

JAPAN INTERNATIONAL COOPERATION AGENCY

No 2

THE REPUBLIC OF KENYA

KENYA WILDLIFE SERVICE

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR WILDLIFE CONSERVATION
IN
THE REPUBLIC OF KENYA

April 1992

J C P Inc.

BASIC DESIGN STUDY REPORT ON THE PROJECT FOR WILDLIFE CONSERVATION IN THE REPUBLIC OF KENYA

April 1992

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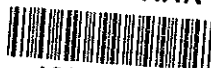
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PREFACE

In response to a request from the Government of the Republic of Kenya, the Government of Japan decided to conduct a basic design study on the Project for Wildlife Conservation and entrusted the study to the Japan International Cooperation Agency (JICA).

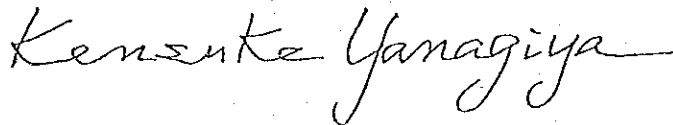
JICA sent to Kenya a study team headed by Mr. Masa-aki Kohmaru, Chief Management Officer, Kushiro Shitsugen National Park Office, Nature Conservation Bureau, Environment Agency of Japan and constituted by members of JCP Inc. from February 15 to March 4, 1992.

The team held discussions with the officials concerned of the Government of Kenya, and conducted a field study at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

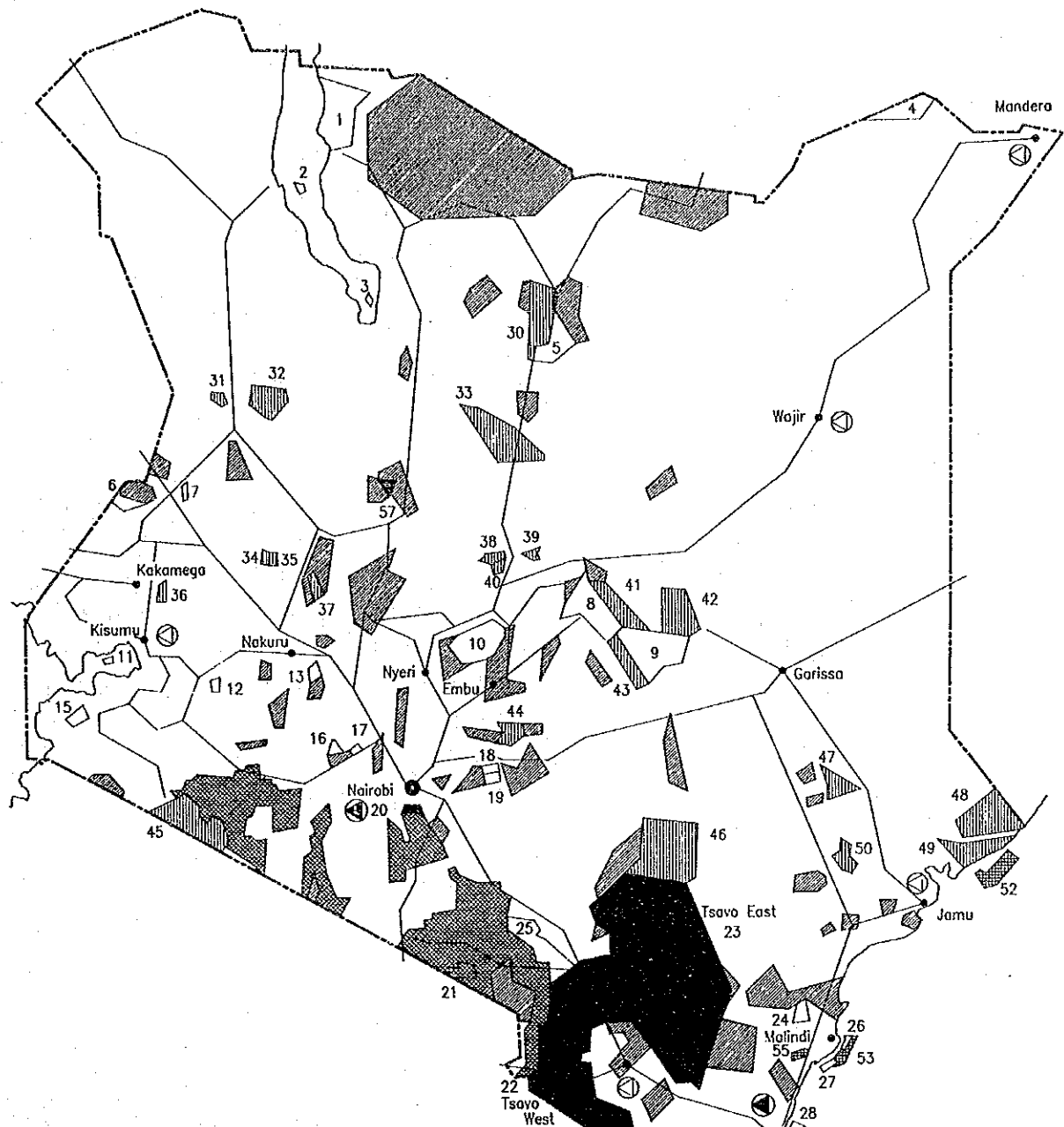
I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Kenya for their close cooperation extended to the team.

April, 1992



Kensuke Yanagiya
President

Japan International Cooperation Agency



NATIONAL PARKS

- 1 Sibiloi
- 2 Central Island
- 3 South Island
- 4 Malka Mari
- 5 Marsabit
- 6 Mount Elgon
- 7 Saiwa Swamp
- 8 Meru
- 9 Kora
- 10 Mt. Kenya
- 11 Ndere Island
- 12 Mau
- 13 Lake Nakuru
- 14 Aberdare
- 15 Ruma
- 16 Hell's Gate
- 17 Longonot
- 18 Fouteen Falls
- 19 Oldonyu Sabuk
- 20 Nairobi
- 21 Amboseli
- 22 Tsavo West
- 23 Tsavo East
- 24 Arabuko Sokoke
- 25 Chyulu

NATIONAL RESERVES

- 30 Marsabit
- 31 Nasolot
- 32 South Turkana
- 33 Losai
- 34 Kerio Valley
- 35 Kamnarok
- 36 Kakamega
- 37 Lake Bogoria
- 38 Samburu
- 39 Shana
- 40 Buffalo Springs
- 41 Disanadi
- 42 Rahoie
- 43 North Kitui
- 44 Mwea
- 45 Masai Mara
- 46 South Kitui
- 47 Arawale
- 48 Boni
- 49 Dodori
- 50 Tana River Primate
- 51 Shimba Hills

MARINE PARKS

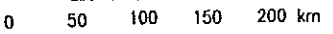
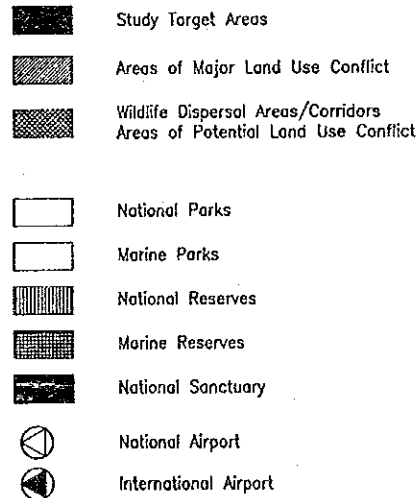
- 26 Malindi
- 27 Watamu
- 28 Mombasa
- 29 Kisite

MARINE RESERVES

- 52 Malindi
- 53 Watamu
- 54 Mombasa
- 55 Kisite
- 56 Kisite

NATIONAL SANCTUARY

- 57 Maralal



Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

We are pleased to submit to you the basic design study report on The Project for the Wildlife Conservation in the Republic of Kenya.

This study has been made by JCP Inc., based on a contract with JICA, from January 27, 1992 to April 30, 1992. Throughout the study, we have taken into full consideration the present situation in the Republic of Kenya, and have planned the most appropriate project in the scheme of Japan's grant aid.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA, the Ministry of Foreign Affairs, Environmental Agency and the Japanese Embassy in Kenya. We also wish to express our deep gratitude to the officials concerned of the Kenya Wildlife Service, JICA office, and Japanese Embassy in Nairobi, Kenya for their close cooperation and assistance during our study.

At last, we hope that this report will be effectively used for the promotion of the project.

Very truly yours,



Team leader, Isamu Koike
Basic design study team on
the Project for the Wildlife
Conservation
JCP Inc.

SUMMARY

Approximately eight percent of Kenya's land area (Total area: 582,650 sq. km) has been designated as either National Park (29,455 sq. km) or National Reserve (15,022 sq. km) to conserve and protect the natural and wildlife habitats existing in the country. These areas so designated constitute the fundamental attractiveness of the tourism industry in Kenya.

Conflicting demands by the rapidly expanding human population upon the use of these preserved lands combined with the growing occurrence of discretionary poaching, particularly of elephants and rhinoceri for economic gain, has caused serious deterioration of the environment over the last twenty years.

By 1989, Kenya's elephant and rhinoceros populations had been depleted by 85 percent and 95 percent respectively (130,000 head of elephants in 1973 down to 16,000 head in 1989, and 20,000 head of rhinoceros down to 500 head in 1989) due to this poaching.

In 1976, the Government of Kenya legislated the Wildlife Conservation and Management Act and integrated the national park board of trustees, which had operated and managed all national parks, and the wildlife department which had managed wildlife in open areas outside the national parks and reserves. Their intent in doing so was to establish the Wildlife Conservation and Management Department and unify both functions into a single administrative organization.

The wildlife protection act, with various revisions, has been the basis for the Government of Kenya to administer wildlife conservation. The key elements of this act are:

- 1) All wildlife management and use of wildlife is under the management of a single body;

- 2) The legal boundaries of national parks and reserves, and open areas were established with the aim to protect wildlife; and
- 3) Protect wildlife against increasing poaching and ban completely hunting and trade of wildlife animals and their products.

The third element became legislation in 1977 to ban hunting totally which had been allowed with certain permission throughout the country till then. At the same time, the trade and possession of wildlife products also was totally banned, and, it was declared to use wildlife thoroughly for development of tourism.

This drastic decline in the elephant population in particular propelled the Kenyan Government to lead the ban on ivory trading under the framework of the Convention of International Trade in Endangered Species.

Although wildlife protection measures are strictly legalized, ineffective administration capacity and deterioration of performance as well as declining morale of the staff, the poaching of wild animals, including the elephant and the rhino, has been greatly exacerbated.

The Government of Kenya abolished the above mentioned Wildlife Conservation and Management Department and created a new parastatal organization, the Kenya Wildlife Service (KWS), in January 1990 to protect the land and its indigenous wildlife through the appropriate management of National Parks and Reserves which has been in a critical situation. In mid-1990, on the basis of two years of intensive study and analysis of the situation, the KWS initiated the preparation of a "Policy Framework and a 5-year Investment Programme for 1991-1996" comprised of a park and reserve management plan, a wildlife protection and proliferation plan, an institutional development plan, and a financial plan to guide the development of the sector over the next decade. The Government of Kenya decided to request a financial and technical cooperation for the implementation of the above mentioned programme to the World Bank and various donor countries including Japan.

Under such circumstances, the Government of Kenya requested a Grant Aid from the Government of Japan in 1990 aiming mainly to protect

elephants and rhinos which are facing extinction but to conserve wildlife in general. Responding to this request, the Japanese Government followed its procedure of conducting a preliminary study of the existing situation relating to this request, and subsequently, the Japan International Cooperation Agency dispatched a team of experts to Kenya from September 26 to October 21, 1991 to assess the circumstances and examine the content of the project.

The preliminary study concluded that the maintenance and management of park infrastructure of which major component is a park road network and enhanced anti-poaching activity are expected to heighten the effect of wildlife conservation efforts. And it also confirmed that a provision of necessary machinery for such activities to three national parks (i.e. Nairobi, Tsavo East and Tsavo West National Parks) is appropriate to extend a Grant Aid.

In accordance with the result of the preliminary study, the Government of Japan decided to conduct the Basic Design Study, and entrusted the study to the Japan International Cooperation Agency for the period between 16th February - 4th March 1992 in Kenya. This study focused on an examination of the contents of the equipment and machinery to be procured and the maintenance and management plan for the same through the discussions with concerned agencies of the Government of Kenya and field survey.

It was confirmed that the objectives of the Project is to heighten effects of the wildlife protection efforts so as to conserve wildlife effectively and to improve the park infrastructures to enhance tourism by means of providing necessary equipment and machinery for maintenance and management of (1) park road, (2) wildlife protection activities, and (3) equip necessary machinery and tools for repair workshops.

The outline of the equipment and machinery planned to be procured through the implementation of the Project are as follows:

(1) For park management

Vehicles, motor cycles, pick-ups, station wagons, buses, water lifting pumps etc.

(2) For maintenance works of park infrastructures

Graders, vibrating rollers, tractor shovels, dump trucks etc.

(3) For wildlife protection activity

Pick-ups, trucks, power generators etc.

(4) For maintenance of above machinery

Double-cab pick-ups, trucks, mobile workshops, tools etc.

Project implementation will proceed under the administration of the Kenya Wildlife Services (KWS). The equipment and machinery to be procured through the implementation of the project is listed in Appendix-5 "List of Equipment and Machinery". Utilizing this equipment, KWS shall conduct a road maintenance operation and manage wildlife protection activities.

The necessary period for delivery of the equipment and machinery planned to be procured is about seven (7) months composed with one(1) month for contracting with the supplier(s), and maximum six (6) months for manufacturing of the products to shipments.

Implementation of the "Wildlife Conservation Project" enables Kenya to protect and conserve wildlife and focuses attention on the protection of animal species threatened with extinction - a common worldwide goal of humanity. The protection and preservation of wildlife together with the improvement of the road systems in both Tsavo East and Tsavo West National Parks - the largest among all national parks in Kenya - and Nairobi National Park, which is a core park in the country, will greatly enhance the attractiveness of wildlife-based tourism in the country.

The conservation of wildlife as an important tourism resource and the increase of tourism receipts through tourism promotion will directly reinforce the foundation of Kenya Wildlife Service's operation and management. Thus, these ensure sustainable development of wildlife-based tourism as a result.

It is necessary that a technical cooperation by means of a despatching of expert as well as a Japan Overseas Cooperation Volunteer to for mechanical maintenance to Kenya so that the equipment and machinery planned to be procured through the implementation of the project can be utilized effectively and maintained satisfactory.

