

No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
FORESTRY COMMISSION, MINISTRY OF ENVIRONMENT AND TOURISM,
REPUBLIC OF ZIMBABWE

**THE FOREST SURVEY
IN
THE GWAAI AND BEMBESI AREAS
IN
THE REPUBLIC OF ZIMBABWE**

FINAL REPORT

MARCH, 2001

**JAPAN FOREST TECHNICAL ASSOCIATION (JAFTA)
KOKUSAI KOGYO CO., LTD.**

AFF
JR
01-08

PREFACE

In response to the request from the Government of Zimbabwe, the Government of Japan decided to conduct the Forest Survey in the Gwaai and Bembesi Areas and entrusted the survey to Japan International Cooperation Agency (JICA).

JICA sent to Zimbabwe the Survey Team headed by Dr. Takao FUJIMORI, the Japan Forest Technical Association (JAFTA), four times between July 1999 and December 2000.

The Survey Team held discussions with the officials concerned of the Government of Zimbabwe, and conducted field surveys in the Survey Area. After the Survey Team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the formulation of the forest conservation plan and to the enhancement of friendly relations between two countries.

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

March, 2001



Mr. Kunihiko Saito
The President of
Japan International Cooperation
Agency

LETTER OF SUBMITTAL

Mr. Kunihiko SAITO

President
Japan International Cooperation Agency

It is my great pleasure to inform you that the Forest Survey in the Gwaai and Bembesi Areas has been successfully completed and that the Final Report has also been completed for submittal to your agency.

The present Report compiles the results of the surveys and analyses conducted by the joint venture in the period from June 25, 1999 to March 31, 2001 in accordance with the contract made with the Japan International Cooperation Agency.


The forest resources inventory was conducted by the Survey. The recommendations for forest conservation plan formulation were prepared on the basis of the inventory results and other relevant information.

I really hope that the future forest conservation plan will be appropriately formulated and implemented with the efforts of Zimbabwean Government and the assistance of the related persons and contribute to the Zimbabwe by fostering its forest resources after all.

I would like to take this opportunity to express my utmost gratitude for the considerable understanding and assistance afforded to the Survey Team by JICA, as well as the Ministry of Foreign Affairs and the Ministry of Agriculture, Forestry and Fisheries. I would also like to draw your attention to the facts that the Survey Team was provided with useful advice and assistance in Zimbabwe by the JICA Zimbabwe Office, the Embassy of Japan, the Ministry of Environment and Tourism of Zimbabwe, the Forestry Commission under the said Ministry and many other organizations involved in this Survey.

It is sincerely hoped that the Report submitted here to your organization will prove useful for the further promotion of the plan.

March, 2001



Takao FUJIMORI

Team Leader
Survey Team for the Forest Survey
in the Gwaai and Bembesi Areas
in the Republic of Zimbabwe



Explanation of and discussion on Inception Report



Endorsement of Minutes of Meeting on explanation of & discussion on Interim Report



Forest view from the top of a fire tower by the Forest Hill Office. Trees were defoliated in the early September, 1999 as they do every year.



Same view from the same site as left. The rainy season lasted later than usual. Therefore, trees have leaves even in the middle of August, 2000.



Forest survey (setting up of plots)



Dwarf teak bushland. It is said that the teak woodland becomes this type of vegetation through logging and repeated fire.



Young regeneration of *Baikiaea plurijuga* at Plot No. 5. *Baikiaea plurijuga* has active regeneration by both seedlings and sprouts.



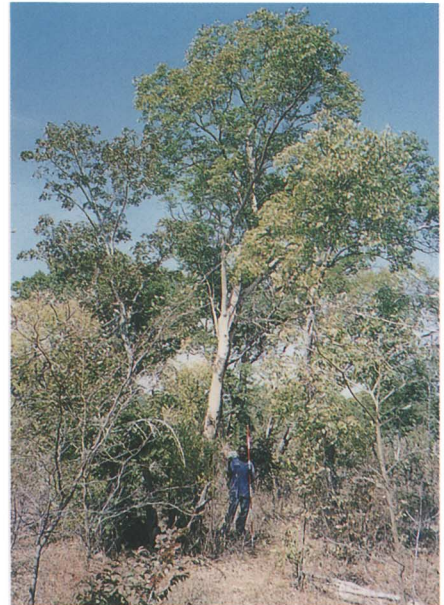
A young tree of *Baikiaea plurijuga*. Comparing with terrestrial part, the subterranean part develops very well in order to accommodate to the sandy site.



