not affected, there are indication in pocket areas towards cheetah gate of over-grazing.

In view of the reduced animal habitat, mortalities of animals during drought due to high concentrations, carrying capacity will have to be an important considerations in management of the park. The upper limit at which wildlife can be stocked inside the park without damage or drastic change to the habitat must be known.

5.4 CONSTRAINTS AND LIMITATIONS

Before we present possible alternative options to put a check on the impacts of the land use changes in the study area; we evaluate some of the major constraints and limitations that may hinder future development in this area. These are:

(a) HIGH GROWTH RATE OF HUMAN POPULATION

As we observed in chapter one, Kenya's population is today estimated at over 16 million with the highest growth rates in the world - 4 per cent per annum. Over 80 percent of the population live in the rural area and depends entirely on land. The districts with the fertile soils have been depleted and some exceeded their carrying capacity (Kenya's Report to the UN Human Environment, 1972).

A situation prevails in Kenya today where land use interests such as urban development, agriculture, ranching, wildlife management forestry and water catchment each of them valid and nationally productive usages of land are in some instances in competition and often conflict. This is compounded by the demand of the landlessness and the burgeoning population. An important factor to consider here is that every Kenyan requires a plot of land as part of his birthright. At the same time, he has to earn a reasonable living. The existence of wildlife conservation areas must compete for its existence.

(b) LAND TENURE SYSTEM

The land tenure system is a constraint that may not easily be solved. The land policy states that an individual land owner has total rights over the piece of land he or she legally owns and has a title deed. The prevailing circumstances show that land ownership in the study area is going to be privately owned under individual title deeds. The wildlife will now be grazing on the private lands of the local inhabitants. The land owner has the right to allow only the wildlife he or she wishes, if any, to see on his land. The authorities have no power over the control of his land.

Furthermore, section 31 of the wildlife (Conservation and Management) Act, 1976 (Kenya 1976) states that

"....Any occupier of land or any owner of stock may for the protection of his land or stock kill any game animal which is causing material damage or loss to his land or stock thereon".

This legal provision, as we stated earlier, appears to give the landowners the choice of permitting or denying the use of their lands to

wildlife. This implies that the private land owners must see tangible benefits for allowing wildlife on their lands. Before any implementation is undertaken the land owners must be made aware of their gains.

(c) CHANGE IN ATTITUDE AND LACK OF AWARENESS

There is a general concensus that Masaaais' attitudes towards wildlife have greatly changed. Traditionally, the Masaaais' attitudes have tolerated wildlife co-existence. This attitude is rapidly changing. They now see wildlife as a hazard. It takes life of people and livestock. Wildlife spread diseases to cattle e.g. malignant catarrh from wild beests virus. Wildlife contribute to the reduction of water available to cattle.

These negative attitudes require education - creation of public awareness through extension programmes to explain to the local residents that wildlife resources, whose economic value they have so far hardly appreciated can be highly profitable. They must be made to understand that by including wildlife in the land use returns from rangeland can be considerably increased.

(d) RAPID URBAN DEVELOPMENT

Rapid urban development around the park is in itself a constraint to any future development in this area geared towards wildlife conservation. All the urban centres, Athi River, Ngong, Ongata Rongai and the metropolitan Nairobi are experiencing high growth rate. To accommodate this urban population and expand employment opportunities, the spatial areas of these urban centres will be increased. This constant land requirements for urban development is a constraint to a number of proposals for wildlife conservation in the area. The urban encroachment into the park and Ngong division will be very difficult to control.

(e) NATIONAL GOVERNMENT POLICIES

It is the government policy to develop potential arid and semi-arid areas (ASAL) so as to meet the national needs. The National Food Policy very clearly indicates this trend. The national development plans also stress this policy. The Ministry of Agriculture in response established the Arid and Semi-Arid lands Project - concerned largely with developing those areas. Coupled with these government policies, there are spontaneous migration into these areas. The

study area which is part of these areas has been receiving high number of in-migrants.

It is not rational to argue against these policy objectives. However, these development rush will make it very difficult to advocate for wildlife conservation. It will not be so easy to even advocate for co-existence.

Further, it is the government objective to settle permanently the nomadic Masaais pastoralists. This will ease the problem of administering them and help in improving their standard of living and bring it near to the national standard. All these imply developing the land leading to more changes in land use. They are, undoubtedly, sound objectives which cannot be challenged in this study. However, they are constraints to any proposal that attempts to ensure wildlife conservation as a primary land use in this area.

(f) DEPARTMENTALIZATION OF THE GOVERNMENT BODIES

There is also a problem of lack of cooperation and understanding between government agencies concerned with the land use of the area and the entire rangeland. The different departments trail

on their own line defined with their own objectives and policies. For example, the Ministry of Agriculture and livestock separately treat animal husbandry and wildlife management without appreciating that wildlife and livestock are economic resource from rangeland.

This departmentalization of the government bodies prevents an integrated approach. Because while one department's efforts are exclusively directed to livestock production, the other is only concerned with wildlife conservation.

(g) LACK OF TECHNICAL MANPOWER

It was stated by the experts that there is insufficient staff to manage the park, particularly, if it is completely fenced. But that is perhaps taking too far. Even at the moment, there is not enough, technically equipped manpower to plan for the co-existence of the park with the adjacent areas. But in case the park gets completely closed, the level of the required manpower will be a big constraint.

(h) LACK OF EQUIPMENT

To monitor the changes in land use and their impacts on wildlife require relevant equipments. These equipments are not available. It will be a big constraint to future development that may require intensive management of the park.

(i) LACK OF FUNDS

Last but not least is lack of funds. For instance, all the above constraints require some funds to be controlled or solved. The need to provide enough trained manpower and equipments will require funds. If the dispersal areas have to be acquired by the government, the landowners must be compensated. This money cannot easily be met by the existing resources unless we start soliciting for fund from the international bodies. This alone may not be enough leave alone the success of getting it and whether that will be the national priority of using that donation.

In brief, this section of the chapter has attempted to assess the possible constraints to future development in the area. The main constraints include the high rate of population growth in the study area and the entire nation.

Others include government policies, changes in land tenure system, lack of technical manpower and finance. In the next chapter of proposals and recommendations these constraints have been considered.

5.5 SUMMARY

This chapter has considered the main impacts on the park and its immediate environment of the changes in land use in the adjacent areas. We found that these will be impringement on the migratory routes on wildlife leading to eventual confinement of the wildlife into the park. Subsequently, there will be deterioration of the vegetation and water resources inside and outside the park. All lead to the stress on the carrying capacity of the park and its immediate environment.

Overstocking leads to over-grazing and over-browsing inside and outside the park. This has or will cause great impacts on the vegetation coverage and utilization leading to exotic succession of indegenous species with woody species. This leads to change on the feeding habits of the wildlife causing starvation or nutrition problems.

Other impacts on the park and the immediate environment includes water pollution, flow rate and volume. This affects the health of the aquatic resources and other animals that may use the water. Pollution as a result of the noise of the aircrafts and industrial development around the park also directly and indirectly affect the animals and vegetation in and around the park.

Generally, the future of the park is threatened by the rapid changes in land use. Apart from turning it into an enclosed "zoo" or "safari park", its land is threatened by being axed for urban development. The Masaais are already grazing along the Mbagathi river inside the park. In future, such grazing may be forced, if other land uses will have dominated the Kitengela and other dispersal areas of the park. So we will not be surprised in the year 2003 to see livestock grazing inside the park or industries being located in the plains of the park.