Table of Contents

	Page
PREFACE	i
LOCATION MAP	ii
SUMMARY	iii
CHAPTER - I INTRODUCTION	1
CHAPTER - II BACKGROUND OF THE PROJECT	4
2.1 Wildlife Conservation	4
2.2 Outline of the Relevant Plans	7
2.2.1 National Development Plan	7
2.2.2 Wildlife Conservation Programme	9
2.3 History and Contents of the Request	13
CHAPTER - III PROJECT AREAS	15
3.1 National Parks and Reserves	15
3.2 Nairobi National Park	17
3.3 Tsavo East National Park	21
3.4 Tsavo West National Park	22

CHAPTER - IV	OUTLINE OF THE PROJECT	25
4.1	Objectives of the Project	25
4.2	Study and Examination on the Request	25
4.2.1	Rationale and Necessity of the Project	25
4.2.2	Implementation and Operation Plan	27
4.2.3	International Aid Agencies Involvement.....	27
4.2.4	Outline of Equipment	30
4.2.5	Appropriate Equipment.....	31
4.2.6	Implementation Policy on Cooperation	36
4.3	Objectives of the Programme.....	37
4.3.1	Executing Agency and Operational Structure	37
4.3.2	Plan of Operation	37
4.3.3	Outline of Equipment to be Procured	41
4.4	Technical Cooperation	44
CHAPTER - V	BASIC DESIGN	46
5.1	Design Policy	46
5.2	Design Conditions	48
5.3	Basic Plan	54
5.3.1	Equipment Allocation Plan	54
5.3.2	Particulars of Equipment and Machinery	54
5.4	Implementation Plan	54
5.4.1	Procurement Policy	54
5.4.2	Remarks on the Procurement Process.....	55
5.4.3	Procurement Management Plan.....	55

5.4.4	Implementation Schedule	55
5.4.5	Estimated Project Cost	58
CHAPTER - VI	EVALUATION AND CONCLUSION	59

Appendices:

Appendix - 1	Member List of Study Team
Appendix - 2	Study Team Itinerary
Appendix - 3	Contact List
Appendix - 4	Minutes of Discussions
Appendix - 5	Organization Chart of Kenya Wildlife Service

List of Tables

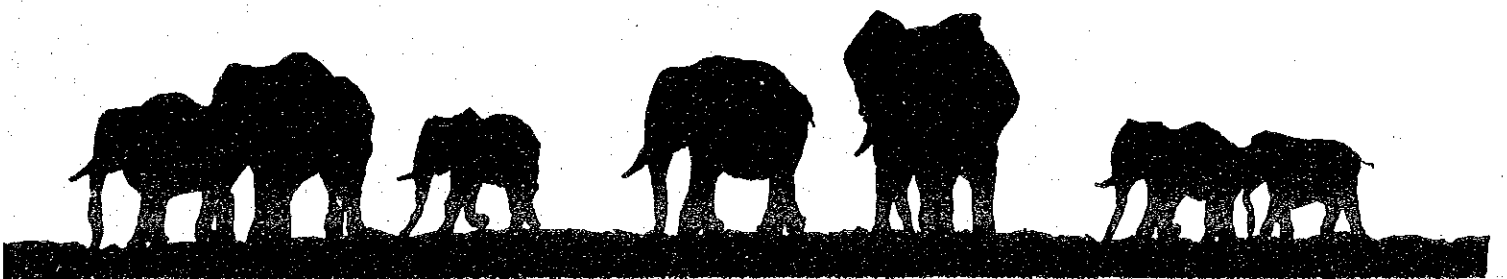
	Page	
Table - 1	Number of Major Animal Groups in Kenya	4
Table - 2	Changes in the Number of African Elephants in East Africa	5
Table - 3	Changes in the Number of Black Rhinos in Africa	5
Table - 4	Changes in the Number of Tourists per Year	7
Table - 5	Performance of Tourism Sector in Trade Balance and Foreign Exchange Earning	8
Table - 6	National Parks and Reserves of Kenya	15
Table - 7	Number of Paid Entry of 3 National Parks	16
Table - 8	List of Equipment and Machinery	32
Table - 9	A Comparative Look at the Differences Between the Preliminary Study and Basic Design Study	34
Table - 10	Particulars of Equipment	43
Table - 11	Demand Estimation of Equipment	49

List of Figures

Figure - 1	Administrative Boundary for Management of National Parks and Reserves	19
Figure - 2	Nairobi National Park	20
Figure - 3	Tsavo East and West National Park	24
Figure - 4	Wildlife Conservation Master Programme - International Cooperation	27
Figure - 5	Management Division for Road Works in the Park	50
Figure - 6	Tentative Project Implementation Schedule	57

CHAPTER - I

INTRODUCTION



CHAPTER - I INTRODUCTION

In August 1989 the Government of Kenya requested the Government of Japan to provide Grant Aid in its effort to save the elephant and rhinoceros populations from extinction inside the country. Responding to this request, the Government of Japan decided to authorize a preliminary study of its context, and subsequently the Japan International Cooperation Agency (JICA) sent a mission headed by Mr. Mikio Nakamura, Grant Aid Appraisal Officer, Grant Aid Division of the Ministry of Foreign Affairs, to Kenya from September 26 to October 21, 1991 to assess the situation, evaluate the request, and formulate an appropriate project.

The Preliminary Study Team discussed the contents and scope of works with various concerned government agencies aimed at the formulation of a project entitled the "Wildlife Conservation Project". The Preliminary Study team recommend that the components of the Project be the provision of equipment and machinery necessary to manage and maintain the park infrastructure, and the protection of wildlife at the three selected national parks, namely Nairobi, Tsavo West and Tsavo East National Parks.

Following from the scope of works agreed to by the two governments and stipulated in the minutes of discussion prepared by the preliminary study team and the executing agency, the Kenya Wildlife Service (KWS), the Government of Japan decided to conduct a "basic design study". Then the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study Team headed by Mr. Masa-aki Kohmaru, Management Officer, Kushiro Shitsugen National Park, Nature Conservation Bureau, Environment Agency of Japan, to Kenya from February 16 to March 4, 1992. Primary study tasks included: (1) discussions with the relevant authorities of the Government of Kenya, (2) collection of the necessary data and collection, (3) a field survey, and (4) the preparation of a basic plan on machine selection as well as a maintenance plan for equipment and machinery planned to be procured for the Project.

1.1 Discussions with Kenyan Authorities

The study team held a series of discussions with the Kenya Wildlife Service and the officers in charge of international cooperation in the External Resources Division of the Ministry of Finance and Planning with respect to the following subjects:

- Components of the project and necessary procedures related to its implementation under the Japanese Grant Aid system;
- Exemption of import duties for all goods and equipment procured through the implementation of the Project.

1.2 Collection of Data and Information

The data and information collected was in relation to the park and road maintenance and management plans, as well as wildlife protection activities in Nairobi, Tsavo East and West National Parks which were selected as the subject areas of the Project. The purpose was to determine the type and amount of equipment and machinery required to render said plans more effective.

Also, data and information required to clarify the present position of other donor countries with respect to implementation of the project from the Nairobi branch office of the World Bank, Overseas Development Agency of the United Kingdom as well as for USAID respectively.

1.3 Field survey

A field survey was carried out over Nairobi, Tsavo East and Tsavo West National Parks to collect information from the persons in charge of management and maintenance of the relevant parks.

1.4 Machine Maintenance and Management Plan

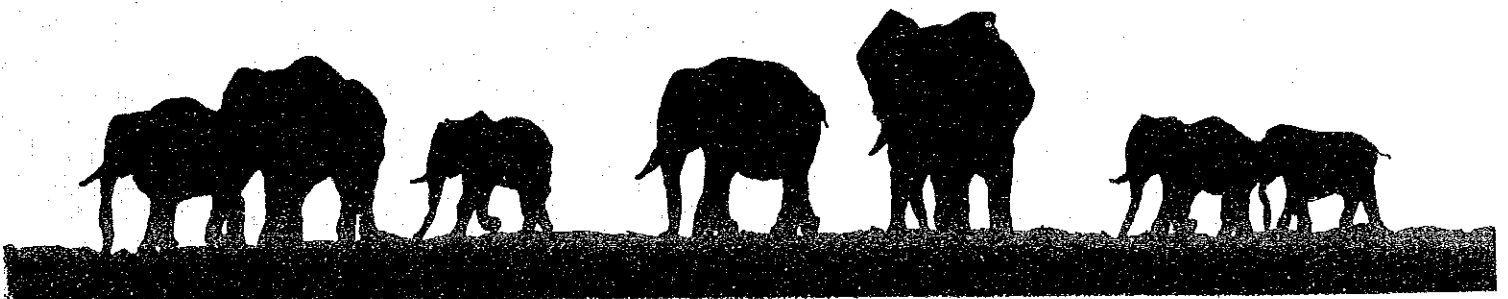
The type and amount of relevant pre-selected equipment and machinery was assessed and determined in accordance with the confirmed road maintenance and management plans and current wildlife protection activities.

With respect to the maintenance plan for the equipment and machinery to be procured through the implementation of the Project, the study team focused on both the present situation of the workshops operating under the Kenya Wildlife Service and those belonging to the local dealers or after service agents of the manufacturers so as to clarify and determine the scope of maintenance works to be undertaken by the executing agency (KWS).

The list of team members, the study team itinerary, the contact list, the minutes of discussions, and the list of equipment and machinery appear as Appendices - 1, 2, 3, 4 and 5 respectively.

CHAPTER - II

BACKGROUND OF THE PROJECT



CHAPTER - II BACKGROUND OF THE PROJECT

2.1 Wildlife Conservation

Kenya has been consistently well known for its rich wildlife, although the decline of the number of elephants and rhinoceri has been severe in the recent past. The populations of the following major animal groups were counted in the country in 1977.

Table - 1 Number of Major Animals Groups in Kenya, 1977

Elephant	80,000
Black Rhinoceros	3,636
Giraffe	79,000
Buffalo	78,750
Eland	41,000
Oryx	63,900
Coke Hartebeest	39,600
Hunter Hartebeest	2,400
Topi	86,900
Wild Beast	148,000
Burchells Zebra	147,000
Grevy Zebra	13,000
Water Buck	21,000
Impala	145,000
Grant Gazelle	236,300
Thomson Gazelle	163,600
Lesser Kudu	17,000

(Source: Kenya Rangeland Ecological Monitoring Unit, 1977)

As long as elephant tusk (ivory) and rhinoceros horn continue to be valuable commercial commodities on the international market, the legislated banning of a trade with such a long and entrenched history will not simply cease. While open trading of these materials is increasingly being driven underground as a result of the international ban, actual on-the-ground enforcement levels continue to be pathetically low due primarily: i) to the lack of an organized management and facility infrastructure in the national parks and reserves to systematically intervene to protect wildlife in their natural environment, and ii) to the utter inadequacy of vehicles, equipment, and maintenance machinery sufficient to carry out the task. Meanwhile as the business risks in this trade expand, and ever greater attention is paid to the insipid act of supplying the traders with the raw materials - i.e. illegal poaching of animals - and concerted efforts are made to eliminate consumer demand, the price of the materials, in both their raw and manufactured forms, goes up,

which then fuels the determination of the poachers and traders to carry on the tradition.

During the past 15 years or more, rampant organized poaching has been frequently reported all over the African continent. Consequently the number of elephants declined from about 600,000 to 200,000 and the number of rhinoceri declined to a level approaching extinction in the same period.

Tables 2 and 3 below show that between 1973 and 1989 the population of elephants in East Africa (including Kenya) was depleted by 87 percent, while the rhinoceros herds were reduced 65 percent between 1980 and 1987 in the same region.

Table - 2 Changes in the Number of African Elephants in East Africa

	1973	1979	1987	1988	1989
Kenya	130,000	65,000	na	20,000	16,000
Tanzania	na	316,300	85,000	na	61,000
Sudan	na	134,000	na	na	22,000
Somalia	na	35,000	na	2,000	na
Ethiopia	na	na	na	na	8,000
Uganda	na	6,000	na	na	1,600

(source: Wildlife Conservation Management; JICA expert Kazuo Saigawa, August 30, 1990)

Table - 3 Changes in the Number of Black Rhinos in Africa

	1980	1984	1987
Kenya	1,500	550	520
Africa (17)	13,285	8,300	3,270
Total Africa	14,785	8,800	3,800

(Source: East Africa Wildlife Association, 1989)

The areas designated by the KWS as the highest priority areas are, quite understandably, where poaching has frequently been reported. These areas lie east of the line connecting Tsavo East National Park and Meru National Park stretching to the Somalese border. Increasing the effectiveness of anti-poaching measures will require enhancement and better maintenance

of the road and facility infrastructure of the parks. A park's road network and the adequacy of the park manager's official vehicle fleet are two of the most critically important elements infrastructure necessary for the protection of wildlife and the natural environment. The deterioration of said park roads in the designated study-area parks is readily apparent from the neglect of 20 or more years during which no maintenance has been adequately performed on them due to a lack of funds and equipment.

Most of the park roads are unpaved and require regular maintenance particularly after the major and minor rainy seasons which befall Kenya from April to June and from October to December respectively. Poorly maintained roads hinder smooth monitoring and anti-poaching surveillance, and reduce the park's attractiveness to tourists. The lack of road maintenance and the inadequacy of surveillance vehicles to engage in effective anti-poaching activity has enabled poachers to act with impunity in their grisly vocation, and precipitated the drastic decline in the animal populations of East Africa.

A sufficient amount of equipment and machinery for maintenance of park roads and anti-poaching activities, and equipment required to carry out effective maintenance of the machinery procured, is planned to be procured. Road maintenance work including grading of roads twice a year, repair of deteriorated sections of roads, maintenance of bridges, culverts, Irish bridges, drainage pits, etc. which make up part of the road will become available by utilizing the equipment and machinery procured. These works will remove any obstacles to smooth monitoring and maintenance and the effectiveness of anti-poaching activity should increase substantially.

On the other hand, the number of tourists and the amount of tourism receipts have been growing year by year as shown in the Tables 4 and 5 respectively. In 1988, the number of tourists reached to 580,000 (out of 700,000 total visitors to Kenya), with eighty percent of those visiting Kenya to view the wildlife. There is no doubt that the role of the wildlife sector is quite important with respect to the national economy.

Table - 4 Changes in the Number of Tourists Per Year

(Unit: 1,000 persons)

Year	1985	1986	1987	1988	1989
Purpose					
Tour / Business	477.5	542.5	586.8	616.9	695.9
Transit	52.0	58.9	62.4	65.3	34.5
Others	11.1	12.8	12.1	12.7	34.5
Total	540.6	614.2	661.3	694.9	764.9

(Statistical Abstract 1990, Ministry of National Development, Central Information Bureau)

As the wildlife sector is closely related to the tourism sector from an economic point of view, it can be judged that the future of the tourism sector is quite dependent on the conservation of wildlife as an important resource for the tourism industry. The Government of Kenya has prepared a master programme for wildlife protection in order to achieve sustainable development by an establishment of the system which aims to conserve and protect wildlife by the effective utilization of revenue from the tourism sector.

2.2 OUTLINE OF THE RELEVANT PLANS

2.2.1 National Economic Development Plan

Long term economic development plans, having plan periods of 3-5 years, have been executed 6 times to date since the year of independence - 1963. In the past, the planning effort faced various external economic changes, and development targets were forced to be revised each time major perturbations such as the oil crises of 1973 and 1979, the sudden price hike of primary products such as coffee and tea in 1977 and 1978, and the severe draught of 1980 - 1984. For such reasons, the targets of planned economic growth have not been successfully achieved since the 2nd economic plan period.

In 1986, a long term economic development plan to the year 2000 was prepared for 15 years envisioning an economic model of Kenya to correspond with structural changes. The sixth national economic development plan for 5 years (1988 - 1993) was prepared in line with this long term plan, of which the

major theme was called "participation for progress" and the major target is to create 2 million jobs. This plan emphasizes the revitalization of agriculture and industry as a key to achieve targeted economic growth set at 5.4% per annum.

As the decade of the '80s came to a close, the Kenyan economy was facing high rates of inflation, severely tight national budgets, and an export slump. To assist in the solution to these problems, the Kenyan Government received support from the International Monetary Fund from 1989-1991 for the initiation of its Enhanced Structural Adjustment Facility (ESAF). The major objectives of this ESAF initiative included: the realization of a higher rate of GDP growth than that of population growth; a reduction of the prevailing rate of inflation down to the level of the country's balance of payments; and an increase in foreign exchange earnings.

The Government of Kenya has been striving to re-structure the national economy so as to reduce its vulnerability to changes in external economic conditions. The economic structural reformation focuses mainly on the privatization of state enterprises, the improvement of foreign investment laws, and the promotion of industries oriented to earn foreign exchange etc. Major foreign exchange earners have traditionally been the exports of primary products mainly coffee, and tea. However, the tourism receipt has been listed as a top foreign exchange earner as shown in Table - 5 below, and the importance of the tourism sector has been steadily growing year by year.

Table - 5 Performance of the Tourism Sector in Trade Balance and Foreign Exchange Earning

	(Unit: million Kenya Shilling)				
Year	1985	1986	1987	1988	1989
A. Merchandise Exports (FOB)	811	986	789	951	1,010
B. Merchandise Import (CIF)	1,196	1,338	1,431	1,765	2,239
C. Trade Balance (A - B)	- 385	- 352	- 642	- 814	- 1,229
D. Tourist Receipts	197	246	292	349	432
E. Ratio in Exports (A/D) %	24	25	37	37	42
F. Growth Ratio %	0	24	16	20	24

(Source: Planning and Economic Survey, 1987, 1989

Ministry of Planning, Central Information Bureau)

2.2.2 Wildlife Conservation Programme

In 1988, the World Bank was enlisted to assist the Government of Kenya in the execution of an economic structural reform programme. The Bank suggested that increased revenue and income from the tourism sector should be given high priority attention so as to improve the prevailing financial stringency of the Kenyan government and to promote industry oriented to the earning of foreign exchange. First, in accordance with this policy, the programme to conserve and protect the wildlife which has been facing a significant problem of extinction of certain species despite that the wildlife itself is the most important tourism resource was called the " Double Elephant and Rhino Sanctuaries Project". Secondly, the establishment of the Kenya Wildlife Service as a new organization to replace the Wildlife Conservation and Management Department which had become inoperative. Furthermore, a study for the preparation of a master programme for wildlife conservation was commissioned designed to improve the operation and maintenance of all 26 National Parks and 29 National Reserves scattered throughout the country under the newly planned Kenya Wildlife Service.

Established in January 1990, the new parastatal organization, the Kenya Wildlife Service (KWS), received the mandate to control overall integrated wildlife conservation programmes, and to manage national parks and reserves while protecting the wildlife in said areas. After beginning in November 1990, the result of the World Bank sponsorship of this new agency's initiative took the form of a report aimed at the total control and investment programme for wildlife conservation. This report has been widely distributed to concerned countries under the title - "Policy Framework and Development Programme for 1991-1996".

The principal goals of this Programme are:

- i) To conserve the natural environment of Kenya and its fauna and flora, for the benefit of present and future generations;
- ii) To use the sustainable wildlife resources of Kenya for the economic development of the nation and for the benefit of people living in wildlife areas; and

- iii) To involve the peoples of the surrounding region in the process of conservation, and to establish harmony between on-going restoration/conservation activities and related industries

The sub-programmes comprising the above mentioned master programmes are: a KWS institutional reinforcement programme; a National Parks and Reserves operation and reinforcement programme; a wildlife conservation programme; and a financial programme to implement them.

The Program consists of the following eight (8) identical programme activities and respective investment plans. The outline of these programme activities are as follows:

1. Improvement and maintenance of national parks and reserves
2. Operation and maintenance of wildlife conservation activity
3. Development, upgrading, improvement and maintenance of national reserves
4. Development of the KWS institutional capacity
5. Strengthening the KWS planning capacity
6. Revitalization of the KWS scientific research
7. Extension of the wildlife education programme
8. Community wildlife programme

The estimated amount above cannot be covered by the revenues generated by the park entrance charges which KWS is entitled to receive through nationwide tourism operations. In accordance with the investment programme, one third of the total cost is planned to be covered by the revenues of KWS with the remainder to be covered by the international financial and technical cooperation package established for the implementation of the Programme.

The World Bank has already taken the decision to support the projects mentioned above. The scope of its support measures will include the reinforcement of the organization, the training of personnel, the improvement of infrastructure, the supply of vehicles and equipment, and the financial support for certain operational expenses related to these areas.

The major items of support are:

- a) Reinforcement of the KWS organization, supply of material and equipment, technical support, and the supply of technical training of personnel;
- b) Construction of roads, office buildings, staff housing, and related maintenance facilities;
- c) Implementation of technical, financial, and manpower training support with the participation of local residents for - profit sharing and distribution to local residents, encouragement of wildlife related industries, and the prevention of animal-caused damage;
- d) Building visitor centers located in Nairobi and other places, and the improvement of educational facilities located in national park and reserve areas which teach methods of wildlife protection;
- e) Implementation of up-grading measures of the KWS's planning capability: i) Regional Policy Planning for Parks and Reserves, ii) Land Use plan-making; and iii) Socio-economic surveys. In addition technical support for management and maintenance related to marine parks, and comprehensive plan-making for marshland areas will be provided;
- f) Provision of measures to re-activate scientific survey and research institutions of the KWS: particularly marshland and marine area ecosystems, dispatching experts to reinforce and support the effort. These activating measures include financial support to special protection programmes such as the Global Environmental Facility to protect elephants and rhinoceri.

- g) Financial support to the Wildlife Protection Unit for procurement of vehicles and improvement of related facility.

The World Bank approved a loan amounting to US\$60 million to cover the costs estimated to operate, maintain, and manage and employ experts needed for the above eight programme activities in February 1992. In addition to this, five (5) donor countries such as Japan, the United States of America, United Kingdom, Germany and Holland as well as one international financial institution, such as the EEC, have begun preparation of various types of financial and technical facilities to be made available to Kenya.

This study deals with: (1) Improvement and maintenance of national parks and reserves; and (2) Operations and Maintenance of wildlife conservation activity. The above mentioned activities can be considered as an independent activity, however, when these activities are executed and implemented in harmony the effect of the programme can be maximized.

2.3 History and Contents of the Request

The Government of Kenya requested to the Government of Japan financial and technical cooperation to implement the Double Elephant and Rhino Sanctuary Project. In response to the above request the Japan International Cooperation Agency dispatched Mr. Kazuo Saigawa, of the Japan Wildlife Center, and Mr. Masa-aki Kohmaru, of the Environment Agency as short term experts to clarify the integrated wildlife conservation master programme under preparation at that time and study the response of the Government of Kenya, the World Bank and other donor countries.

In June 1991, Mr. Kazuo Saigawa was dispatched again to assess the content of this master programme submitted as well as to study the response of the World Bank and other donor countries. On the basis of the report of these experts, the Government of Japan decided to conduct a preliminary study and the Japan International Cooperation Agency dispatched the Preliminary Study Team headed by Mr. Mikio Nakamura, Ministry of Foreign Affairs, Economic Cooperation Dept. Grant Aid Division, Grant Aid Appraisal Officer, from September 26 to October 21, 1991.

The preliminary study team identified the Project as the Wildlife Conservation Project and confirmed that certain equipment and machinery would be necessary for the maintenance and management of park infrastructure in the three designated parks: Nairobi, Tsavo East and Tsavo West National Parks. These three parks were selected because the team judged that fewer problems would arise in maintenance and management of the equipment and machinery planned to be procured through the implementation of the project in these selected parks.

Further, in accordance with the result of the study and the content of minutes of discussions dated October 7, 1991 between the study team and the Kenya Wildlife Service, the Government of Japan decided to conduct a basic design study and the Japan International Cooperation Agency dispatched the Basic Design Team headed by Mr. Masa-aki Kohmaru, Chief Management Officer, Kushiro Shitsugen National Park Office, Nature Conservation Bureau, Environment Agency of Japan from February 16 to March 4, 1992.

The contents of the request were clarified through these studies and can be summarized in the form of long term goals:

Objectives of the request:

- i) Enhancement and promotion of the Kenyan Tourism Industry through the improvement of road and facility infrastructure at tourism destinations and locations;
- ii) Conservation of the natural environment and protection of wildlife facing extinction in Kenya

Outline of the Project

Provision of the equipment and machinery required to manage , repair and maintain the road networks, and engage in wildlife protection activities in the below mentioned national parks.

Objective Parks

Nairobi National Park
Tsavo West National Park
Tsavo East National Park

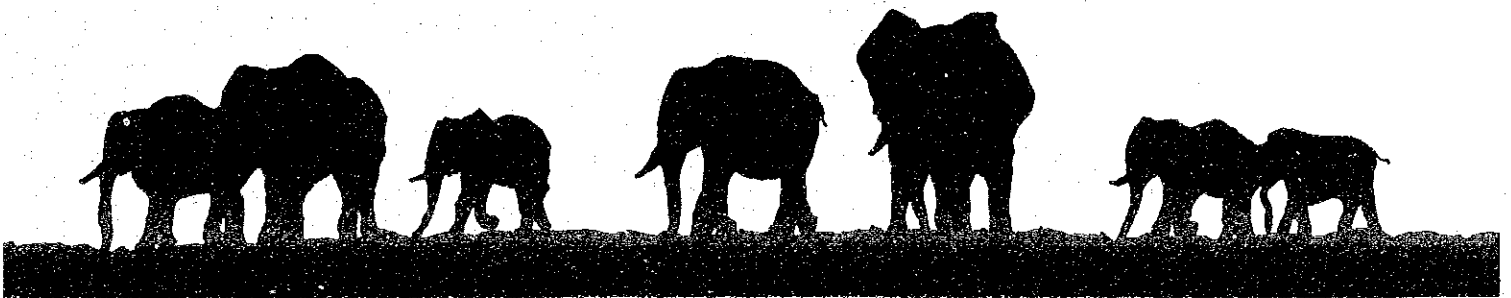
Executing Agency

Kenya Wildlife Service

Outline of Equipment and Machinery

- Vehicles and construction machinery required for the maintenance of park roads;
- Vehicles required for park management and wildlife protection activities.
- Workshop tools and equipment required for maintenance of vehicles and construction machinery mentioned above.

CHAPTER - III PROJECT AREAS



CHAPTER - III PROJECT AREAS

3.1 National Parks and Reserves

In 1991, Kenya has 26 National Parks (29,455 sq. km) and 29 Reserves (15,022 sq. km) scattered throughout Kenya as shown in the Map. Total park and reserve areas represent approximately 8 % of total land area as shown in Table - 6 "National Parks and Reserves of Kenya".

Table - 6 "National Parks and Reserves of Kenya".

No.	(A) NATIONAL PARK	AREA (Sq. Km)	ESTABLISH	No.	(B) NATIONAL RESERVE	AREA (Sq. Km)	ESTABLISH
1	Nairobi	117	1946.12	1	Marsabit	1,132	1967.07
2	Tsavo West	9,065	1948.04	2	Marindi Marine	213	1668.03
3	Tsavo East	11,724	1948.04	3	Watam Marine	32	1968.03
4	Mount Kenya	715	1949.12	4	Shimba Hills	192	1968.09
5	Aberdare	766	1950.05	5	Lake Bogoria	102	1970.11
6	Meru	870	1966.12	6	Shaba	239	1974.10
7	Oi Donyo Sabuk	18	1967.12	7	Masai Mara	1,510	1974.11
8	Malindi Marine	6	1968.03	8	Arawale	533	1974.11
9	Watam Marine	10	1968.03	9	Mwea	68	1976.01
10	Mount Elgon	169	1968.04	10	Rahole	1,270	1976.01
11	Sibilo	1,570	1973.08	11	Tana/R. Primate	169	1976.01
12	Saiwa Swamp	2	1974.01	12	Boni	1,339	1976.01
13	Amboseli	392	1974.01	13	Losai	1,806	1976.01
14	marine Wasini	28	1978.09	14	Ngai Ndethya	212	1976.01
15	Chyulu	471	1983.01	15	Dodori	877	1976.05
16	Longonot	52	1983.01	16	Mpunguti Marine	11	1978.06
17	Central Island	5	1983.01	17	South Kitui	1,833	1979.09
18	South Island	39	1983.01	18	North Kitui	745	1979.09
19	Lake Nakuru	188	1983.01	19	Bisandi	606	1979.09
20	Marsabit	360	1983.06	20	South Turkana	1,091	1979.10
21	Ruma	120	1983.10	21	Kiunga Marine	251	1979.10
22	Hell's Gate	68	1984.02	22	Nasolot	92	1979.11
23	Ndera Island	4	1986.11	23	Kerio Valley	66	1983.01
24	Mombasa	10	1986.12	24	Kamnarok	88	1983.06
25	Kora	1,787	1989.10	25	Kakamega	45	1985.05
26	Malka Mari	876	1989.10	26	Samburu	165	1985.08
				27	Buffalo Springs	131	1985.08
				28	Mombasa Marine	200	1986.12
				29	Maralal Sanctuary	5	1986.12
Total				Total			
		29,455				15,022	

The Parks and Reserves are grouped into eight (8) regions {(1) Western, (2) Coast, (3) Northern, (4) Eastern, (5) Nairobi, (6) Mountain, (7) Southern and (8) Rift Valley and 24 areas as illustrated in Figure - 1 Administrative Boundary for Management of National Parks and Reserves. As for the park infrastructure maintenance activity, equipment and machinery are planned to be pooled at each regional center where equipment based units would operate so as to ensure operational effectiveness.

To upgrade the work efficiency and effectiveness of park management and facility maintenance of the national park infrastructure, KWS established its centralized control headquarters, there is a central repair workshop to repair and maintain vital equipment. The three parks selected as the beneficiaries of the project have been recognized as having the technical capacity and availability of technical support to make the best use of the equipment to be procured through the implementation of the project .

Nairobi National Park is a center for the management of all national parks and national reserves, and is the oldest national park in Kenya. Its area is the smallest among other parks, however, it is a quite unique national park because of its superior diversity of habitats and variety of wildlife. Tsavo East and West National Parks are the biggest natural parks in east Africa in terms of area. (The areas of the Serengetti and the Ngorongoro National Parks of Tanzania are 14,500 sq. km and 6,475 sq. km respectively.) It can be regarded one of the biggest natural parks not only in Africa but also in the World. Its scenery is valuable as a tourism resource.

Following Table-7 shows number of paid entry of 3 parks.

Table-7 "Number of Paid Entry of 3 Parks"

(UNIT: 1,000)

National Park	1986.0	1987.0	1988.0	1989.0	1990.0	Total	%
Nairobi N.P.	91.6	99.8	125.5	155.2	152.8	624.9	11%
Tsavo West	82.9	80.6	85.4	96.8	78.6	424.3	7%
Tsavo East	75.3	89.6	87.3	101.1	127.7	481.0	8%
Sub Total	249.8	270.0	298.2	353.1	359.1	1530.2	26%
Other N.P.s	675.7	726.0	797.6	901.9	1173.1	4274.3	74%
Total	925.5	996.0	1095.8	1255.0	1532.2	5804.5	100%

(Source:Economic Abstract 1991, Ministry of National Development,
Central Information Bureau)

However, as the infrastructure, especially the road networks of these parks have been neglected for almost 20 years without any proper and sufficient maintenance, the degradation of roads has become so severe that the high potential for tourism development based on wildlife viewing cannot be exploited. Due to their huge size in terms of land area, these particular parks have proved to be ripe for indiscriminate poaching.

Although the Wildlife Protection Unit has been paying the highest attention in and around the Tsavo East National Park to prevent poaching, it has not been able to attain the optimum effect due to this bad state of the roads which hinder anti-poaching patrols.

The profiles of these parks are described in following sub-chapter 3.2 respectively.

3.2 Nairobi National Park

Nairobi National Park is situated 7 km south-west from the center of Nairobi, the capital city of Kenya, at an altitude of 1,400 - 1,800 m in Athi hill. This park is unique because nowhere else in the world does a wild life reserve exist with such a variety of animals and birds so close to a major city. The area is a little over 117 sq. km. Though of such small dimensions compared with other such reserves in East and Central Africa, it possesses a diversity of environments as shown in Figure-2 "Nairobi National Park"

Over much of the park, open arid country predominates, with or without scattered acacia bushes. The plethora of large game animals creates a tourist attraction. Animals seen include: lions, leopards, cheetah, Masai giraffe, zebra, and hippopotami. The great herds often seen are impala, congoni, wildebeest, eland, thomson gazelle, etc.