CHAPTER SIX

PROPOSALS:

6.0 SYNTHESIS

The foregoing analysis of the study area has revealed that there are significant land use changes that effect, mostly, negative impacts on wildlife conservation, hence the Nairobi National Park. The most dominant factor that influence the other land use changes in the area was found to be increased human population. Thus it has been noted that population has expanded and increased in the whole of the study area, particularly, the areas with higher rainfall such as Ngong-hills.

This has led to numerous changes in land use such as changes in land tenure, livestock production, crop production, urban settlement, rural settlement, physical infrastructural development and conservation. Land tenure has changed from communal to private group or individual ranch. Livestock production has also changed from nomadic pastoralism to group or individual sedentary pastoralism. It has also increased in number and changed from native cattle to grade types.

It has also been revealed that cultivation- (crop production) has increased in the study area taking over grazing land and leading to clearance of vegetation. Crop production has changed involving the production of cash crops such as coffee, maize and beans, particularly, in Ngong-hills areas. In some farms of Ngong, farm chemicals such as fertilizers as means of land use intensification are being applied.

Other land use changes are associated with urban expansion. The Nairobi urban development has expanded from a 1½ miles radius size in 1906 to a metropolitan area completely engulfing the park in it. Athi River town which fairly recently, had its boundary extensively enlarged from 960 ha. to 5410 ha. has engulfed the park in all its eastern part. Ngong town has significantly contributed to the clearance of former Ngong forests.

It has also been observed that rural settlement has changed from nomadic Masai Manyatta to permanent fenced homesteads. These is occurring in all parts of the study area. The density is high in Ngong-hills and on the northern fringe of Kitengela area and the areas around Isenya centre and Kajiado town.

Other changes in land use are associated with physical infrastructural development such as creation of artificial water sources such as boreholes and wells, road construction and airports. These have taken place in the whole of the study area, particularly, on the northern part of the park. It was also noted that conservation areas have been turned into other land uses.

These changes in land use were noted to effect impacts on wildlife conservation, hence the continued viability of the park. Major areas of impacts were observed on wildlife, vegetation and water resources. It was observed that the population of wildlife has reduced in the areas adjacent to Nairobi National Park. It was also realized that the migratory routes of wildlife in these areas are impinged on. There is a general displacement of wildlife in the area owing to the clearance of vegetation and overgrazing by the increased livestock. These imply reduction in wildlife habitat and food. The Mbagathi river water is polluted by the land use intensification in the Ngong-hills. This has led to pollution of the aquatic species such as hippopotamus inside the park. Wildlife that consume this water inside the park are also impacted upon.

It was found that all these impacts on wildlife, vegetation and water resources effect significant implication to the management and the continued viability of the Nairobi National Park. As wildlife are displaced from the park's dispersal areas, they get confined inside the park. It was observed that some wildlife species such as giraffes have become permanent residents of the park. Of all the 35 Lions of the study area, not even one is in the dispersal areas except the thickest parts of Ngong forest. The commonly seen 11 Lions are always in the park.

It was also observed that the continued urban development may eventually require a portion of the park open land to be given for urban development. These revealed to be the most threatening land developments that may completely turn the park area into other land uses.

Having determined that there have been/or are changes in land use in the study area, and that these changes effect impacts on wildlife conservation hence, threatens the viability of Nairobi National Park, an attempt was made to collect local inhabitants, government

officials and the experts viewpoints regarding the possible land use alternative of addressing the problems.

Of the surveyed local inhabitants 79 percent preferred that the wild animals should be fenced completely inside the park. Asked to comment whether they have any particular species in mind, most respondents singled out Wildebeests, Lions and Baboons. They claimed that Wildebeests spread the malignant catarrh diseases to their livestock. Lions and Baboons kill their livestock. Baboons kill mostly young goats. However, those in Ngong hills areas do not experience these conflicts unless those to the thickest parts of the forest.

Next to complete separation of wildlife from human beings, preference, was fencing of the farms and homesteads to avoid animals intrusions. The respondents however, said that this activity require capital to erect effective fences. 5.2% (2) of the respondents, however, preferred institution of more effective game control methods. They said that the present system of compensation for wildlife damages takes too long to be effected. They however, stated

it is a good idea. The compensation scheme for wildlife damages was introduced in Kenya in early 70's and incorporated in the Wildlife Act, 1976. The aim was to provide or re-imburse the property lost through wildlife menances. It is apparently the only way that farmers or landowners get any assistance from the loss of their property from the government. However, the implementation of the scheme has received a lot of criticisms from parliamentarians and the residents of animals habited areas. It is claimed that the procedure takes too long and some people never get compensated at all. While those who are lucky, get it after an average of 2 years. Table 17 shows the local inhabitants view points regarding the best resolution of the conflicting interests.

In view of the foregoing analysis of the viewpoint of the local residents, it was revealed that the local residents prefer that Nairobi National Park be managed as an open "Zoo". It was however observed that they may not understand the scientific nature or benefits of undertaking an integrated land use approach. Hence, it was taken that their "stand" on this was not properly evaluated.

TABLE 17: THE LOCAL INHABITANTS VIEWPOINT OF THE BEST RESOLUTION OF THE CONFLICTS

RESOLUTIONS	NO. OF RESPONDENTS	%
1. Shoot the animals that are causing the damage such as Wildebeests	1	2.6
2. Institute more effective game control methods eg., provide more game guardians and improve on the compensation machineries	2	5.2
3. Translocate the animals from the park to the places so that the park can be used for grazing or cultivation	1	2.6
4. Move the people away from the surrounding areas of the park and declare Kitengela a protection area onces again	0	0.0
5. Clear all the vegetation around the park so that the animals cannot hide to attack people	1	2.6
6. Fence all the farms and homesteads to avoid animals instrusions	3	7.9
7. Plant forest zone around the park for animals to graze "buffer zone" of forestry.	0	0.0
8. Fence the park completely to keep the animals inside the park	30	79.1
9. Restrict other land uses in the area to allow wildlife to co-exist	0	0.0
Total	38	100.0

Source: Research data.

It was observed that most of the interviewed government officials had varied views. This explains the conflicts that exist as a result of departmentalization of government agencies. However, of the twenty seven interviewed, 59.3% (16) stated that Nairobi National Park should be completely fenced. They explained that as a measure of maintaining the carrying capacity, wildlife should then be managed, harvested or ranched and those edible species be sold in the butcheries or exported. Some officials particularly, from the Ministry of Livestock and Agriculture, explained that this will automatically resolve the many management problems regarding land use in the study area.

The rest 40.7% (11) stated that we can still plan the area into an integrated land use system. Of these 40.7% (11) some people explained that the integrated land use policy may require the government to buy a portion of Kitengela. Asked to comment further on other alternatives, the officials interviewed felt creation of a corridor will not be an effective and long term solution. It will also require a clear determination of the length and width on the basis of the animals to use it.

It was observed therefore that the government officials views were varied. They largely expressed the difficulties of resolving the problem. Even some of those who felt that multiple use plan is necessary expressed the difficulties of implementing it.

The Experts on the other hand was found to have a sort of unanimous view that wildlife at the present must pay in order to survive. They explained that the concept of wildlife conservation, hence National Parks is alien to the local population. Some awareness still needs to be created amongst the local population. They stated that given the change in land tenure from communal to private individual ownership, the private landowners who allow wildlife on their lands must benefit directly from the money received from tourists industry.