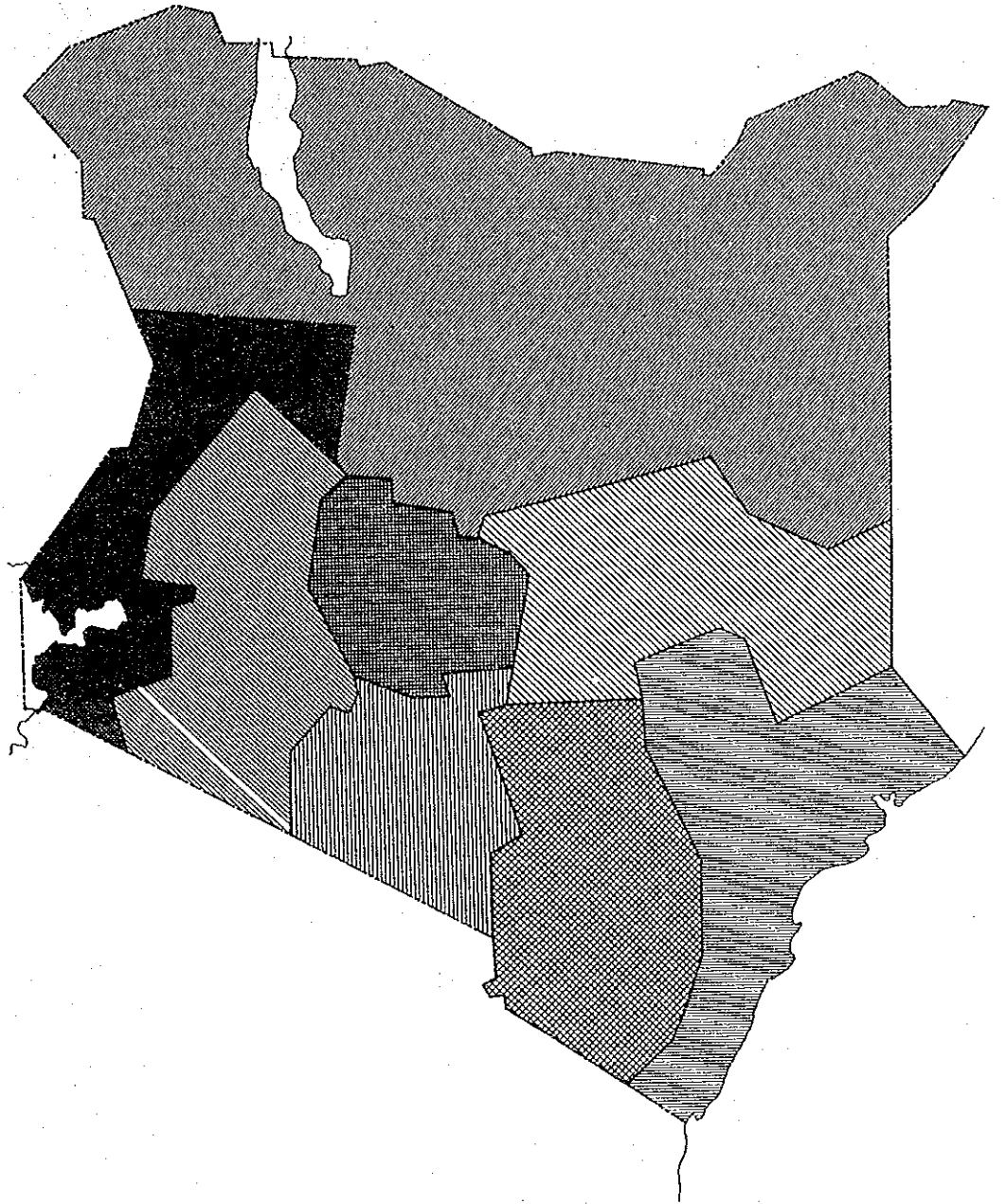
The park road network stretches throughout the park as illustrated in Figure-2. The total length of the respective road is as follows:









Total Length of Existing Road

Paved Road	4 km
Gravel Road	48 km
Unpaved Road	158 km
<hr/>	
Total	210 km

Between 1986-1990, approximately 625,000 tourists visited this park. This figure represents approximately 11 percent of all visitors to Kenya's national park system. In August 1991, Mr. Hitoshi Kitamura, Japan Overseas Cooperation Volunteers, was dispatched to the national park center's machinery repair workshop. His assignment was technical training for vehicle maintenance.

Figure - 1 "Administrative Boundary for Management of National Parks and Reserves"



	Rift Valley	Nakuru
	Northern Kenya	Marsabit
	Western Kenya	Kitale
	Eastern Kenya	Meru
	Nairobi	Nairobi
	Southern Kenya	Voi
	Mountains	Nyeri
	Coast Region	Mombasa

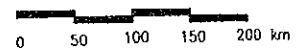
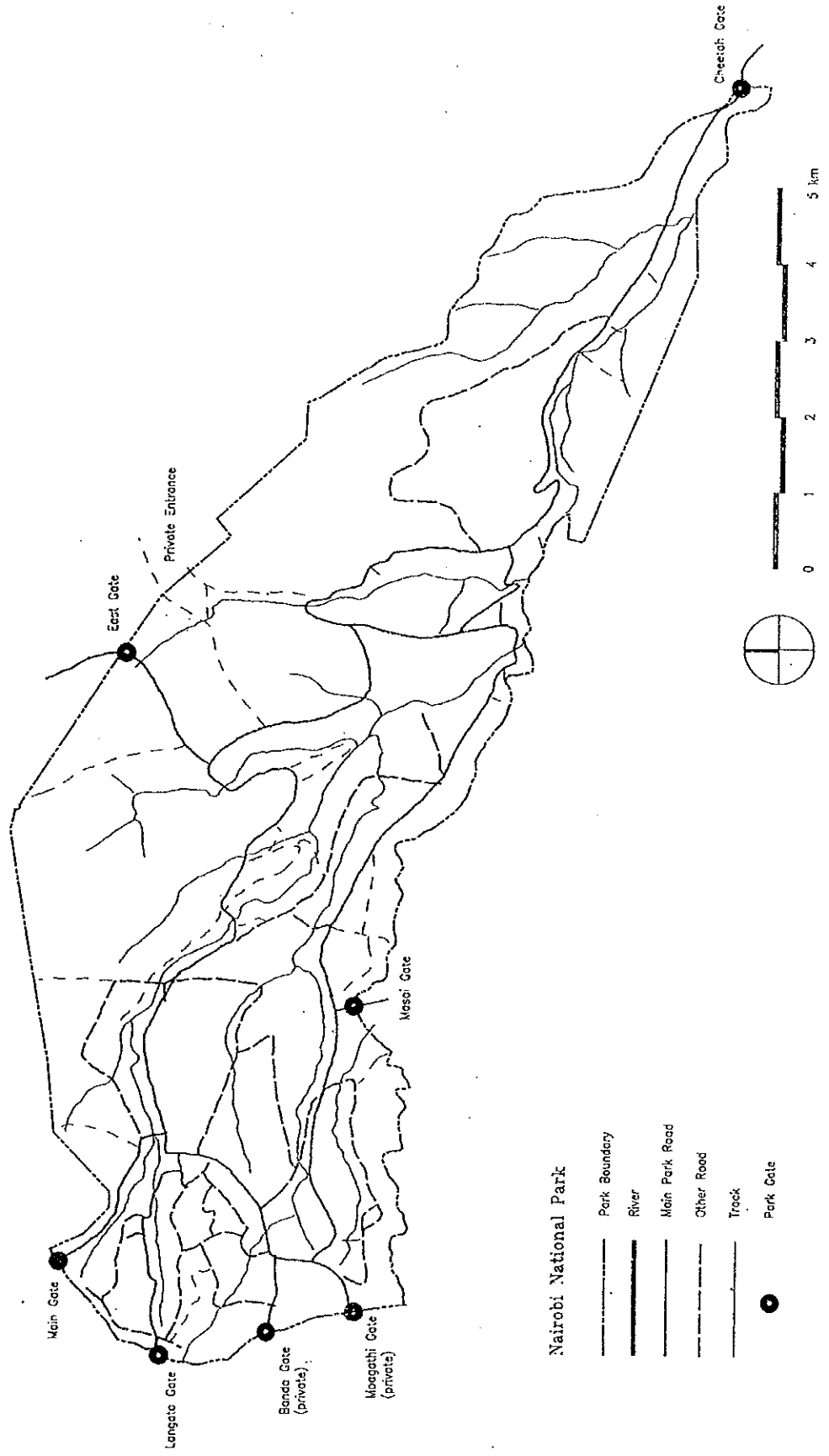


Figure - 2 "Nairobi National Park"



3.3 Tsavo East National Park

The Tsavo National Park composed of Tsavo East and West National Park, a vast arid region of 20,807 sq. km (equivalent to 1.1 times the size of Shikoku Island of Japan), is Kenya's largest wildlife stronghold. The Park comprises a diversity of habitats, open plains alternating with savannah bush and semi-desert scrub; acacia woodlands; rocky ridges and outcrops, and more extensive ranges, isolated hills and mountain forest.

The park, which lies roughly half-way between the coast and Nairobi, is bisected by the main Nairobi - Mombasa road and railway. That portion lying north and east of the road is designated as Tsavo East National Park; that to the south and west as Tsavo West National Park.

The Tsavo East National Park is naturally watered by two permanent rivers, the Tsavo River which flows through Tsavo West Park and the Athi River crossing a corner of Tsavo East. The two unite above Lugard Falls to become the Galana River. The park is geographically divided in roughly three parts by the rivers. Mainly on account of the difficult waterless nature of much of the terrain, parts of the park have not yet been developed for visitors. These include the uninhabited scrub desert north of the Galana River.

The roadways pass through much of the best game viewing areas and follow the rivers where there is a great concentration of game during the dry season. Elephants in large herds are the best attraction in the park. Tsavo is also a good place to see one of the most beautiful antelopes, the Lesser Kudu. Other animals likely to be encountered are Buffalo, Waterbuck, Eland, Gerenuk, Oryx, Impala and Masai Giraffe. Black Rhinoceri, once numerous, are now less frequently seen due to the pervasive poaching.

These parks frequently experience spontaneous combustion of wild bush and tumbleweed. The patrol roads designed as anti-fire belts do not function effectively against these small bush fires due mostly to the prevalence of the wild grass. Approximately 2-3 times per year this wild grass and bush should be cleared, but this action to regulate bush fires is not occurring due to the lack of equipment to accomplish the job.

Ranger units patrol the northern most underdeveloped areas. However, a full patrol cycle requires 10-14 days by car for surveillance of poaching

activity over the entire area. During these patrol cycles, the rangers often run short of food and supplies. New roads, vehicles, and state-of-the-art surveillance equipment is vitally needed to protect wildlife from poachers.

The park road network is illustrated in Figure-3. The road length of the existing road by category is as follows:

Total Length of Existing Road	
Paved Road	0 km.
Gravel Road	100 km.
Unpaved Road	1690 km.

Total	1790 km.

Between 1986-1990, 481,000 tourists visited this park representing 8 percent of the total visitors to all national parks in Kenya. Mr. Shinya Matsumoto of Japan's Overseas Cooperation Volunteers was dispatched to the park assigned for technical training in car maintenance.

3.4 Tsavo West National Park

Volcanic magma and inactive volcanoes in conical forms are quite prevalent in this park. In this area an underground aquifer called Mzjima Springs pushes 235,000 cubic meters of pure water per day out through the porous earth. This water is piped 220 km away to Mombasa, the second largest city in Kenya and the largest city on the Kenyan coastline at 300,000 population.

Hippopotami and Alligators inhabit this area. An enclosed observation structure built under the water enables tourists to view wild animals living in their natural state. In the dry season, hundreds of elephants can be seen searching for water over a 1.5 km stretch of land between Voi and Maniani. This is a popular area for tourists because the accommodations available are of good quality and are well maintained. From the southern tip of this park, Mt. Kilimanjaro can be seen from where the park shares a common border with Tanzania.

Here also, in the dry season, spontaneous combustion of wild bush fires occurs frequently, and the resulting fires rage nearly unabated as necessary vehicles are in such short supply. Equipment and vehicles necessary for removal of bush on the fire breaker and grading unpaved roads and tracks are in short supply, required road maintenance work has not been carried out at satisfactory level.

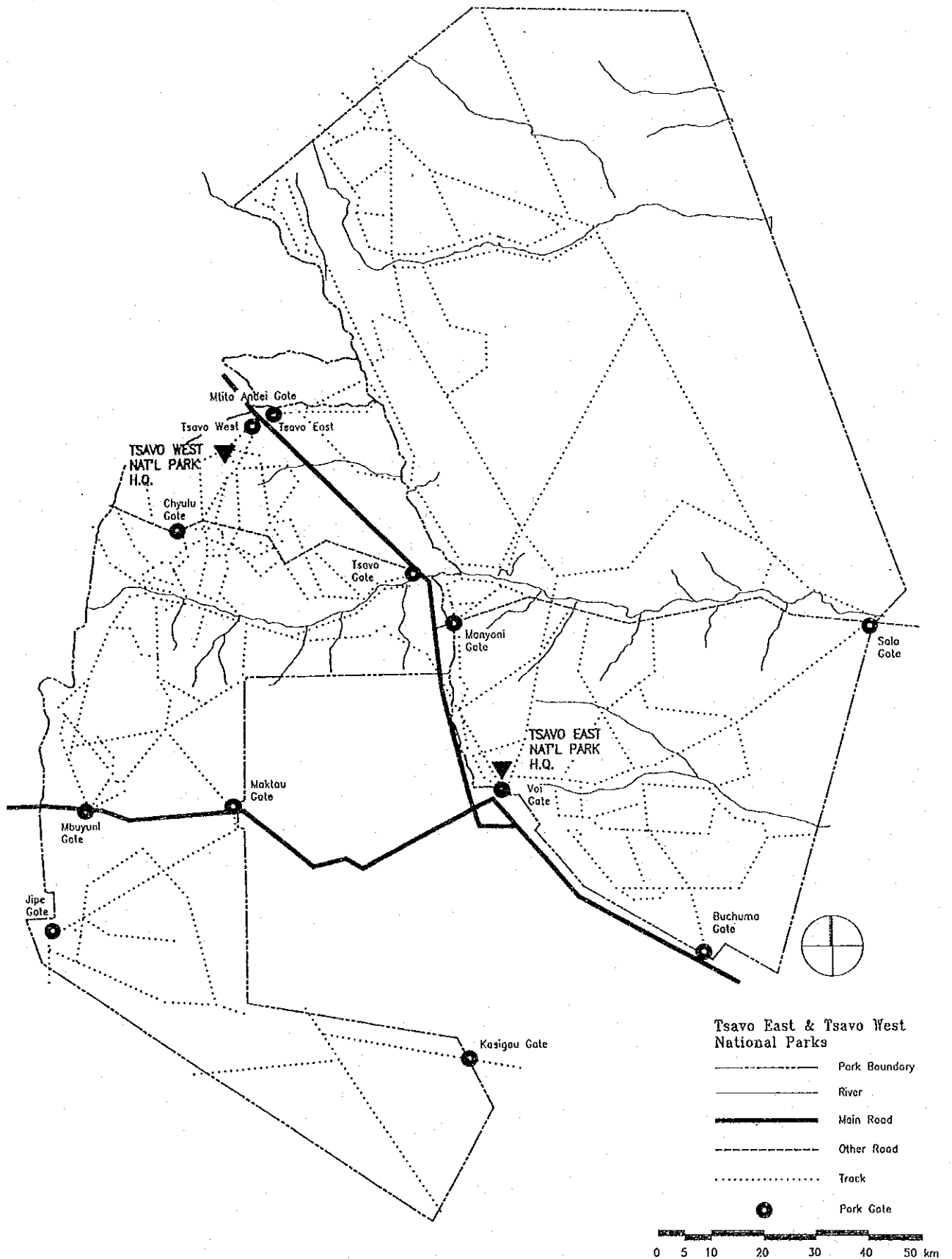
Total Length of Existing Road

Paved Road	0 km.
Gravel Road	100 km.
Unpaved Road	1118 km.

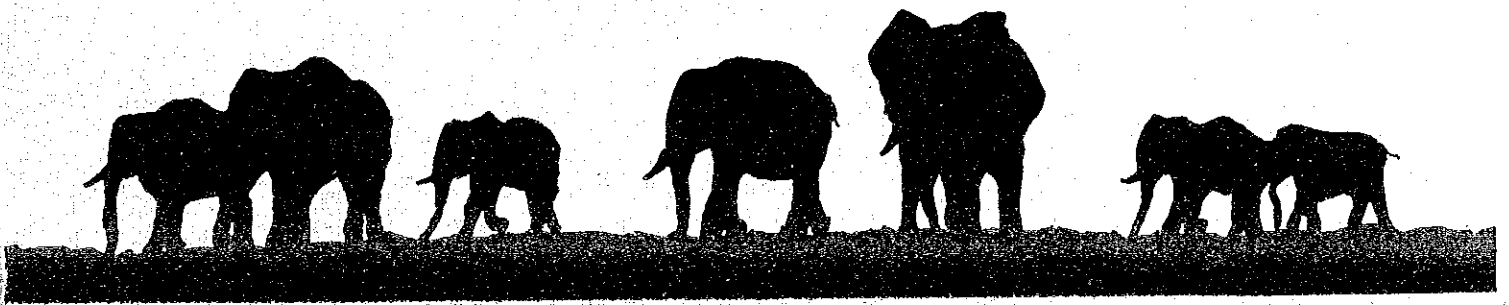
Total	1218 km.

Between 1986 - 1990, 424,000 tourists visited this park representing 7 percent of all visitors to all national parks in the country. Mr. Hitoshi Oka of Japan Overseas Cooperation Volunteers was dispatched assigned to the machinery repair workshop for technical training in vehicle maintenance.

Figure - 3 "Tsavo East and West National Park"



CHAPTER - IV OUTLINE OF THE PROJECT



CHAPTER IV OUTLINE OF THE PROJECT

4.1 Objectives of the Project

The Kenyan national parks and reserve system includes significant areas of most of Kenya's habitats that contain diverse wildlife and appealing scenery - the hallmarks of the tourism industry of Kenya.

The past twenty years have, however, witnessed a severe deterioration of Kenya's wildlife sector as the pressures on the animals' habitats increased due to land use conflicts resulting from the rapidly expanding human population, and the increased threat of organized poaching.

Since mid-1970s, each year for almost 15 years, Kenya's elephant population declined through organized poaching and habitat denigration, by 85 percent and the rhino population by 97 percent severely endangering the survival of the species.

The Kenya Wildlife Service has prepared a comprehensive and integrated master program for the wildlife conservation of Kenya (hereinafter referred to as "the Program") to conserve wildlife as a tourism resource through the improvement of the adverse prevailing situation. This project is to provide assistance to the KWS to the project identified in the integrated framework of the programme mentioned above.

The part of the Program to which the Project directly relates are the improvement and maintenance of (1) infrastructures of the national parks and (2) wildlife protection system. The Project envisages to provide equipment and machinery for the realization of relevant programme.

4.2 Analytic Study of the Request

4.2.1 Rationale and Necessity of the Project

The administration of wildlife parks can be categorized into the following three areas:

- a) Improvement and maintenance of essential infrastructure such as road networks vital to park operation;
- b) Monitoring of the entire physical area of the park and its surroundings by wildlife protection units;
- c) General office administrative works.

Identifiable problems associated with the works described above are:

- 1) Park infrastructure improvement and maintenance works

The road network inside a park or reserve is regarded as a main infrastructure component. The road networks in this case have been neglected for approximately 20 years and thus their general condition has visibly deteriorated. During the rainy seasons most of the existing roads are unusable. This adversely affects the business of circulating tourists through the parks for the observation of wildlife. It also has a serious detrimental effect on the patrolling efforts of the park management seeking to protect the indigenous wildlife.

Two alternatives in the contracting system have been available to undertake the maintenance of these park roads - employ a public organization or private company or carry out works on the force account of the KWS. The former is used for the overall repair of main roads, while the latter is used for more minor routine maintenance works. However, in the latter case, all maintenance equipment presently owned by the KWS is either outdated or dysfunctional and insufficient in quantity to do an adequate job.

- 2) Wildlife Protection Activities

The main duty of the wildlife protection unit is to patrol the park or reserve to detect and prevent poaching. The effectiveness of these patrols in the Kenyan national parks and reserves has proved to be very low because the areas to be covered are vast, the roads are in extremely poor condition, the time required for a single round of patrolling is approximately 10-14 days, and the number and quality of patrol vehicles is insufficient to satisfactorily do the job. This situation of ineffective patrols intended to protect wildlife in and around national parks and reserves has without doubt exacerbated the

pervasive poaching problem. The Project seeks to provide the vehicles, equipment, and machinery necessary to satisfactorily patrol the parks to prevent or at least significantly reduce the poaching going on. Successful implementation of this project and proper utilization of the vehicles provided in its course, considering its organizational, technical and financial contributions to solving the problems, the project should serve as a major step in the cause of protecting animals and the environment in Kenya.

Although the subject areas have been limited to three national parks among a total of twenty-six in the entire country (since Nairobi is the administration center and Tsavo East and West comprise the largest national park in the country), implementing the project would demonstrate the Kenyan Government's serious commitment to conserve and protect the wildlife environment. The results of the project should greatly contribute to the prevention of poaching throughout the country.

Figure-4 Wildlife Conservation Master Programme-International Cooperation

International Agencies and Donor Countries	IBRD	EC	JAPAN	U.S.A.	GERMANY	U.K.	HOLLAND
Aid Organization	IDA	EEC	JICA	USAID	KfW	ODA	DUTCH
Master Programme for Wildlife Conservation Activities							
A) Improvement, Maintenance & Management of the Park Infra.							
Road Rehabilitation							
Provision of Vehicles							
Provision of Construction Machinery							
Construction of Fences							
B) Reinforce and Maintenance of the Wildlife Protection Unit							
Improvement of Communication Networks							
Provision of Vehicles							
Provision of Equipment							
C) Organizational Reinforcement & Man-power Training for the KWS							
Provision of Vehicles							
Provision of Equipment							
Training & Dispatch of Experts							
Operation Cost							
D) Community / Wildlife Programme							
Construction of Fences							
Provision of Vehicles							
Provision of Equipment							
Dispatch of Experts							
Operation Cost							
E) Upgrading the KWS Planning Capability							
Provision of Vehicles							
Training							
Dispatch of Experts							
F) Scientific Activities of the KWS							
Provision of Vehicles							
G) Infrastructure Improvement in the National Reserves							
Provision of Vehicles							
Road Rehabilitation							
Committed or Planned Aid Amount (US\$ million)	60.5	8.0	5.3	7.0	6.3	20.0	5.5

4.2.2 Implementation and Operation Plan

A detailed implementation plan has already been prepared for both the rehabilitation and maintenance of park infrastructure, as these are considered the major works of the Programme. The project budget formulated for these works reaches USD\$12.97 million, of which USD\$11.67 million is secured from the World Bank.

The organizational improvement of the KWS by a reduction of the number of staffs was done in 1991. Present number of staffs is 3,219 in total and the number of staffs concerned to operation of plant is about 35, machine repair works 40 and staffs including rangers for wildlife protection is about 1,300 respectively as appeared in Appendix -6.

Number of staff in objective parks for respective ranks and jobs are shown in Appendix - 6.

Though the manpower to undertake the operation and maintenance of the equipment in these works remains to be settled, the resources are in place for employing the skilled personnel. Assembly of this manpower is set to begin from June 1992. Employment of operators, staff workers, repairmen, and engineers will be assigned to coincide with the scheduled delivery of equipment to be procured through the implementation of the Project.

4.2.3 International Aid Agency Involvement

The master programme for wildlife conservation in Kenya has a unique character. The development plan, intended to reconstitute the KWS, aims to succeed under a single master programme which systematically organizes sub-programmes under the direction of various international aid organizations and donor country agencies in an atmosphere of mutual cooperation. The sub-projects remain independent in operation but are connected under an over-arching framework to avoid any conflict of interest or overlap of accomplishment.

Simultaneous to the initiation of this study, projects to be implemented by the World Bank and other agencies of donor countries are shown in Figure - 4, and the current status of each of those projects is summarized below.

(1) The World Bank

The World Bank has been lending assistance to the KWS since its inception both technically and financially toward the preparation of their master programme for wildlife protection. On February 11, 1992 the Bank agreed to finance USD\$60.5 million to the KWS for their purchase of equipment necessary to implement their projects and cover operations and maintenance costs for a 5 year period from the beginning of the programme. The first disbursement of funds is scheduled to be made by the end of June 1992 - an amount of approximately USD\$1.6 million. KWS has finalized the detailed annual investment plan and programme for this '92/93 fiscal year which begins July 1, 1992.

(2) European Economic Community

A grant of USD\$80 million is programmed for disbursement by the EEC for the specific purpose of protecting elephants and rhinoceri.

(3) United Kingdom - Overseas Development Agency

Policies of this agency are in place to provide both technical and financial support for the development of skilled manpower to work in all capacities of wildlife protection. In January 1992, this agency approved a grant of USD\$20 million as a budget for financial and technical aid to Kenya. Subsequently, necessary steps for the employment of experts for manpower development and training began in March 1992. Technical cooperation for the dispatch of experts covering trading, organization, and training is scheduled from May 1992. In the area of equipment supply, a technical study of how to improve the wireless communication network for wildlife protection was finalized at the end of March 1992. This project was to install a trunk communication line connecting Mombasa, Nairobi, and Elgon.

(4) USA - Agency for International Development

Technical and financial support is to be provided so as to realize a harmonious co-existence between the indigenous habitat and the newly devised wildlife protection measures. In August 1991, an agreement was drafted between KWS and USAID resulting in the latter granting USD\$7.1

million to the former for technical and financial support. However, as of March 1992, this agreement was not yet signed.

(5) Government of The Netherlands - Dutch

In January 1992, a grant of USD\$5.5 million was committed to supply boats and equipment for the protection of wildlife along the coastline of eastern Kenya and in the marsh areas of the country.

(6) Federal Republic of Germany

A general agreement for the granting of USD\$6.3 million for the improvement of main roads in national parks has been entered into between the two governments. However, implementation works have not commenced since the necessary study has not yet been completed at the time of this study.

According to information currently available implementation of the works approved under this grant may result in some degree of overlap with the World Bank and the UK Overseas Development Agency's projects to provide vehicles and equipment for road construction already in the pipeline. The degree of potential is estimated to be minimal at most since this project limits its subject area to the designated three parks.

It is exceedingly rare that two international agencies and four donor countries cooperate to undertake a single programme. At present, all organizations committed for this programme are making equal progress toward disbursing the funds committed and implementing their projects. It is becoming necessary to coordinate the efforts of all these parties in the implementation process. To do so, the KWS has formed a "coordination department".

4.2.4 Outline of Equipment

The major components of the project is a provision of vehicles and construction equipment for the improvement and maintenance of the national park infrastructure facilities, primarily road structures, and the supply of

vehicles needed for effective wildlife protection. It also includes the supply of machine tools for repairing the vehicles and equipment mentioned herein.

4.2.5 Appropriate Equipment

The types and quantities of equipment to be procured were determined in the following way.

First, an examination of the purpose and degree of necessity of each type of equipment has been made, and secondly, the required quantities of equipment have been decided based on the needs of each sub-project identified. The preliminary survey made an initial recommendation as to the needs for equipment subject to refinement in the final study process. The study has now finalized the selection of equipment in detail after eliminating certain unnecessary elements. The type, quantities and purposes of requested equipment are shown in Table - 8 "List of Equipment & Machinery"

TABLE - 8 LIST OF EQUIPMENT & MACHINERY

No.	Item	Specification
(A)	Vehicles	
A-1	Vehicles	All Mounted Engines are Diesel, Tropical, Dust Proof and Altitude Spec.
1.	Motor Cycle	Mounted Bike Type 125~200cc, 15~20ps, Gasoline Engine
2.	Pick-up	4x4, 2500cc~, 85ps~, with Winch, Kangaroo Bar, Head Light Guard and Canvas Roof
3.	Double Cab Pick-up	4x4, Double Cabin, 2500cc~, 85PS~, with Winch, Kangaroo Bar, Head Light Guard and Canvas Roof
4.	Station Wagon	4x4, 2500cc~, 85PS~, Kangaroo Bar, Head Light Guard, Air Conditioner High-Roof
5.	Tourist Bus	4x2, 20seat, 120~170PS, Minimum Road Clearance 190mm ~
A-2	Trucks	All Mounted Engines are Diesel, Tropical, Dust Proof and Altitude Spec.
1.	Truck	4x2, 3ton, 100~140ps
2.	Truck	4x4, 3.5ton, 160~200ps
3.	Water Tanker	4x4, 3,000Lt, 160~200ps
4.	Water Tanker	4x2, 8,000Lt, 200ps, with Spreader (Total Head 10cm~)
5.	Truck	4x2, 8ton, 270ps~
6.	Tipper Truck	4x2, 8ton, 200ps~
7.	Fuel Tanker	4x2, 8ton~, 270ps~
8.	Vacuum Car	4x2, 3ton~, 120ps~
9.	Recovery Car	4x4, 8ton~, 150ps ~
10.	Prime Mover	with Trailer 30ton class
11.	Prime Mover	with Trailer 20ton Class
(B)	Construction Machinery	
B-1	Major Equipment	Tropical, Dust Proof and Altitude Spec.
1.	Motor Grader	150~160ps, 3.7m Blade
2.	Tractor Shovel	135ps~, Baket 1.6~1.9cu.m, with Ripper
3.	Vibration Roller	10ton class, 60ps, Canvas Roof
B-2	Small Equipment	
1.	Towed Workshop	Generator, Welder, Electric Drill Shaper, Air Compressor Winch etc.
2.	1000L Fuel Trailer	1,000Lt.
3.	1000L Water Trailer	1,000Lt.
4.	Ped. Vibration Roller	0.7~ 1 ton
5.	Concrete Mixer	0.5 cu.m class, 15KW~
6.	Concrete Vibrator	Internal Vibration Type, 28~32mm caliber, 1~1.2KW
7.	Power Saw	50~70cm
8.	Water Pump Unit	0.5 cu. m, 3.7KW, Engine Driven
9.	Power Generator	10KVA
10.	Bicycle	
11.	Workshop Tools & Equipment	90Items, including 10KVA Portable Generator

Items on the list of equipment and machinery were identified in the Preliminary survey and selected according to the best possible type, size, and part availability for each type of vehicle and equipment. However this may result in problems of efficiency in operation. For example, when any new or different type of vehicle is added to the list, 30 - 100 different kinds of parts become added to the list. Then, at least one set of machine tools for a specific type has to be provided for the workshop in each park. Each different model requires a specific knowledge of operation and repair.

For these types of reasons, nine 4x4 light sedans, six 4x4 medium-sized pick-up trucks have been omitted and replaced by fifteen large-sized pick-up trucks.

In addition to the above, whenever the preliminary survey listed an item as being of low priority, that item was omitted in this study; and conversely, an item was added when it was found to be essential. The reasons for such changes in equipment or machinery are outlined in Table - 9 "A Comparative Look at the Differences Between the Preliminary Study and Basic Design Study".

An outline of the purposes for use of equipment and vehicles to be supplied by the project are as follows:

(1) General Administrative Works for the Parks

- Contacts, shared administration, and coordination efforts between the three national parks selected;
- Contacts between the headquarters and parks gates, and between those same park gates and neighboring towns;
- Transportation of park staff;
- Providing drinking water for the wildlife

For these purposes, bicycles, motor-bikes, pick-up trucks, station-wagons, buses, and well-pumps are planned to be provided.

Table - 9 "A Comparative Look at the Differences Between the Preliminary Study and Basic Design Study"

KWS No	Item	Preliminary Study	Basic Design	Changes	REMARKS
1	Bicycle	19	19	-	
2	Motor Cycle	11	11	-	
3	Saloon Car	0	0	-	
4	4x4 Light Utility	9	0	-9	
6	4x4 M.D. Pick-up	6	0	-6	Collected to No.8
8	4x4 H.D. Pick-up	12	27	15	9Units for Park Management, 18Units for Patrol
9	4x4 Double Cab Pick-up	0	6	+6	1Unit for Each Road Maintenance Manager, 1Unit for Each Machine Repair
11	4x4 Station Wagon	6	4	-2	1Unit for Each Park Management, but 2Units for Nairobi Head Office
13	4x2 Micro Bus	0	0	-	
14	4x2 Tourist Bus	3	3	-	
15	4x2 Large Bus	0	0	-	
16	4x2 4ton Truck	3	3	-(3 ton)	
17	4x2 8ton Truck	3	6	+3	1Unit Each for 6 Road Maintenance Territories
18	4x4 4ton Truck	0	0	-	
19	4x2 8ton Tipper Truck	15	6	-9	2Units for Each Road Maintenance
20	4x2 8ton Water Tanker	0	3	+3	1Unit for Each Road Maintenance
21	4x4 4ton Water Tanker	3	2	-1 (3.5 ton)	1Unit for Each Park, Except Nairobi
22	4x2 8ton Fuel Tanker	3	2	-1	1Unit for Each Park, Except Nairobi
23	4x2 5ton Vacuum Car	2	2	-	
24	4x4 14ton Recovery Car	1	1	-	
25	Water Drilling Rig	0	0	-	
26	Rig Tender	0	0	-	
27	Prime Mover	1	1	-1 (Heavy)	Transfer a Troubled Machine , and Tractor Shovel
27*	Prime Mover	0	2	+2 (Middle)	Transfer a Tractor Shovel for Each 1Unit Except Nairobi
28	Low Bed Grader Loader	0	0	-	
29	4x2 Wheel Tractor	0	0	-	

KWS No	Item	Preliminary Study	Basic Design	Changes	REMARKS
30	4x4 Wheel Tractor	0	0	-	
31	Motor Grader	6	6	-	
32	10ton Vibration Roller	3	3	-	
33	Tractor Shovel	3	3	-	
34	Wheel Loader	0	0	-	
35	Bulldozer	1	0	-1	Not Necessary for Road Maintenance
36	11on Towed Workshop	2	2	-	
37	3ton Tipping Trailer	0	0	-	
39	1000L Fuel Trailer	3	5	+2	Matching to Fleet Numbers (except Nairobi)
40	1000L Water Trailer	3	6	+3	Matching to Fleet Numbers (except Nairobi)
41	1000L Water Trailer	3	6	+3	Matching to Fleet Numbers (except Nairobi)
42	Concrete Mixer	3	6	+3	Matching to Fleet Numbers (except Nairobi)
43	Lawn Mower	0	0	-	
44	Grass Cutter	0	0	-	
45	Power Saw	4	6	+2	
46	Concrete Vibrator	3	6	+3	
47	Bitumen Sprayer	1	0	-1	Not Arranged for Pavement Road
48	Water Pump Unit	6	10	+4	Matching to the Well Numbers
49	Power Generator	3	6	+3	Matching to Fleet Numbers
51	Auger Bit	2	0	-2	Not Accepted, due to close International Proximity
52	Telecom. Equipment	0	0	-	
53	Office Equipment	0	0	-	
54	Aircraft	0	0	-	
55	Boat (12 Seat)	2	0	-2	Not Necessary, Because of Mount on Tractor
56	Workshop Tools & Equipment	3	3	-	

(2) Maintenance Works for Park Infrastructure Facilities

- Diurnal regular maintenance works for roads in the park;
- Inspection works on protective fences;
- Maintenance works on the administrative buildings;
- Maintenance of well pumping facilities to provide drinking water for the wildlife in the parks.