Commenting on the corridor concept, most experts felt that this may not help resolve the situation. They explained that it will be difficult to define the corridor in terms of the user, size and length. Other difficulties which will be associated with the corridor, they explained would be the management, particularly, during the dry season when the wildlife

would need to move to other places in search of water and food. They argued that although such concepts have been used in some parts of the world, it requires a lot of technical inputs.

Commenting on buying of the parts of Kitengela, the experts felt that would ensure to some extent the continued viability of the park. However, it is faced with a lot of constraints such as how much to spend on buying it, and how much of it should be bought. But most importantly, where will the dislocated people be taken to and where do you get the money?

Referring to the possibilities of game ranching in the Kitengela area, most experts supported it and indicated that it is within the current government objective of consumptive use of wildlife. However, they pointed out that a detailed research on the cropping, marketing and demand of the wildlife meat must be undertaken first.

Explaining the possibility of multi-purpose land use planning, most experts felt that this is the most desirable approach to the problem although it would be faced with implementation difficulties.

Referring to complete fencing of Nairobi National Park, the experts indicated that given the trend of land development in the area, the park may eventually be enclosed. They explained that there is no future for unfenced wildlife in the Kitengela and Ngong areas, given that the land is under individual ownerships. They explained that managing the park as an "Open Zoo" would imply intensive management of the carrying capacity of the park. This they explained would require high level manpower which the country does not have.

Generally, it was observed that, the experts maintained that dispersal areas of Kitengela are necessary for Nairobi National Park. But the general consensus that they expressed is that whatever proposal advanced, the interests of the private land owners in the dispersal areas who share their lands with wildlife must get tangible gains.

We set out with three assumptions regarding the study problem. The first, we assumed that there have been/or are changes in land use in the adjacent areas of Nairobi National Park. From the foregoing discussing it has been shown clearly that this is the pattern in the study area. We have seen that land

use changes have/or rapidly taking place in the study area. We have projected that all the uses will be dominated by human beings in the area in the near future. The second assumption was that these changes in land use effect, mostly negative impacts on the park and its immediate environment. We have determined this beyond any reasonable doubt and projected that the impacts will be more disastrous in the near future. The third assumption was that several alternative land use system can be viewed that may realise the resolution to the problem. However, it was indicated that a most realistic one is multiple use plan. We have seen from the viewpoints of the local residents, the government officials and the experts that different land use options can be generated but all suffer from numerous significant weaknesses and are faced with several constraints.

6.1 PLANNING IMPLICATION

The above going analysis has indicated the need for a careful re-examination and complete change of the planning policy approach for conservation and management of wildlife and the conserved ecosystems. It is evident that National Parks and equivalent game cannot be planned and managed in isolation to their

adjacent areas. It therefore appears significant that planning and management policy of National Parks and equivalent game reserves should recognize the existence of this strong ecological interrelationships. They should accept that without the dispersal areas, the continued viability of these conservation areas is threatened. The future of wildlife, hence, tourism industry is doomed. It was further noted that with particular reference to Nairobi National Park, the importance of dispersal areas cannot be under-estimated. It was found that the park is completely fenced on the northern, eastern and western sides, and that the dry season concentration area of the park can feed only one-tenth of the current migratory herds without the availability of the adjacent dispersal areas. This implies that if the park were used by the migratory wild herbivores all year round then its qualities as a dry season retreat diminish.

It was noted that the problem of land use changes is rooted to the increased population change and human aspirations. This has led to changes in other land uses amongst them land tenure which has changed from communal to individual ownerships. It was further noted that with individual ownerships of land, the

owner has the legal rights to decide which wildlife, if any, should be on his or her land. It was also noted that other areas of land uses such as livestock and crop production, urban and rural settlements, infrastructural development and conservation have/are rapidly changing with various impacts on wildlife conservation. It therefore follows that the future of wildlife in the dispersal areas of Nairobi National Park depends largely on the individual landowners.

On examination of Kenya's wildlife conservation and management policies, one notices a strong emphasis on internal planning and management problems. It does not provide for the changes in land uses in the adjacent areas. This has been inherited from the colonial periods when wildlife was merely preserved from the unscrupulous shooters for sport and trade. This has yet changed to no significant extent since independence yet, the social, cultural, ecological, economic and political factors have significantly changed. These imply that the wildlife conservations policies regarding planning and management of National Parks must change to meet the requirements of the present situation.

At the moment, little official attention has been paid to the control of the land use changes in the adjacent areas of these conservation areas. In effect these changes have aroused numerous conflicts with wildlife the main loser. Attempts such as compensation schemes have received as per now very negative view about its success. Proposals from the official quarters regarding integrated land use planning approach are only in papers. They have never been put on ground. No attempts have been made to involve the local residents who share their lands with wildlife to participate in their well-beings.

It has been noted in this study that Nairobi National Park was the first one to be established not only in Kenya but in the whole of East Africa. In addition, the Headquarters of Wildlife Conservation and Management Department of the Ministry of Tourism and Wildlife is coincidentally located at its main entrance. Despite these facts, the park has not had a comprehensive plan. It has no specific conservation objectives. The planning and management attempts that have been made with regard to this park have been aimed largely at promoting it as a tourist's attraction. This has been realized in the provision of roads,

campsites and provision of other biological requirements for wildlife such as water to maintain them inside hence attract more tourists. Very little attempts, as we said have been concerned with the future viability of this park despite the general views and fears that the park is going out.

From the foregoing discussion it would be deduced that it is not only the planning and management regulations that need to be made to include the activities in the adjacent areas but a complete change is needed of the planning and management methods, the general planning and management policy approach and attitudes of the local people, government officials at national regional and local levels regarding not only wildlife conservation and the conservation areas but more particularly the accommodation of the needs of the local private individual landowners.

6.2 POLICY APPROACH

It has been recognized that although changes in land use effect mostly, negative impacts on wildlife conservation, hence the viability of Nairobi National Park, the accommodation of the needs of the local private individual landowners and other national policies and objectives are equally important.

Our task as planners now is actually to restore a balance which used to exist before the present drastic changes. In other words, we restore a balance between development and environmental conservation. We have to wisely use our resources for the future generations. But we cannot expect the area to go back to its old days' conditions with entire natural resources. Those days will never come back. We now only have to accept and meet the challenge of the changed circumstances. The current development needs must be realized.

The resolution to the Nairobi National Park problem and that of other National Parks and equivalent game reserves in the country must take into account this changed needs for wildlife conservation and developments. Even with the good intension of conserving wildlife to boost our tourism industry hence foreign exchange can only worsen the shortage of food and poor standard of living of the Masaaais.

The Masaaais should not be forced to maintain at their own expense what has come to be regarded as a national resource or asset. Land titles are preferred not only because of the moral value involved but also because without land titles there

can be no security of tenure and no incentive for improvement of the land for human use. Security of tenure is the most important consideration of the people in the study area now and they see wildlife preservation as one of the main obstacles hindering the issueing of individual title deeds. Refusing these people of this national right will not help conserve wildlife in this area effectively, not even for the survival of Nairobi National Park. Wildlife here must be able to pay directly to the individual title holders for its survival. The ranchers of the study area contribute to the national coffers by sustaining wild animals on their land. At the same time they incur costs. They loose domestic stock because of wildlife. They also loose production and/or income from the potential domestic stock displaced by wild animals needed to support the economic activity of wildlife viewing, a national gain which does not benefit them at all.

The impacts explained above in Chapter 5 are grim facts demonstrating that land use changes analysed in Chapter 4 have threatened the wildlife conservation, hence the continued viability of Nairobi National Park.