For these purposes, graders, vibration rollers, dozer shovels, and dump trucks are to be supplied

(3) Wildlife Protection Activities

- Patrols
- Maintenance works on the protection bases

For these purposes, pick-ups, trucks, power generators, etc. are to be supplied

(4) Maintenance Works for Machinery

- Daily checks and repair works for all machinery supplied by the project

For this purpose, double cab pick-ups, trucks, mobile repair cars, etc. are to be supplied.

4.2.6 Implementation Policy on Cooperation

After careful study of the situation, it was judged that the most appropriate form of cooperation between the two governments for the implementation of this project is by the Japanese Government's Grant Aid Programme taking into account the effects of the cooperative effort, its viability, and the capacity of the aid recipient to implement the Project. It has therefore been decided that a Basic Design Study be undertaken to examine the outline of the project assuming that the Project will be implemented under the Japanese Government's Grant Aid Programme. However, as already mentioned in this report, certain changes in requested project components and equipment have been made after careful study.

4.3 Objectives of the Project

4.3.1 Executing Agency and Operational Structure

The KWS is an organization responsible for execution and implementation of the project. The Technical Service Department will be the central control organization for maintenance work on overall park infrastructure and facilities. The Security Department will cover park patrolling duties and wildlife protection activity. The KWS will establish local offices all over the country in key areas of eight regions and each of these local offices mentioned above are to have several national park offices under their control. For example, the Nairobi National Park is administered under the jurisdiction of KWS's Nairobi district office while the Tsavo East and West National Parks belong to KWS's south district office. Park administration for maintenance works using the equipment procured through the implementation of the project will be the role of Nairobi and East and West Tsavo Park offices. An organizational structure of each national park is illustrated in Figure-6 "Organization of the New KWS".

Maintenance and control of the use of the equipment to be supplied will remain the responsibility of the workshops provided for that purpose in each park.

Wildlife protection activities are carried out by the Wildlife Protection Unit (WPU) set up in each park by the KWS to guard and patrol the parks and reserves. This Wildlife Protection Unit is to be equipped with weapons to defend themselves against both threatening animals such as cheetahs or lions, and groups of predatory poachers fully armed with modern weapons. The WPU organized group actions should include patrol from land, sea, and sky, and be equipped to fight fires and arrest and detain poachers. Therefore the WPU should be organized in a para-military system composed of 'wardens' and 'rangers'.

4.3.2 Project Operation Plan

Administration of the park can largely be categorized into three areas:

- a) Improvement and maintenance of essential infrastructure such as road networks vital to park operation;

- b) Monitoring of the entire physical area of the park and its surroundings by wildlife protection units;
- c) General office administrative works.

The outline of respective activities are as follows:

(1) Improvement and maintenance works for park infrastructure facilities i.e. road networks.

Road maintenance activities can be categorized further as (i) road rehabilitation; (ii) routine road maintenance; and (iii) improvement of administrative and maintenance facility. These activities can be outlined as follows:

(i) Road Rehabilitation

The programme activity of this part of the sub-programme envisages the rehabilitation and construction of limited high priority roads and tracks. The proposed network is designed along routes of the most traveled roads and tracks covering all the main flora, fauna and scenic attractions and distributing traffic more evenly in the parks and reserves. About 400 km of primary roads would be rehabilitated within certain important park areas. These roads were built 10 to 20 years ago and carry about 100 to 200 vehicles per day. The key roads would be rehabilitated with pavement widths ranging from 6.0 m to 5.0 m, and shoulders of 0.5 m. The rehabilitation works will be carried out by private contractors on a contract basis.

(ii) Routine Road Maintenance

The proposed KWS road maintenance programme includes small geographically dispersed spot improvement, and simple routine maintenance operations on about 5,000 km of tourist service roads and tracks in the parks and reserves.

(iii) Improvement of Administrative and Maintenance Facilities

This includes construction and rehabilitation as well as maintenance of facilities within parks and reserves, including machine maintenance workshops, headquarters buildings, offices, guard camps, and staff houses. The workshops would constitute maintenance centers which would procure, service, and repair road and building equipment tools.

The Project identified to come under Japan's Grant Aid directly concerns the programme activities of the above paragraphs of (ii), and (iii) through the provision of necessary equipment and machinery required to operate such activities properly.

The equipment and machinery to be procured through the implementation of the Project are mostly plants and vehicles required for road maintenance, vehicles required for park management, and machinery required for workshops. This equipment and machinery are designated to be used mainly for park management and routine road maintenance works. The workshop tools and equipment are planned to be used for emergency repair and routine maintenance of the equipment and machinery.

- (1) Improvement and maintenance works for park infrastructure facilities, i.e. primarily road networks;

The park road networks constitute the main infrastructure, with KWS categorizing these roads into five sub-categories: access roads, first grade roads, second grade roads, fire protection roads, and administration roads. All are unpaved, however some parts are 'macadam' paved roads. Most roads are generally 5 - 6 meters in width with 0.5 meter shoulders on each side.

The deterioration of the existing roads has reached the extent that this condition is affecting wildlife observation and tourist traffic.

When implementing road improvements and maintenance, two methods are employed - contracting with private companies or government agencies, or by the force account of the KWS using their own equipment. The former is employed on rehabilitation of the primary roads while the latter is employed for periodical and spot maintenance needs.

Necessary equipment and machinery planned to be procured through the implementation of the Project are planned to be operated and managed by the KWS based on the latter method. These maintenance works can be subdivided into three types.

a) Regravelling work

The aggregate (maram, common name of aggregate in Kenya) naturally contained in the soil is spread on existing roads surfaces to a thickness of 20 cm, moistening and compacted to resurface the road. The geological base of these roads is black cotton soil, having several strata which become softer during the rainy seasons making road traffic impossible. This road surface and sub-strata structure can be found prevalent within the park areas.

b) Grading work

As all roads in the parks are earth roads, grading work on the roads is required at least twice every year. It is preferable to implement these works during the rainy season which is suitable for road grading. If implemented in Kenya's dry season, mobile water tankers would have to be used accompanied with graders.

c) Spot improvement

Daily or regular road maintenance works include repair and checking of road sub-structures such as culverts, water outlets, Irish bridges become damaged with floating lumber in the rainy seasons. This category also covers road signs, and staff accommodation facilities other than road maintenance works.

(2) Patrolling the parks and their surroundings by the WPU ;

Major wildlife protection works include the search and elimination of poachers and traders of illegally acquired animals or animal products according to information collected by the WPU. These protection units are organized in military order with squads (consisting of ten staff each), platoons (consisting of three squads), and battalions (consisting of three platoons each) which carry out patrolling duties. Each group begins at a certain point and fans out on patrol staying in contact by remote wireless. A complete patrol round requires 10-14 days before returning to base.

(3) Maintenance and Management of Equipment

Workshops are already set up or under construction at each national park selected for maintenance and management of equipment and machinery to be provided. The KWS is expecting to receive considerable supplies of equipment from donor countries other than Japan as well. Based on the above mentioned plan, the KWS is establishing a nationwide workshop network in the national parks according to the programme. The cost of building such workshops is to be financed by the World Bank, however, the cost of the tools and machines to be placed in each workshop is not included under the Bank's aid package.

Among these workshops selected by the project, since the workshop in Nairobi National Park is to be upgraded as a center of the nationwide network, acquisition of tools and machinery for workshops and the improvement of its administrative capacity for maintenance and management of equipment is very much required.

The headquarters of the KWS is currently seeking a capable experienced person to take the director's position in the Technical Services Department, which administers the maintenance and management of the park infrastructure facilities. Presently, for this study, a section head of the Mechanical and Telecommunications Section is assisting for preparatory work to establish a viable organization by providing software such as the design of check sheets, and the preparation of training texts for machine maintenance and control, and the preparation of manuals for daily checks.

The overall policy of the project is to rationalize the organization, and provide the optimum number and type of equipment necessary for its use in the national park for maintenance of park infrastructure.

4.3.3 Outline of Equipment to be Procured

The particulars of the equipment to be supplied are indicated in Table - 10 "Particulars of Equipment".

In order to select the equipment, machinery, or vehicles which would prove to be of optimum use to the KWS, technical particulars were studied on three models for each item planned to be procured for the Project. Conditions of climate, topography, and locality were taken into account during this selection and information gathering process. Additionally, certain special accessories such as Winch and Kangaroo bar were planned to be employed for some types of vehicles.

Table - 10 "Particulars of Equipment"

Item	Total	Nairobi	Tsavo West	Tsavo East	Usage	Remarks
(A) Park Management						
1. Bicycle	19	5	2	12	Communication Park gates - Neighbouring Town	-
2. Motor Cycle	11	3	2	6	Communication Park gates - Neighbouring Town Inspection & Fencing	-
3. 4x4 Pick-up	9	2	3	4	General Park Maintenance	Kangaroo, Head Light Guard, Canvas roof
4. 4x4 Station Wagon	4	2	1	1	Transport of Administrative Staff	-
5. 4x2 Tourist Bus	3	1	1	1	Transport of General Staff	22 ~ 30 seat
6. 4x2 Vacuum Car	2	1	0	1	Discharge of Household Waste Water	5 ~ 8 ton class
7. Water Pump Unit	10	2	4	4	Lifting Water for Animal	Engine Driven
(B) Wildlife Protection						
1. 4x4 Pick-up	18	3	6	9	Patrol of WPU	Same as (A)-3, but seat allocation is different.
2. 4x4 3 ton Truck	6	1	2	3	Logistic Supply for WPU's Patrol	-
3. 4x4 3ton Water Tanker	2	0	1	1	Potable Water Transport for WPU's Patrol	With Water Lifting Pump
4. Portable Generator Set	6	0	3	3	Lighting Use for Animal	-
(C) Park Infrastructure Maintenance						
1. Motor Grader	6	1	2	3	Grading and Makadam Road Works	130 ~ 160hp, 3.7m Blade
2. Vibration Roller	3	1	1	1	Compaction for Regraveling of Road	130 ~ 160hp, 10ton class
3. Tractor Shovel	3	1	1	1	Digging and Loading	130 ~ 160hp
4. 4x2 8ton Tipper Truck	6	2	2	2	Transport of aggregates	Loaded on (C)-3
5. 4x2 8ton Water Tanker	3	1	1	1	Water Spraying for Compaction	With Water Lifting Pump and Spray Bar
6. 30ton Prime Mover	1	1	0	0	Transport of Wrecked/Troubled Plant & Vehicles	-
7. 20ton Prime Mover	2	0	1	1	Transport of (C)-3 Tractor Shovel	-
8. 4x2 8ton Truck	6	1	2	3	General Road and Structure Maintenance Work	(C)-9 ~ (C)12
9. 0.75ton Ped. Vibration Roller	6	1	2	3	Pre Hole Repairing	0.75ton Class
10. Concrete Mixer	6	1	2	3	Construction of Concrete Structure	-
11. Concrete Vibrator	6	1	2	3	Construction of Concrete Structure	-
12. Power Saw	6	1	2	3	Removal of Driftwood	50 ~ 70cm class
13. 4x2 8ton Fuel Tanker	2	0	1	1	Fuel Supply for Machinery Deployed	-
14. 1,000L Fuel Trailer	5	0	2	3	Mobil Fuel Depot	Towed Type, by (C)-8 8ton Truck
15. 1,000L Water Trailer	6	1	2	3	Mobil Portable Water Depot	Same as above
16. 4x4 Double Cab Pick-up	3	1	1	1	General Construction and Maintenance Supervision	-
(D) Machine Maintenance						
1. 4x4 Double Cab Pick-up	3	1	1	1	Transport of Technicians for Machinery Repair	Same as (C)-16
2. 4x2 3ton Truck	3	1	1	1	Transport of Inspection Staff and Tools	-
3. 4x4 Recovery Car	1	1	0	0	Drawing Wrecked / Troubled Heavy Machine for Repair	-
4. Towed Workshop	2	1	1	0	Small Mobile Workshop to repair Machinery Outside	Towed by (D)-1
5. Workshop Tools & Equipment	3	1	1	1	Tools and Equipment for Workshop	-

4.4 Technical Cooperation

In connection with the project, the Kenyan Government has requested technical cooperation from the Japanese Government in a form of despatching experts specialized in maintenance of the construction machinery and the protection of wildlife with respect to the implementation of the Programme. For this purpose, Mr. Kazuo Saigawa, an expert in wildlife protection, was dispatched to Kenya in March 1992.

The scope of work or assignment briefs of the above mentioned experts is summarized as follows.

- 1) Mechanical Engineer is to be engaged to examine KWS's operation and maintenance plan of machinery and equipment procured through the implementation of the project for giving appropriate advice to technical managers and responsible engineers for the operation and maintenance of those machinery which may include a preparation of related operational and managerial manuals.
- 2) Wildlife Protection Specialist is to be engaged to examine the KWS policy framework in relation to the 1991-1996 First Investment Plan, to advise and to recommend the KWS appropriate plan and/or actions to be taken in order to optimize the bilateral cooperation of the Japanese Government.

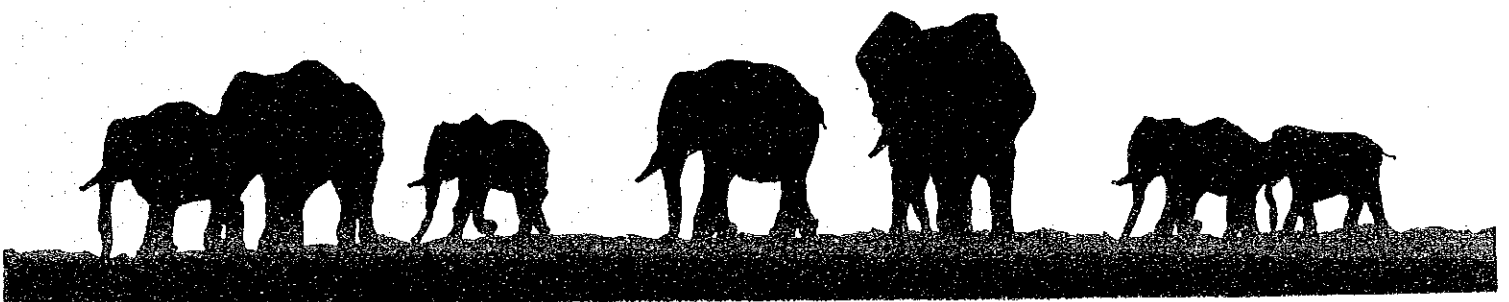
It may require certain level of training of middle management, supervisory staffs and mechanics of the KWS for the operation and maintenance of the construction machinery as the construction machinery requires most specialized skill for maintenance and repairing among other equipment and machinery being provided. Such training, if it is deemed essential, is thought to be appropriate to be conducted in the KWS Central Machine Workshop in the Nairobi National Park where necessary facilities are furnished substantially and the head quarter of KWS is located.

In addition to the above mentioned scope of technical cooperation, it may require a practical training of local personnel engaged to supervise and to manage the road maintenance works on-the-job site using equipment and

machinery procured through the Project how to plan and operate machine properly at work site of respective national parks.