I. OUTDOOR ZOO:

In view of the considered viewpoints of most of the respondents interviewed, the government officials, and experts of wildlife conservation and management, we noted the suggestions for the Nairobi National Park to be planned and managed as an "Outdoor Zoo".

By "outdoor zoo" is meant a completely enclosed system but where wildlife species are not stall fed as in ordinary zoos. They should be allowed to move freely but within the enclosed area. With regard to Nairobi National Park, the size would remain the same. The remaining unfenced 22 kilometres distance on the southern boundary would have to be very strongly fenced so that wildlife from the park may not go out and no human activities, for instance, livestock grazing could enter.

From an ecological point of view, this proposal is disastrous. First, it is seldom to find a dynamic system such as a park where wildlife population is wide ranging to be self-contained ecological unit. Normally, as with most savannah nature areas, they require dispersal areas for dry and wet seasons.

Secondly, from experiences with regards to "zoos" and "botanical gardens", these systems maintain better plants rather than animals. They are not so suitable for wildlife species, particularly, the mobile ones.

With regard to Nairobi National Park, we noted that the park has over 80 various species of wildlife. Most of them are the migratory herbivores, mostly, wildebeests and zebra. We also observed that the park contains a number of predators, lions, leopards and cheetahs. Infact, the remaining 11 lions out of the 35 in the ecosystem are now permanent residents of the park. However, they come out in the adjacent areas occasionally. In addition, we found that there are a number of large mammals such as rhinoes, giraffes and hippotamus. Further, we also found that even before the establishment of the park most of these species used to move in and out of the park area. The predators preferred the degraded Ngong-hills forests. Buffaloes were numerous in Ngong areas. Giraffes were common on the plains. Most of those species which survived are now mostly inside the park.

However, as opposed to these ecologically sound viewpoints, it was clearly revealed that the future of the park is at stake. Nairobi urban development and Athi River town are now completely joined together following the Athi River town extensive boundary enlargement. The Athi River towns industrial area is apparently extending towards the Kitengela Plains along the south-eastern part of the park where the topographical conditions support industrial development. Already a large industrial plant, the Athi River Kenya Portland Cement Factory has been established. It was also revealed that a number of firms have tendered their application to establish industrial plants in Athi River town which is apparently becoming a satellite of the congested Nairobi industrial area. In addition to these two main urban development in the area is the Ongata Rongai which is apparently forming a part of Nairobi like Ngong town, Bulbul, Kiserian and Kitengela. One significant point with regard to urban development is that, wherever it takes place, wildlife has no room. It is therefore a very incompatible land use to wildlife conservation as compared to livestock or crop productions. The Nairobi City experience has shown that, when the two meet, a completely strong separation is the solution. Yet this is the land development that is very rapidly growing around the park.

A part from these urban developments, we observed that, changes in land tenure from communal to individual or group ranch with numerous permanent homesteads have taken place in the Kitengela area. Livestock and crop productions have also changed. Physical infrastructural developments such as roads, boreholes and wells have been constructed. The trend with regard to all these land uses is rapid changes.

But most importantly, it was observed that most of the respondents interviewed, the government officials and experts felt that the park should be completely fenced up and managed as an "outdoor zoo". The experts explained that this is happening in most of the developed world and given the trend in Kenya, it may be advisable to provide Nairobi National Park as an example. They felt that the park can be used to breed some of the threatened species in the country or other parts of the continent or the world for redistribution in other National Parks and Reserves in the country or abroad. The problem however will be the cost of management. If the park is enclosed, there must be constant evaluation population, vegetation and other resources to maintain the carrying capacity of the park. There

will be the question of controlling the number of the predators versus the preys. In all cases, there will be a serious need of experts in these fields as well as equipments to undertake these management issues.

In view of the foregoing arguments for and against the question of Nairobi as an "outdoor zoo", this study proposes a detailed study regarding this possibility. Such a study, we propose, should be undertaken by the Wildlife Planning Unit staff in consultation with relevant experts as may be identified by the Planning Unit. Its aim should be to establish in more clear terms the feasibility or otherwise of such a policy, and the advantages and disadvantages associated with it.

II INTEGRATED LAND USE

The above going proposal is considered as circumstantial but not a realistic land use system given the ecological, social, economic factors at local, regional and national levels. A more realistic proposal that can be undertaken in the short term period but also ensures a long term resolution to the more critical problems of the study area is seen, in this study, to be integrated land use policy.

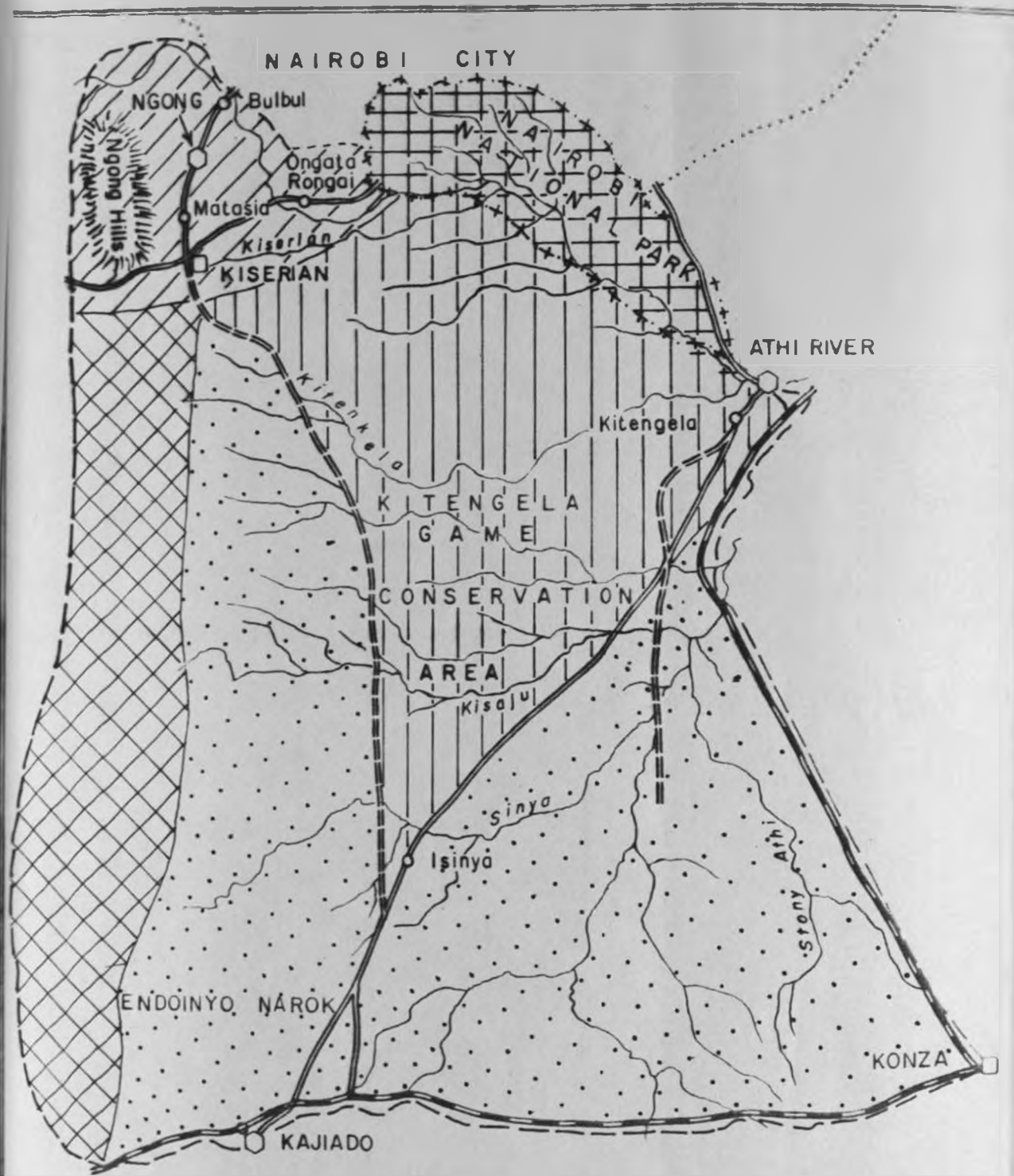
Under all the above analysed circumstances, it would appear that it would be necessary for the Wildlife Planning Unit, and the Wildlife Conservation and Management Department of the Ministry of Tourism and Wildlife to Institute Comprehensive Programmes under which Nairobi National Park and the adjacent areas can be planned and managed as one ecosystem. This should essentially take the form of integrated land use that incorporate the different and conflicting land use requirements in the study area. To this end, close cooperation of the relevant Ministries, in other words, Ministry of Agriculture and Livestock, Ministry of Water Development, Ministry of Local Government, Ministry of Works, Housing and Physical Planning, Ministry of Environment and Natural Resources, Ministry of Lands and Settlements and Office of the President is recommended. This should serve as some sort of an Inter-Ministerial Land Use Planning and Resource Management Committee for reconciling conflicts and national, regional and local levels.

In view of the observed situation in the study area, we feel strongly that in the short run, this integrated land use is the most realistic resolution. It should not only be applied with the case of

Nairobi National Park alone but even other National Parks and Game Reserves which we identified in our Chapter two that are also facing the same problem as the Nairobi National Park. Furthermore, the situation that is facing Nairobi National Park is now a common one in Kenya.

As the Government of Kenya, 1972: National Report to the United Nations Conference on the Human Environment, Stockholm indicated; "In Kenya today, we have reached a situation where land use interests such as agriculture, tourism, ranching, wildlife-management, forestry and water conservation each of them vital and nationally productive usages of land are in some instances in competition and often in conflict over large areas of the country. Not only are various arms of the government in disagreement or confusion on those issues but this is compounded by the demand of the landlessness and the burgeoning population which are haphazardly realized in the absence of clear policies."

Precisely, this is the kind of situation that we observed in the study area. It is taking place



IMPACT ON NAIROBI NATIONAL PARK OF CHANGES IN LAND USE IN ADJACENT AREAS.

at the national level, district, and the local levels that we are now dealing with. Our proposed integrated land use approach could be applied at all these three levels. This is the land use system that we suggest in this study as the most realistic one for this problem.

This integrated land use approach is seen here as a process of sequential planning and management and co-ordination leading to purposeful action programmes. It should have clearly defined objectives and clearly stated policies. Its objectives generally, as seen from our study should include:

1. Establishing patterns of land use and resource development that conform with changing conditions and public needs. In the light of our study area, we observed changing conditions which range from changes in the attitudes of the local inhabitants towards existing pattern of land use and resource development to changes in land tenure and all other land uses. We also observed the needs of the public as of significant importance in planning for resource development and patterns of land use in this area.

2. To identify areas of concentration for the different land use activities and interests and plan these as areas of land use specialization but maintaining a clear policy linkage between them so that, at the same time they are together capable of functioning as an interrelated whole system.

The above objectives should be adhered to by all bodies concerned with policy formulation and implementation with regard to land use planning and resource management in this area.

a) OPERATION OF THE INTEGRATED LAND USE

Our study area is approximately 2000 km². To apply the proposed integrated land use system, we have zoned the study area on the basis of the observed land use pattern, changes and impacts that they effect on the environment, wildlife conservation, hence, the viability of the park. These zones also have different resource potentials as was explained in detail in Chapter one.

The zones are (Map 23). The proposals map

- | | | |
|--------|---|-----------------------|
| Zone 1 | - | Nairobi National Park |
| Zone 2 | - | Kitengela area |

- Zone 3 - Ngong-Hills area
- Zone 4 - Kaputei
- Zone 5 - Senya.

(i) ZONE 1: NAIROBI NATIONAL PARK

This is a zone of pure wildlife conservation. The area is about 115 km². In this zone, no human activities should be allowed. There should be internal subdivision into smaller operational units.

From the field study, we observed that due to land use pressures in the Kitengela area, some illicit grazing takes place in the lower part of the zone. We also observed impacts on natural vegetation, specifically, tree species some of which have been over-browsed by the confined giraffes. We also noted that the remaining 11 Lions of the ecosystem are now all within the park.

In view of these observations, we recommend that livestock grazing should be immediately stopped. Also, the remaining riverine, bushy areas and forest parts of the park should be maintained as hide outs of wild species from the now confined predators. There should be constant check on the ecological changes inside

the park. We also recommend that no human and urban developments should be allowed inside the park.

ii) ZONE 2: KITENGELA AREA

We observed that this zone is currently experiencing different land use changes. The human population has increased. The land tenure in this zone, we observed, had changed from communal to private group and individual ownerships, then to individual. However, there are, still, two group ranch ownership. But generally block title deeds are no longer applicable here.

It was also noted that fenced homesteads have come up and are increasing in this zone. Several developments have taken place in this zone. These include the government sheep and goat project, the G.K. Prison Kitengela, artificial water sources - boreholes and tracks for access to developments. However, it was noted that this zone is still predominantly a grazing area and forms a wildlife passage to the rest of the study area.

In view of these, we propose that all other land use developments in the zone should be stopped in preference for livestock. This is on ground that

livestock and wildlife can co-exist to an extent. Croze (1978) "indicated that pastoral areas occupied by both wildlife and livestock can sustain a higher biomass of animals than an area exclusively inhabited by wild game. This suggest that a combination of wildlife and domestic stock at traditional population levels on rangelands actually helps to increase the capacity." Furthermore, the argument that wildlife cause disease to livestock or kill them is negligible. Croze (1978) again, found that vital disease which in the belief of the Masaai is transmitted by Wildebeest, has caused only two deaths per 10,000 cattle on a six-year average. Cattle losses from predation in parts of the study area amounted to four in about 10,000 per annum for a five year period. While the study does not fully rely on the foregoing findings of Croze (1978) largely due to some of the obvious difficulties such as controlling the domestic stock at traditional population, livestock however would remain the principal land use to be emphasised in the zone. Any other activities should receive less priorities. It would not be easy to completely stop them, for instance rural settlements, infrastructure such as roads, and water supply can not completely be stopped.

However, according to the Wildlife Act, 1976 section 15 (1), which enable the Minister to prohibit, restrict or regulate any particular acts in any area adjacent to the park, the other land uses such as settlements and urban encroachment would be controlled.

iii) ZONE 4 AND 5: KAPUTEI AND SENYA

These two zones are comparatively still sustainable. From the field observations, the land ownership here is still largely on a group basis only a few have been individualized. However, sub-division to individual plots is ripe. The primary land use is livestock ranching.

In view of these, we propose that these zones should be managed primarily as livestock and wildlife areas. The other types of land uses should be secondary and must be constantly checked. Unlike Kitengela zone, we propose consumptive utilization of game such as game hunting and ranching.

These proposals are based on the rationale that wildlife resources can generate income to private landowners when hunted in a controlled manner, and that game meat can be eaten and sold commercially. This is

in accordance with the government's objective of consumptive exploitation of wildlife.