The employment of supervisors and skilled workers for respective national parks is planned to be proceeded in accordance with the schedule of procurement of machinery. It is appropriate to despatch a Japan Overseas Cooperation Volunteer for such requirement.

CHAPTER - V BASIC DESIGN



CHAPTER - V BASIC DESIGN

5.1 Design Policy

1) Major Equipment

The variety and multiplicity of equipment and vehicles to be procured through the implementation of the Project are significant. As only one year has elapsed since the reorganization of the executing agency of the Project namely KWS and the management structure of respective national parks, the capability of management, operations and maintenance of equipment and machinery has not been sufficiently developed yet to cope with this situation. However, the KWS is currently making efforts to rapidly reinforce their organization by staffing it with skilled workers, and capable engineers and machinery operators as part of the implementation of the general programme funded by the World Bank and the donor countries.

Under such circumstances, in order to ensure ease of operations, maintenance, and management of the equipment and machinery, for the selection and determination of equipment and machinery consideration was given on simplification, streamlining and standardization of equipment taking account of following elements:

- a) Increasing the efficiency of equipment use as high as possible by upgrading the skills of operators in relatively short period;
- b) Maximized efficiency of technical training on machine repair staffs ensure appropriate and sufficient inspection and repairs, and extend the life of equipment and machinery.
- c) Achieving planned works according to schedule by stocking spare parts for vehicles and equipment supplied.

The following policy measures are established to achieve the simplification of equipment type:

- a) To standardize a single type of equipment whenever the quality and performance of two or more items of equipment are to be selected;

- b) To prepare specifications of engines and chassis so that interchanging of vehicle bodies and/or engines can be made available.
- c) To employ diesel driven engines for all vehicles and equipment.

In addition, specifications are to be prepared to fit local conditions for on-site works, as well as tropical standard, and to provide a long life of use and easy maintenance.

2) Workshop Equipment

Selection of repairing equipment and tools is to follow the tenets indicated in the Machine Maintenance and Management Plan. Its selection policy is: to repair equipment in individual workshops whenever problems are found during daily checks or regular inspections; and to request major repairs or overhauls be done by the local agents of the equipment manufacturers.

Adhering to these basic repair policies, the repair of equipment or tools to be procured through the implementation of the project is limited to the following categories:

- repairing tools for daily checks (manual tools)
- repairing tools for regular inspection (manual and measurement tools)
- repairing equipment and tools for minor repairs (oil jacks, welding machines, measuring devices)
- basic equipment (mobile cranes, high pressure cleaning machines)

2) Spare Parts Management

Adequate numbers of spare parts are to be supplied in addition to each piece of equipment procured through the implementation of the project. Considering local dry dusty conditions of roads in Kenya, an additional fifteen percent more spare parts will accompany all equipment than is usually provided by manufacturers, particularly spare parts such as:

- Consumable parts (tires, cutting blades, serrated edges, etc.)
- Regular spare parts (filter, elements, etc.)
- Small spare parts (rubber V-belts, lamps, fans, etc.)

5.2 Design Conditions

A) Size of the Project

To finalize the scope of the project and reach conclusions as to the volume of equipment required, each administrative activities for the selected parks is identified and summarized as follows:

- general park administration,
- wildlife protection activities,
- maintenance and management for park infrastructure,
- maintenance of machinery designated for above activities

Table - 11 "Demand Estimation of Equipment " displays the results of the criteria used to estimate the volume of equipment required, and is summarized below.

A-1. Maintenance and Management of the Park Infrastructure Facilities

(1) Road Maintenance Work

Maintenance of roads is not to follow geographical divisions of subject areas as indicated in Figure-13 "Work Area Division for Road Maintenance", but , is to have total road length subdivided into 400-500km for each working area, according to the divisions mentioned below.

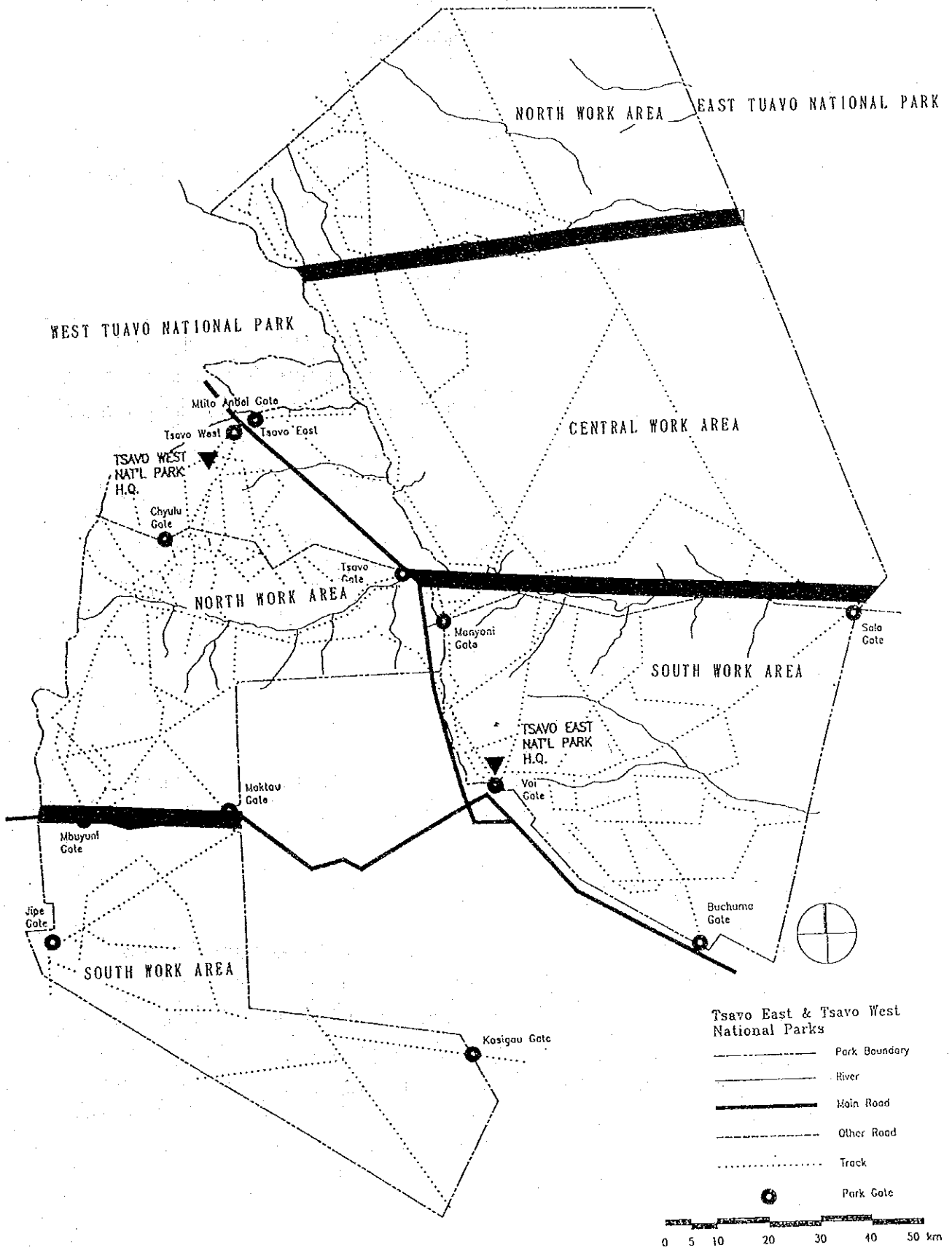
	Nairobi	Tsavo West	Tsavo East
(1) Total Area	117 sq. km	7,117 sq. km	11,655 sq. km
(2) Total Length of the Road	210 km	1,368 km	2,055 km
(3) Number of geographically divided work areas	1	2	3
(4) Road Length in work area (Approximate figures)	No division	North: 850 km South: 450 km	North: 500 km Middle: 500 km South: 1000 km
(5) Number of Actual Work Areas per road length of 4 - 500 km	1	3	4
(6) Number of Actual Work Areas to be covered by the project	1	2	3

Based on the table above, and, considering organizational capacity, working capability and machine repair skills, some work areas having less need and lower priority have been omitted. Finally the number of work areas were decided - Nairobi 1, Tsavo West 2, and Tsavo East 3.

Table - 11 "Demand Estimation of Equipment"

Item	Total	Nairobi	Tsavo West	Tsavo East	Elements to Determine Necessary Number	Ref. No.
(A) Park Management						
1. Bicycle	19	5	2	12	Estimate from the number of main gates plus two bicycles	
2. Motor Cycle	11	3	2	6	Same as above	
3. 4x4 Pick-up	9	2	3	4	Proportional to the park acreage	
4. 4x4 Station Wagon	4	2	1	1	1 unit for each main office, but two at the Nairobi office	
5. 4x2 Tourist Bus	3	1	1	1	1 unit for each main office	
6. 4x2 Vacuum Car	2	1	0	1	1 unit for each park where the Vacuum Car is needed	
7. Water Pump Unit	10	2	4	4	The number of wells to be replaced by new ones for the animals	
(B) Wildlife Protection						
1. 4x4 Pick-up	18	3	6	9	3 units for each platoon	5.2 A-2
2. 4x4 3.5ton Truck	6	1	2	3	1 unit for each platoon	5.2 A-2
3. 4x4 3ton Water Tanker	2	0	1	1	1 unit for each park, but not necessary in Nairobi since the city water is available	
4. Portable Generator Set	6	0	3	3	1 unit for each base camp which exists in each park	
(C) Park Infrastructure Maintenance						
1. Motor Grader	6	1	2	3	1 unit for each work district	5.2 A-1(a)
2. Vibration Roller	3	1	1	1	1 unit for each park	5.2 A-1
3. Tractor Shovel	3	1	1	1	1 unit for each park	5.2 A-1
4. 4x2 8ton Tipper Truck	6	2	2	2	2 units for each park	5.2 A-1
5. 4x2 8ton Water Tanker	3	1	1	1	1 unit for each park	5.2 A-1
6. 30ton Prime Mover	1	1	0	0	For Tractor Shovels and for Large Construction equipment	
7. 20ton Prime Mover	2	0	1	1	For transporting Tractor Shovels . 1 for each park	
8. 4x2 8ton Truck	6	1	2	3	1 unit for each work district	5.2 A-1(b)
9. 0.75ton Ped. Vibration Roller	6	1	2	3	1 unit for each work district	5.2 A-1(b)
10. Concrete Mixer	6	1	2	3	1 unit for each work district	5.2 A-1(b)
11. Concrete Vibrator	6	1	2	3	1 unit for each work district	5.2 A-1(b)
12. Power Saw	6	1	2	3	1 unit for each work district	5.2 A-1(b)
13. 4x2 8ton Fuel Tanker	2	0	1	1	1 unit for each work district	5.2 A-1(b)
14. 1,000L Fuel Trailer	5	0	2	3	1 unit for each work district. Not necessary in Nairobi since gasoline is easy to obtain in the city	5.2 A-1(c)
15. 1,000L Water Trailer	6	1	2	3	1 unit for each work district	5.2 A-1(c)
16. 4x4 Double Cab Pick-up	3	1	1	1	1 unit for each park	5.2 A-1(d)
(D) Machine Maintenance						
1. 4x4 Double Cab Pick-up	3	1	1	1	1 unit for each park	5.2 A-3
2. 4x2 3ton Track	3	1	1	1	1 unit for each park	
3. 4x4 Recovery Car	1	1	0	0	1 unit in Nairobi park is enough	
4. Towed Workshop	2	1	1	0	1 unit for each park	5.2 A-3
5. Workshop Tools & Equipment	3	1	1	1	1 unit for each workshop	5.2 A-3

**FIGURE-5 "DIVISION MAP FOR ROAD MAINTENANCE WORK
AREAS FOR THE SELECTED PARKS"**



Contrarily, road maintenance works can also be divided into the following sub-works having required equipment as indicated below:

i) Grading

Graders are necessary for grading work; one grader is to be allocated for one work area with a road length of 400 - 500 km.

ii) Macadam Paving with Water Compaction for Regravelling

One fleet composed with the kind of vehicles and road construction machines mentioned below for each park is planned to be allocated, as this regravelling work is planned to be performed on approximate road lengths of 20 km per year in each park.

Grader	Vibrating Roller	8-ton dump truck	7-ton water spray tanker	Dozer shovel
1	1	2	1	1

It is possible to have greater flexibility by using a grader for this work since each park has one existing grader in usable condition.

iii) Road Maintenance Work

The structures included in road maintenance are bridges, culverts, water discharge conduits, Irish bridges, road signs, and staff accommodations in the parks. In order to implement repair and maintenance works for the above mentioned road structures, one 8-ton truck for transporting work materials such as cement, lumber, and gravel is necessary.

iv) Support Equipment

To efficiently utilize the vehicles and road maintenance equipment mentioned, an adequate mobile fuel tanker is indispensable, along with the following:

- 8-ton fuel tanker (one for each park except Nairobi National Park)
- 7-ton water tanker (one for each park)
- Mobile fuel tanker for work site use (one for each work area)
- Mobile drinking water tanker (one at each work area)

v) Site Supervision

A 4x4 double cab pick-up truck is to be provided for use by the site supervisor at each park.

A-2. Wildlife Protection Activities

The Wildlife Protection Units (WPU) are deployed in the subject parks as indicated below.

Nairobi	West Tsavo	East Tsavo
One (1)	Two (2)	Three (3)
Platoon	Platoons	Platoons

Each platoon consists of three squads, and each squad has ten members. Patrol duties are to be performed by one platoon; and each platoon requires the following sets of equipment:

- 4x4 pick-ups - one per squad; three per platoon
- 4x4 3.5-ton truck - one per platoon
- 4x4 8-ton water tanker - one per park

A-3. Machine Maintenance Works

One towing type mobile workshop to be towed by 4x4 double-cab pick-up which is used to transport machine maintenance crews and supervisor to be allocated per park. One unit of towed mobile workshop is to be allocated to the Nairobi and Tsavo West National Parks each. No towed type workshop is allocated to the Tsavo East National Park since a self-propelled type large mobile workshop has been already in use in this park.

A machine workshop exists in each selected park, however, eight workshops are planned to be built by 1994 throughout the country as one per each administrative region. As there is currently no existing plan for supplying repairing tools for these forthcoming facilities, this study includes an estimate of the provision of workshop tools and equipment necessary for daily inspections for those workshops planned in the selected three national parks. A set of workshop tools for daily and preventive maintenance are planned to be provided to the selected parks which will be furnished in newly built workshops.

B. Natural Conditions

The subject parks are all located south of the equator and in geographic areas of altitudes ranging from 1500 m - 1800 m above sea level. These areas, particularly in Tsavo East and West National Parks, dry unpaved roads are spread over vast land areas. In the dry season, dust whirls around on the surface of these roads, therefore certain special specifications for the equipment are to be selected. Such specifications include:

- Tropical climate specifications,
- Anti-dust specifications,
- High altitude specifications

C. Selection of Types

In conforming with the design policies as established by the project after careful study, simplification of the varieties of types of equipment and vehicles is made. Even in cases in which different models of certain

equipment are available, selection has proceeded based upon the degree to which an engine has a high compatibility with its parts.

D. Local Agents of Equipment Manufacturers and Local Machine Workshops

Warranty period of equipment supplied through the implementation of the project shall be one-year, and after services shall be undertaken by local agents of the manufacturers or the manufacturers themselves at site along with technical support services such as training in operation and maintenance. Stemming from this, manufacturers which have local agents and repair facilities in the country shall be qualified for bidding, on condition that the supply sources of equipment are more than one.

5.3 Basic Plan

5.3.1 Equipment Deployment Plan

The type and number of respective equipment planned to be procured are indicated in Table-8 "List of Equipment & Machinery".

5.3.2 Particulars of Equipment and Machinery

Under the design policy mentioned herein, the specifications of equipment have been established.

5.4 Implementation Plan

5.4.1 Procurement Policy

The manufacturers of the equipment to be procured through the implementation of the project should, as far as possible, have their own local agents and repair workshops in Kenya, so that future repairs and maintenance can always be swiftly handled.

5.4.2 Remarks on the Procurement Process

As simplification of types of equipment adds to long range efficiency of use, so the reduction in the diversity of manufacturers is equally prudent to realize minimize of machine downtime as much as possible.

It is important to classify supplied equipment and clearly state in bidding documents the purpose of such categorization.