Owing to their favourable location and great variety of huntable wild game, we propose controlled sport hunting which should benefit the landowners. The zones are located far from the park compared to Kitengela. Hunting licences, fees and trophy sales should be shared with the landowners.

Game ranching is a system of extensive management of free-ranging wild herbivores on large units of land for the purpose of income raising from meat and other products of the animals. The wild game is harvested by cropping in the field. This can be practiced in these two zones. The game meat can then be supplied to the hotels and butchers in Nairobi or exported. Species that are many in these zones and can be ranched include Impala and Thomason's Gazelle. In connection with the ecological, economic, and social factors involved, we propose a study into the feasibility of this game ranching activity.

Other activities other than controlled livestock grazing such as rural and urban settlements, and also

the development of infrastructure such as roads and water supply facilities will have less priorities. Similar to Kitengela zone, these activities will not completely be stopped but some controls will be exercised by powers stated in the Wildlife Conservation Act.

iv) ZONE 3: NGONG AREA

This is the most complex zone. It is different from all the above zones and has undergone intensive land use changes. This area is already settled by both urban and rural nature. It has been intensively cultivated and land use intensification such as fertilizers are being applied. These changes have led to deforestation of the former Ngong Forests not only destroying wildlife habitat and food but causing serious soil erosion and polluting the Mbagathi River that flows through the park where it is used by both aquatic and terrestrial fauna. At the same time, we observed that Ngong-hills is a watercatchment area from which the Mbagathi river and other streams in the study area originate.

In view of these observations, we recommend regorous aforestation and re-afforestation programmes in most parts of hill-tops of Ngong-hills. Specifically,

we have in mind, Kiserian hills, upper Matasia and other hill tops as will be identified. This we feel will assist in maintaining the ecological balance of Ngong-hills and restore it as a water catchment area and home and food source for wildlife. The programme may not be very costly in view of the fact that aforestation programmes have been started in some parts of Ngong division. Planting grasses, for example, panicum makarikariensis, along the edges of terraces and protecting them from animals should also be included in the programme. Coupled with these, are propose ^{Practice} ~~installation~~ of more soil erosion control measures such as bench terracing and strip cropping. All these will be undertaken by the existing institutions as they will be inco-operated in our integrated land use policy.

From the field surveys, we recognized that some areas of Ngong hills have turned into urban settlements. Those areas will be left for such land activities, but expansion will be controlled through enforcement of relevant statutory regulations. We will encourage concentrated development in these areas. These include Ngong-town, Bulbul and Ongata Rongai area.

b) MANAGEMENT REQUIREMENTS

To avoid difficulties of setting up a new planning authority, we propose an inter-ministerial committee composed of the above mentioned Ministries. The Inter-Ministerial Committee should be organized by the Wildlife Planning Unit. It should, include the District Development Committee of Kajiado the Nairobi City Commission and the people of Kajiado or their representatives. This committee should also work in close consultation with wildlife conservation experts, particularly, those who have been involved in the U.N.D.P. projects in the district. Such experts will be identified by the Wildlife Planning Unit.

c) FUNCTIONS OF THE COMMITTEE

- i) It should determine the land use planning and resource use priorities for the area.
- ii) It should be able to determine and monitor the existing and potential land use changes and impacts in the area.
- iii) It should assess the carrying capacity of the different development zones of the study area.

iv) It should then submit a detailed recommendations to the government regarding all the above for action.

III. POLICY PRIORITIES

a). The field observations revealed that wildlife management cannot be undertaken effectively without full cooperation and participation of the public. Those who share their land resources with wildlife must be involved. We therefore recommend that the local residents must be actively involved in all the processes of wildlife conservation. This should be done by paying directly tangible economic benefits to the landowners who share their land resources with wildlife. Its should also be ensured through extension services and educational programmes.

b) We recommend that there should be constant evaluation and monitoring of changes in land use, and their impacts on wildlife, vegetation, water resources and other land uses in the short and long term basis. This should be one of the main functions of the proposed committee.

CHAPTER 7

7.0 SUMMARY AND CONCLUSIONS

The continued viability of our conserved ecosystem which provide the last refuge for wildlife depends on planning for land use and resource management in the adjacent areas. All national parks and game reserves in Kenya, as they exist, are in some degree or other dependent on the relationships between land use changes and wildlife in the areas surrounding them. If the surrounding lands deteriorate through misuse, or if in their management no consideration is given to wildlife, the national parks and game reserves will suffer, or even be destroyed.

Nairobi National Park situated within the Nairobi Metropolitan city is not an exception to this problem, although this fact has only become apparent after independence.

The idea of National Park started to develop some 100 years ago, when it was observed that in some industrialized countries that due to human needs and pressures certain species of plants and animals were beginning to disappear and features of geological eminence were being disrupted by many forces. The concept then provided for large tracts of land set

aside as wilderness areas and natural areas - devoid of all human influence. The objective was to accord complete protection to representative areas in an environment that was rapidly changing. At that time, the landscapes adjacent to areas of preservation, though different from untouched country, did not seriously affect the natural aspects of the reserve. Impacts of external pressures on the national parks was envisaged.

Hence, the traditional planning and management of our nature reserves have been concerned largely with their internal problems such as the provision of roads, campites and water. The aspects of external pressures as a result of land use changes in the adjacent areas, therefore, have been neglected or deliberately ignored. This is a mistake since it does not take into account the interrelationships between the national parks and the adjacent areas.

National Parks should be seen as key parts of the total environment to conserve natural resource hence be planned and managed not in isolation but with a local, regional and national perspectives. Parks' plans should be developed concurrently with plans for the surrounding areas. National Parks'

management planners should not sit back and yet numerous developments are undertaken in these dispersal areas. They must be able to assess every existing and potential developments around these natural reserves.

Hence, the study set out firstly, identify and, analyse the changes in land use in the adjacent areas of the Nairobi National Park since its establishment. This analysis was undertaken under six main areas of land use changes, namely, changes in land tenure system, livestock production, crop production, urban settlement, rural settlement, physical infrastructure conservation and others. Secondly, the study set out to identify impacts on the park and its dispersal areas of these land use changes in the adjacent areas. Specifically, impacts were assessed on: Wildlife, vegetation and water resources in and around the park. These two objectives were assessed under three periods based on past, present and future situations, namely, the period between 1943 - 1963, 1963 - 1983 and 1983 - 2003. Thirdly, considering the above factors and the importance of Nairobi National Park in its own accord or in the context of environmental conservation, the study attempted to suggest an optimum land use system for the area that takes into account the ecological, social, economic, cultural and political factors at the local, regional and national levels.

It was found that Nairobi National Park, Kitengela area and Ngong hills form one natural ecosystem. However, due to increased development in these areas, particularly, Ngong hills, there appears to be a break in this interrelationships. This is largely due to lack of integrated land use planning and resource management of the area.

It was found that changes in land use in the adjacent areas of Nairobi National Park have been taking place over long time but the pace has increased particularly, since independence. Six significant areas of land use changes, namely, changes in land tenure, livestock production, crop production, urban settlement, rural settlement, physical infrastructure, conservation and others were identified. Land tenure changed from communal to private group or individual ownerships only recently in 1973. Livestock production changed from nomadic pastoralism to sedentary, commercial oriented type. Cultivation of land is a recent phenomena in the whole study area. In brief, it is anticipated that in the near future all the land use in the area will be under human activities. The single important cause of all these is rapid population increase in the study area.

It was further found that these changes in land use effect impacts on wildlife conservation, hence the continued viability of the park. Specific impacts were noted upon wildlife, vegetation and water resources. The animals' migratory routes in the adjacent areas are getting blocked. Wildlife is then getting confined inside the park causing stress on the carrying capacity. It was found that as a result of this confinement, some vegetation particularly, tree species have been overbrowsed by the giraffes which have apparently become permanent residents of the park. It was also noted that the Mbagathi river water is being polluted by the land use intensification in the Ngong hills. This threatens the comfortabilities of the aquatic species such as hippopotamus and crocodiles inside the park. It was then observed that all these impacts on wildlife, vegetation and water resources effect significant implication to the management and the continued viability of the Nairobi National Park.

It was revealed that before the situation is brought under any check, several constraints and limitations have to be understood. These include the high human population growth rate, the land tenure system, government policies and objectives, the attitudes of the local people and lack of skilled manpower and funds.

From the findings and the constraints, it is suggested that a detailed study regarding the possibility of planning and managing Nairobi National Park as an "outdoor zoo", be undertaken by the wildlife planning Unit in consultation with relevant experts as may be identified by the unit. Its aim should be to establish in more clear terms the feasibility or otherwise of such a policy, and the advantages and disadvantages associated to it.

The study has also proposed an integrated land use policy upon which Nairobi National Park, Athi Kaputei Plains and Ngong hills can be planned and managed as one ecosystem. Its aim is to identify areas of concentration for the different land use activities and interests and plan these as areas of land use specialization but maintaining a clear policy linkage between them so that, at the same time they are together capable of functioning as an interrelated whole system.

As policy priorities, we propose that those who share their land resources with wildlife must be involved in the process of wildlife management as a means of full cooperation and public participation. To achieve

this, we recommend that the local residents must be paid directly tangible economic benefits from the wildlife conservation. They should also achieve extension and education services as regards wildlife conservation.

We also recommend that there should be constant evaluation and monitoring of changes in land use, and their impacts on wildlife, vegetation, water resources and other land uses in the short and long term basis. This should be done by the proposed integrated land use policy committee.

In conclusion, it has been recognized that although changes in land use effect mostly, negative impacts on wildlife conservation, hence the viability of Nairobi National Park, the accommodation of the needs of the local private individual landowners and other national policies and objectives are also equally important. This study therefore has only attempted to balance the many needs of developments and wildlife conservation. It is seen in this study that the most realistic policy approach to this is integrated land use planning and resource management.

However, this study has not exhausted the full scope of this subject of balancing development with conservation. Further studies would be considered necessary in current wildlife conservation and management policies as they relate to concerned ecosystems and the adjacent areas. It would also be useful and meaningful to study the co-existence of livestock and wildlife in the study area. It would be important also to study Ngong hills as a water catchment area and its soil conservation measures. Finally, it would be useful to carry out a quantification study on specific land use changes and their possible impacts given their ecological classifications in the study area.

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APPENDIX A

INTERVIEW SCHEDULE
FOR LOCAL RESIDENTS

This interview schedule is being used to collect observations, opinions and preferences of the local residents of this area regarding changes in land use, their impacts on wildlife conservation and possible solutions. I would be very grateful if you please, co-operate. I also wish to stress that the information provided will be used solely for the purpose of this study and will not be disclosed to any other individual or agencies.

O. INTERVIEW RECORDING

Date of interviews -----
Seasonal period -----
Name of zone -----
Person interviewed -----
Local of the farm/ranch from the park -----

A. LAND USE CHANGES

1.0 Discuss the land use conditions in this place.

a) Before independence in 1963 -----

b) After independence in 1963 and as you see it
today (1983) -----

c) What you expect 20 years from now -----

1.1. Could you please provide the following information?

LAND USES (CONDITIONS)	1943-1963		Today 1963-1983		Future 1983-2003	
	Area	%	Area	%	Area	%
Ownership(s)						
(a) Govt.						
(b) Community						
(c) Private						
(d) Owned elsewhere						
Virgin						
Pasture						
Cultivated						
With buildings						
Fenced						
Unfenced						
Treed						
Dense Treed						
Sparsely Treed						
Others						

1.2. Are there more people here today than before 1963?

Yes ----- No -----

1.3 Were there any permanent homesteads before independence.

Yes ----- No -----

2.0 Do you keep any food animals?

Yes ----- No -----

LIVESTOCK	Number owned 1943-1963	Number owned 1963-1983	Number expected in future 20 yrs. from now?
Grade cattle			
Native cattle			
Sheep			
Goats			
Other			

2.1.

SOURCES	NORMALLY	P E R I O D S			
		Long rains	Dry season	short rains	Dry season
PASTURE (Distance from farm)					
WATER (Dist- ance from farm)					

3.0 Economic gains from farming activities.

FARMING ACTIVITIES	PROFITABLE		NOT PROFITABLE	
	Yes/No	How much	Yes/No	How much
Livestock				

3.1 If not profitable, how can you make profits here?

C. IMPACTS OF LAND USE CHANGES

4.0 Do you consider the National Parks in general as being of any value to Kenya? Yes ----- No -----

4.1 Do you consider Nairobi National Park as being of any value to:

- a) You? ----- Yes ----- No -----
- b) Kenya? ----- Yes ----- No -----

4.2 Below are some reasons why Parks in general and Nairobi National Park can be said to be of some value. Indicate the ones that you consider

important and the degree of importance.

VALUE	PARKS IN GENERAL (G) AND THIS PARK (S)					
	VERY IMPORTANT			IMPORTANT		nNOT IMPORTANT
	G	S	G	S	G	S
a) It provides employment						
b) It provides foreign exchange earnings from tourists visits						
c) It protects animals so that we can continue seeing them						
d) Other(s)						

4.3 Below are some reasons why the parks in general and Nairobi National Park can be said to be of some disadvantage. Indicate the ones that you consider important and the degree of their importance.

VALUE	PARKS IN GENERAL (G) AND THIS PARK (S)					
	VERY IMPORTANT		IMPORTANT		NOT IMPORTANT	
	G	S	G	S	G	S
a) It occupies land which could be cultivated or pastures						
b) It encourages animals that attack and destroy our crops/farm						
c) It does not benefit the local people						
d) Entry inside it is too restricted						
e) Others						

5.0 What would you like to see done with this Park in the future? -----

5.1 If change, what other use would you put the park area to instead? -----

5.2 What do you think would become of the wild animals? -----

6.0 Below are some of the animals that cause damage to crops and people around this park. Indicate the ones that you see around and consider to be troublesome, occasional, frequent and more in terns of numbers.

7.0 What have you done to control or prevent the trouble caused by these wild animals? -----

7.1 What do you intend to do if these animals continue to cause the troubles in the future -----

D. SOLUTIONS

a) shoot the animals causing damage -----

b) institute more effective game control methods -----

c) translocate the animals from the park -----

d) move the park from the area -----

e) move people away from the surrounding areas of the park -----

f) clear all the vegetation around the park so that the animals cannot hide -----

g) fence all the farms/homes -----

h) plant forests around the park -----

i) fence the park completely to keep the animals
inside the park -----

j) allow only land uses that are compatible with the
park's presence near the park -----

k) any others -----

8.1 Which three of the above do you think are most
effective? -----

9. Who do you think should do these things? -----

10. Who have you seen been doing any of the above
things? -----

11. Do you think co-operating different government
departments to work together is a good think?

Yes -----

No -----

12. Do you think the wildlife compensation scheme
is a good idea?

Yes -----

No -----

If No, Why? -----

13. Is it really working?

Yes -----

No -----

APPENDIX B
INTERVIEW SCHEDULE
FOR GOVERNMENT OFFICIALS

O. THE INTERVIEWED OFFICIAL

1. Location
- 2.0 Ministry or Department of work
 - a) National Parks
 - b) Wildlife Department
 - c) Ministry of Agriculture
 - d) Forestry Department
 - e) Livestock Development
 - f) Local Government
 - g) Land, Physical Planning and Settlement
 - h) Land Commission and Adjudication
 - i) Water Department
 - j) Administrators (Police, Councillors, D.O. etc.).