5.4.3 Procurement Management Plan

During the course of the implementation of the project, it will be necessary to provide bidding documents including technical specifications. It is desirable to employ a consultant who assists in bidding works, contract arrangements, and overall supervision of the equipment delivery.

The tasks of the consultant cover:

- Preparation of the bidding documents, including specification writing, attendance to necessary technical discussion meetings with Kenyan Government officials for the approval of the bidding documents;
- Bid Management;
- Evaluation of Bids;
- Attendance at the factory inspections;
- Inspection prior to shipment;
- Attendance at test operation and instruction for maintenance at the point of delivery;
- Preparation of Completion Report.

5.4.4 Implementation Schedule

Implementation of the project consists of the following steps:

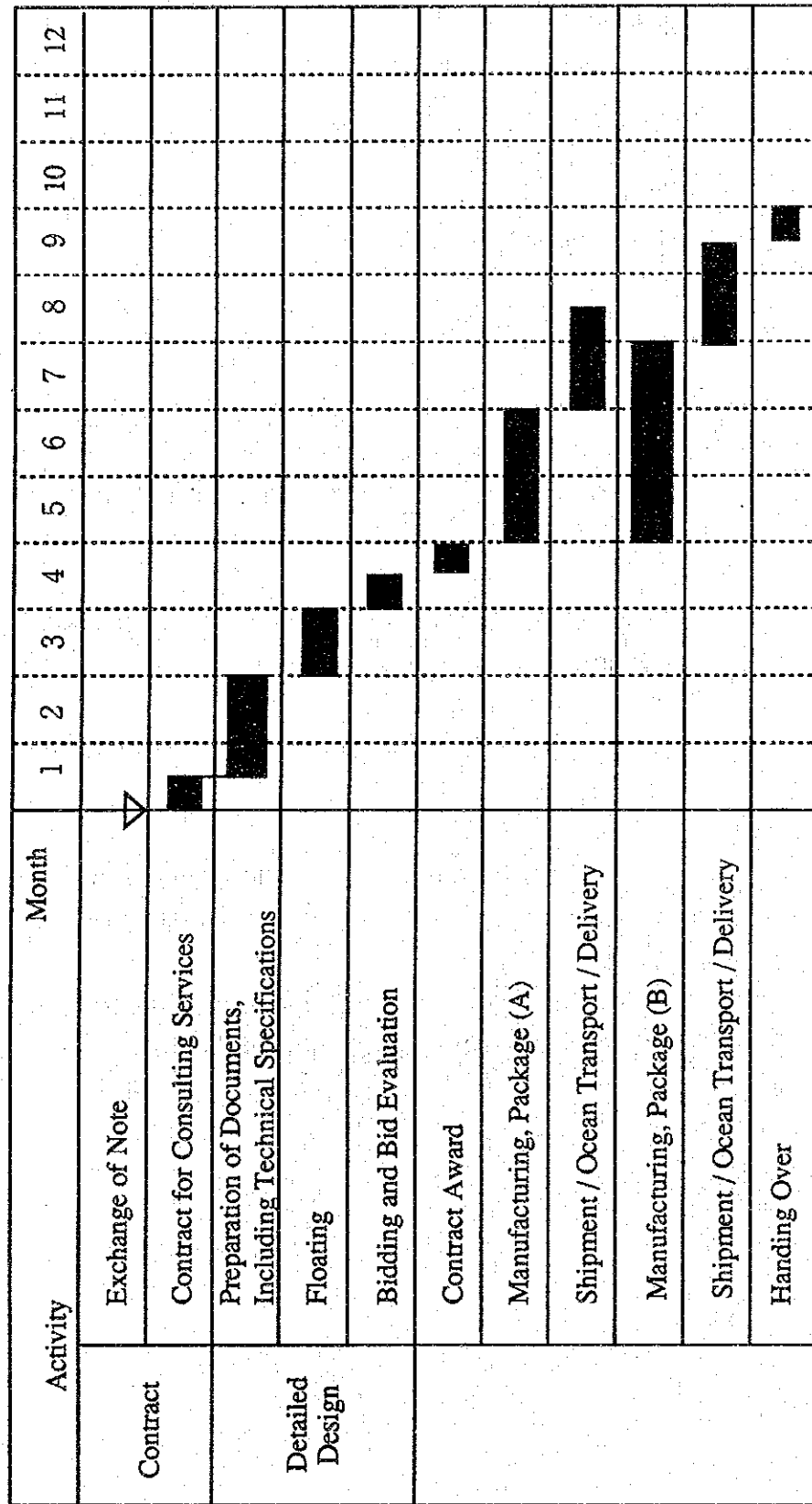
- Preparation of bid documents
- Bid floating
- Bid evaluation
- Contract awarding

- Contract arrangement
- Manufacturing
- Pre-shipment inspection
- Shipment
- Ocean transport
- Inspection at delivery point
- Test operation
- Maintenance instruction
- Final handing over

The Implementation schedule is shown in Figure-6 "Project Implementation Schedule". In order to maintain the time schedule as shown in Figure-6, the following cooperative measures are required from the Kenyan side.

- Quick study and approval of technical specifications and bid documents;
- Quick arrangements for entering into contracts with the awarded bidders;
- Quick custom clearance including payment of any relevant charges for the goods arrived at Monbasa Port; and
- Quick and correct inland transport of the goods to predetermined delivery points at respective national parks.

Figure - 6 "Tentative Project Implementation Schedule"



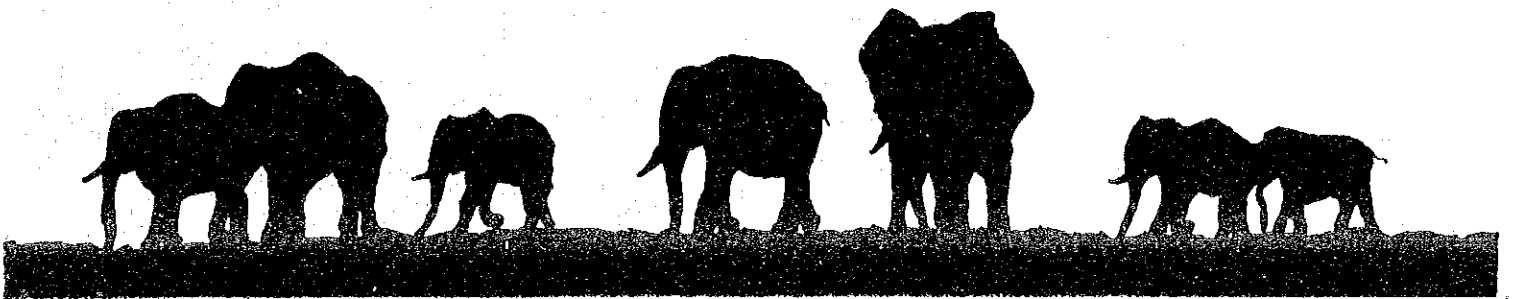
5.4.5 Estimated Project Cost

The estimated project cost for implementing this project is as follows.

a) Condition of the Cost Estimation

- Time March 1992
- Trade Conditions CIF Mombasa
- Spare Parts Construction Plant - 20%
Large Vehicles - 15%
Small Vehicles - 12 %
Others - 10% on FOB price
- Technical Fee Divided into three categories -
construction machines, small
size vehicles, and large size
vehicles, and contractual
obligations which require each
package to provide technical
supporting services of one
month for test operation by either
suppliers or manufacturers
- Others This project is to be
implemented in accordance with
the procedures and procurement
rules and guidelines set out for
the implementation of the Grant
Aid Programme of the
Government of Japan.

CHAPTER - VI EVALUATION AND CONCLUSION



CHAPTER - VI EVALUATION AND CONCLUSION

In June 1992, the United Nations initiated international conference for environment and development (Earth Summit) will take place in Rio de Janeiro, Brazil to respond to worldwide concern for the degradation of the environment. Protection of existing wildlife is one important issue which commands attention in any attempt to halt the destruction going on in the global ecosystem.

The Government of Japan has continuously made substantial pecuniary and technical contributions to the attempts to solve the worldwide environmental problems. However, a combination of both a comprehensive and an integrated measures, and a concrete countermeasures having an immediate effect in respective fields are essential to solve the worldwide environmental problem.

The primary objective of the Study was to search and plan for concrete and immediate actions to ameliorate urgent problematic issues related to the wildlife conservation in Kenya. The Government of Kenya has mapped out an integrated development strategy to promote wildlife based tourism through a conservation of wildlife by protection of Kenya's rich natural environment.

As described previously, the wildlife habitat in Kenya has been disrupted and damaged by blatantly irresponsible mass scale poaching. The extent of the problem has reached a level alarmingly worse than that of only a few short years before. As a result of this, for example, the elephant population has been drastically reduced, and the African Rhinoceros faces extinction. In view of maintaining bio-diversity, the wildlife of Kenya faces with critical state and requires immediate actions.

Protecting wildlife requires proper management of the parks and maintenance of park facilities. Park infrastructure in Kenya, however, has been neglected for 20 years resulting in the deterioration of many park roads. The smooth traffic of vehicles is impossible. This delays any systematic solution to the poaching problem and delays the chance for the realization of greater tourism receipts.

The Project was planned to stop degradation of habitat and conserve the wildlife to be utilized as an important resources of the tourism development in consideration of above mentioned problems into account.

Through the implementation of the Project, indispensable equipment and machinery for maintenance and management of park infrastructures and wildlife protection activities in selected three national parks (i.e. Nairobi, Tsavo East and West National Parks) is planned to be procured as a concrete countermeasures for problem to be solved.

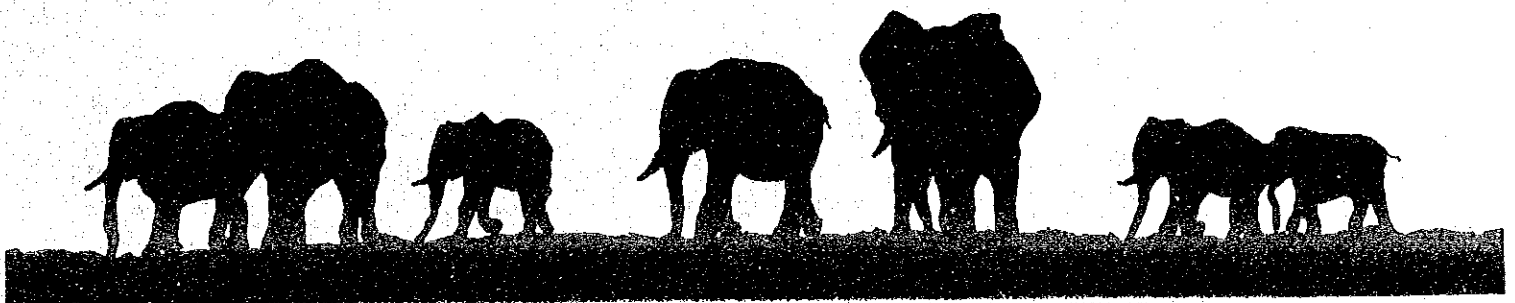
In the early stage of the implementation of the Project, to efficiently implement the project it will be necessary for technical experts to be assigned for the repair and operation of equipment and machinery.

This project forms a part of a master programme of wildlife conservation measures supported by the World Bank and the cooperation of several donor countries. As the financing for operations, manpower, and technical assistance is expected from these and other sources, thus, the KWS should become well-positioned to implement the project.

No problem appears to be hindering the implementation of the project by means of the Japanese Government's Grant Aid Programme.

The Project is recognized as being of great significance as a contribution to Kenya's welfare through an immediate intervention into the environmental problem in the country.

APPENDIX



Appendix - 1 Member List of Study Team

Team Leader	Masa-aki Kohmaru
Park,	Management Officer, Kushiro Shitsugen National Nature Conservation Bureau, Environment Agency
Grant Aid	Hitoshi Minami
	Grant Aid Division, Economic Cooperation Dept. Ministry of Foreign Affairs
Park Management Plan	Isamu Koike
	JCP Inc.
Machinery Plan	Akira Shima
	JCP Inc.

Appendix - 2 Survey Schedule

Month Day	Itinerary	Activity	Location
Feb 15 (Sat)	Left Narita by BA008 Arrived at London	Start Transfer	London
Feb 16 (Sun)	Left London by BA055	Transfer	On board
Feb 17 (Mon)	Arrived at Nairobi JICA Nairobi Office Ministry of Finance	Transfer Meeting Discussion	Nairobi
Feb 18 (Tue)	KWS Nairobi HQ WorldBank Nairobi Office ODA Nairobi Office	Meeting Hearing Hearing	Nairobi
Feb 19 (Wed)	USAID Nairobi Office KWS Central Workshop KWS, Technical Dept.	Hearing Observation Discussion	Nairobi
Feb 20 (Thu)	KWS, Technical Dept. KWS, Security Dept. Left Wilson Airport Tsavo East National Park	Discussion Discussion Transfer Hearing	Voi
Feb 21 (Fri)	Tsavo East National Park Regional workshop TENP infrastructures Tsavo West National Park	Discussion Observation Observation. Hearing	Kirangani
Feb 22 (Sat)	Tsavo West National Park Regional workshop TWNP infrastructures Left Kilangani Airport	Discussion Observation Observation. Transfer	Nairobi
Feb 23 (Sun)	Mr. Minami left Nairobi	Transfer	Nairobi
Feb 24 (Mon)	KWS, Technical Dept.	Discussion	Nairobi
Feb 25 (Tue)	JICA Nairobi Office KWS, Nairobi HQ Intercontinental Hotel JICA, Nairobi Office Japanese Embassy Mr. Kohmaru left NBO	Documents Signing Minutes Lunchon Party Reporting Reporting Transfer	Nairobi

Feb 26 (Wed)	KWS, Road Dept Nairobi NP infrastructure KWS, Technical Dept.	Discussion Observation Discussion	Nairobi
Feb 27 (Thu)	KWS, Nairobi HQ	Discussion	Nairobi
Feb 28 (Fri)	KWS, Nairobi HQ Private workshops MOPW, training center MOPW, central workshop	Q and A Observation Observation Observation	Nairobi
Feb 29 (Sat)	Sorting information		Nairobi
Mar 01 (Sun)	Natural Museum of Kenya		Nairobi
Mar 02 (Mon)	KWS, Nairobi HQ JICA, Nairobi Office	Confirmation Reporting	Nairobi
Mar 03 (Tue)	Japanese Embassy Left Nairobi to Zurich Arrived at Zurich	Reporting Transfer	Nairobi
Mar 04 (Wed)	Left Zurich	Transfer	On board
Mar 05 (Thu)	Arrived at Narita	End	

Appendix - 3 Contact List

Embassy of Japan in Nairobi

Mr. Takamichi Okabe	Counselor
Mr. Takashi Ariyasu	First Secretary
Mr. Kazuaki Hoshino	First Secretary

Japan International cooperation Agency, Nairobi Office

Mr. Masaru Morimoto	Manager
Mr. Tsuneo Takahata	Deputy Manager
Mr. Katsuichiro Sakai	Staff
Mr. Naoya Uchino	JOCV Coordinator

Japan Overseas Cooperation Volunteer

Mr. Hitoshi Kitamura	Nairobi National Park, Central Workshop
Mr. Tatsuya Matsumoto	Tsavo East National Park, Regional Workshop
Mr. Hiroto Oka	Tsavo West National Park, Regional Workshop

Ministry of Finance

Mr. G. N. Gicheru Deputy Director, External
Resources Dept.

Kenya Wildlife Service

Dr. Richard E. Leakey Chairman, Board of Trustee,
Director

Mr. David Mwiraria Special Assistant for Director

Mr. L. N. Kihuria Chief, Mechanical and Tele-
communication Service Dept.

Mr. Cyrus M. Kamau Chief, Road and Fence Dept.

Mr. P. M. Kagiri Chief, Financial Controller

Mr. A. O. Bashir Deputy Director, Security

Mr. B. G. Kimuthia Assistant Director, Development
Dept.

Mrs. J. N. Njeru Assistant Director, Administration

Mr. J. F. Kamau Assistant Director, Planning

Mr. D. M. Muhia Acting Principal, Personnel

Tsavo East National Park

Mr. S. M. Gichangi Senior Warden

Mr. Daniel Woodley Warden

Tsavo West National Park

Mr. Stephen Gichangi Senior Warden

Nairobi National Park

Mr. Simon Ole Makallah Senior Warden

Overseas Development Agency

Mr. Adam Wood

USAID

Mr. James F. Dunn

World Bank