2.1. Please specify your duties -----

2.2 How long have you been working with this
Department? -----

2.3 How long have you been working in this area
(District) -----

B. LAND USE CHANGES

3. What problems regarding the use of land have you encountered/do you expect in this area?

4. What are the main land use changes that have been or is taking place in the area? -----

5. What would you say about the population changes and settlement in the area in the past, now and in future? -----

6. What are your comments on the returns from the main economic activities in this area such as livestock? -----

7. Are there any conflicts in policy formulation and implementation between your department and any other government and non-government departments? Yes ----- No -----

8. If yes, what kind of conflicts and by which particular departments -----

C. IMPACTS

9. Of what value do you consider the Nairobi National Park is to the local people in this area and to the country? -----

10. What problems do you think the people around the park encounter? -----

11. Which animals do you think cause a lot of damage to the crops and the people in the area? -----

12. What have people done or do you think intend to do to prevent the trouble caused by the animals? -----

D. SOLUTIONS

14. What can you suggest as the best ways for preventing the trouble caused by the animals while at-the same time avoid the impacts on the wildlife and the park? -----

15. Which departments do you think should co-operate to solve the problems? -----

16. How can the local residents of the surrounding areas of the park be brought into the picture? -----

17. What is your opinion about the idea of working on an integrated land use policy so as to conserve the wildlife and ensure existence of the park with the surrounding areas? -----

18. Of the possible solutions you have suggested which ones would you give 1st, 2nd and 3rd priorities?

1st -----

2nd -----

3rd -----

19. Which institutions do you think should be approached for financial assistances? -----

APPENDIX C
INTERVIEW SCHEDULE
FOR WILDLIFE CONSERVATION AND
MANAGEMENT EXPERTS

1. Location -----
2. Profession/Discipline -----
3. Duration of work -----

SECTION A

4. What would you say are the main problems sabotaging efforts to conserve wildlife resources in Kenya?

5. The Kenya Government's greatest means of conserving wildlife resources is through creation of National Parks' and equivalent reserves' systems. What is your opinion about these concepts? What would you say are the main problems facing these conserved nature areas - particularly from their surroundings ?

6. What impacts do you think these problems exercise on the parks? Give a present and future perspective?

7. What would you say are the best solutions to these impacts? -----

8. Who do you think can be charged with these duties? -----

9. Do you think an integrated efforts can be a better solutions? If yes, which departments or agencies would you propose to be co-ordinated?-----

SECTION B (NAIROBI NATIONAL PARK)

10. What would you say are the main problems facing this Park since its establishment? Particularly from outside? -----

11. What would you say about the future of this park if these problems persist? -----

12. As a result of these problems, what changes have you experienced within and in the immediate environment of the park regarding: -----

a) wildlife, - their population, mortality rates,
migratory routes and distribution -----

b) vegetation, utilization and coverage -----

c) Water resources -----

13. What would you say are the main causes of these
changes? -----

14. Do you see land use changes on the Ngong-hills and
Athi-Kapiti Plains as contributory to these changes.

15. What would you recommend as the most realistic
solutions to these problems, if this park is to
exist? -----

16. Who do you think should be involved in these solutions?

17. What is your opinion about integrative development
of the Park and its surrounding? -----

APPENDIX D

LIST OF NATIONAL PARKS AND RESERVED IN KENYA

	NATIONAL PARKS AND RESERVES	DISTRICT	AREA KM ²
1.	Nairobi National Park	Nairobi	117
2.	Tsavo East N.P.	Taita Taveta	21,351
3.	Tsavo West N.P.	Taita Taveta	
4.	Amboseli N.P.	Kajiado	392
5.	Masai Mara N.R.	Narok	1,672
6.	Ruma N.P.	South Nyanza	120
7.	Sibiloi N.P.	Marsabit	1,570
8.	Elgon (Mt.) N.P.	Trans Nzoia	169
9.	Marsabit N.R.	Marsabit	144
10.	Losai N.R.	Marsabit	1,806
11.	Rahole N.R.	Garissa	1,270
12.	Kora N.R.	Tana River	250
13.	Boni N.R.	Garissa	1,339
14.	Bodori N.P.	Lamu	877
15.	Arawele N.P.	Garissa	533
16.	Tana River N.R.	Tana River	169
17.	Malindi Marine N.P.	Malindi	6
18.	Watamu Marine N.P.	Kilifi	32
19.	Watamu " N.R.	Kilifi	10
20.	Malindi " N.R.	Kilifi	213
21.	Kisite Mpungui N.P.	Kwale	11
22.	Meru N.P.	Meru	870
23.	Buffalo Springs G.R.	Isiolo	339
24.	Shaba N.R.	Isiolo	239
25.	Mt. Kenya	Nyeri/Meru	590
26.	Aberdares	Nyeri/Murang'a	766
27.	Bogoria N.R.	Baringo	107
28.	Saiwa Swamp N.R.	Trans Nzoia	2
29.	Lake Nakuru N.P.	Nakuru	58
30.	Ol donyo Sapuku N.P.	Machakos	1
31.	Ngai Ndethya N.R.	Machakos	212
	Total		34,262

APPENDIX E

SCIENTIFIC NAMES OF MENTIONED WILD ANIMALS

COMMON	SCIENTIFIC NAMES
Common zebra	<i>Equus burchelli</i>
Wildebeest	<i>Connochaetes taurinus</i>
Coke's hartebeest	<i>Alcelaphus buselaphus cokii</i>
Grant's gazelle	<i>Grazella granti</i>
Thomson's gazelle	<i>Gazella Thomsonii</i>
Impala	<i>Aepyceros Melampus</i>
Eland	<i>Teurotragus orx</i>
Waterbuck	
Common ringed	<i>Kobus ellipsipymnus</i>
Defassa	<i>Kobus defassa</i>
Fringe-earned oryx	<i>Oryx beisa callotis</i>
Bush buck	<i>Tragelaphus scriptus</i>
Dik-Dik	<i>Rhynchotragus harveyi</i>
Red duiker	<i>Cephalophus harveyi</i>
Stein buck	<i>Raphicerus campestris</i>
Bohor reedbuck	<i>Redunca redunca</i>
Klipspringer	<i>Oreotragus oreotragus</i>
Gerunuk	<i>Litocranius walleri</i>
Lesser Kudu	<i>Strepsicerous - imberbis</i>
Buffalo	<i>Syncerus caffer</i>
Elephant	<i>Loxodonta africana</i>
Black rhinoceros	<i>Diceros bicornis</i>
Giraffe	<i>Giraffa camelopardalis</i>
Warthog	<i>Phacochoerus aethiopicus</i>
Leopard	<i>Panthera pardus</i>
Lion	<i>Panthera Leo</i>
Cheetah	<i>Aciononyx Jubatus</i>
Black-backed Jackal	<i>Cananis Mesomelas</i>
Hunting dog	<i>Lyenaon pictus</i>
Spotted hyaena	<i>Crocuta crocuta</i>
Crocodile	<i>Crocodylus hiloticus.</i>