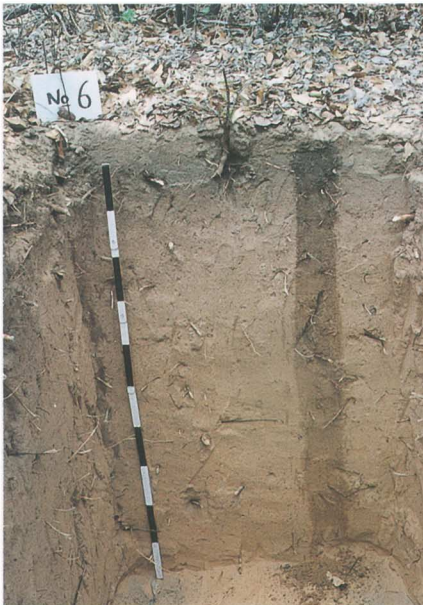
View above the ground having the soil profile shown below (*Baikiaea plurijuga* stand)



Trees of *Pterocarpus angolensis* (Plot No. H11)



Trees of *Guibourtia coleosperma* (Plot No. S55)



Soil profile (Plot No. 6) of soil type *ARI* (Lubic Arenosols) which broadly covers the Survey Area.



Many of *Baikiaea plurijuga* suffer from fire while showing high fire resistance.



Baikiaea plurijuga logs cut recently in Block J of Gwaai Forest Land



Elephants in the wildlife area where water holes are artificially created for wild animals



Explanation of & discussion on Draft Final Report

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Abbreviations

CL	Communal Land
MMET	Ministry of Mines, Environment and Tourism
FC	Forestry Commission
IRD	Indigenous Resources Division
DFID	Department for International Development
SFM	Shared Forest Management
RDC	Rural District Council
RDDC	Rural District Development Committee
WADCO	Ward Development Committee
VIDCO	Village Development Committee
BA	basal area at breast height
DBH (dbh)	diameter at breast height
Ob	over bark
Ub	under bark
FAO	Food and Agriculture Organization of the United Nations
Unesco	United Nations Educational Scientific and Cultural Organization
GTZ	German Agency for Technical Cooperation
JICA	Japan International Cooperation Agency
NGO	non-governmental organization
M/M on IC/R	Minutes of Meetings on Inception Report for the Forest Survey in the Gwaai and Bembesi Areas in the Republic of Zimbabwe
S/W	Scope of Work for the Forest Survey in the Gwaai and Bembesi Areas in the Republic of Zimbabwe
M/M on S/W	Minutes of Meetings on Scope of Work for the Forest Survey in the Gwaai and Bembesi Areas in the Republic of Zimbabwe

Units

M	1 meter = 3.32 feet (1 foot = 0.3048 m = 12 inch)
Ha	1 hectare = 2.47 acres (1 acre = 0.4047 ha)
m ³	1 cubic meter
In	1 inch = 2.54 cm
b(s)	1 pound = 453.59 gram

Exchange Rate

US\$ 1 = J¥ 116.20 = Z\$ 37.3 (1999/8/19)
Z\$ 1 = J¥ 3.115 (1999/8/19)

Note for Place Names

After this survey was considerably proceeded, the names of "Gwaai" and "Bembesi" were changed into "Gwayi" and "Mbembesi" in the government. In order to avoid the confusion in the results of the survey, the FC side and JICA Survey Team had agreed to adopt the names before the change.

Summary

Summary

1. Outline of the Survey

A forest survey and other surveys were conducted to identify the volume of forest resources and other information such as soil condition and existing woody coverage necessary for the formulation of a forest management plan. In addition, the transfer of and guidance on technologies/techniques were provided to the counterparts of the Forestry Commission (FC) regarding individual survey items, planning procedure/principles and others.

2. General Outline of the Survey Area

2-1 Natural Conditions

The Survey Area comprises of a broad Kalahari sand plateau, dissected by the Gwaai and Bembesi seasonal Rivers. The sandy soil is characterized by dryness and a large diurnal range of ground temperatures. The mean monthly temperature ranges from 15 °C (June and July) to 25 °C (October to December). Ground frost occurs in winter between May and September. The annual rainfall is approximately 590 mm and has an erratic pattern with more than 30 % of coefficient of variation.

The principal vegetation type in the Survey Area comprises of deciduous teak woodlands dominated by *Baikiaea plurijuga* which can survive under the dryness due to the Kalahari sand. The woodlands are mixed with the representative species of MIOMBO woodlands such as *Brachystegia* spp. and *Julbernardia* sp. that are widely distributed in the semi-arid area of Southeast Africa. The height of the upper tree story trees of the woodlands ranges from 5 to 15 m and the largest DBH is around 40 cm while the canopy is rarely closed.

Low trees such as *Terminalia* spp. and *Acacia* spp. dominate the broad and grassy depression, which is called “vlei”.

2-2 Socioeconomic Conditions

Some 1,247 households were residing in the Survey Area in 1995, which amounted to approximately 9,976 persons. The forest residents established settlements and farmlands along the Gwaai and Bembesi Rivers. Their livelihood depends mostly on farming, grazing and collection of forest products.

Some residents had already lived in the Survey Area when the forests were gazetted in the 1930s and 1940s. The FC allowed them to reside in the forests. According to the 1995 data from the FC, however, most of the forest residents are non-permit holders (882 households) who came from the surrounding villages. In the early 1990s, the FC prepared a

plan to move all of the forest residents to the Relocation Area established in the state forest. While a part of the forest residents moved to the relocation area, the refusal of the remaining forest residents to be relocated had created tension between the residents and the FC. This hindered the existing system for protection and management of forests by the FC. With such a background, the FC initiated the shared forest management program with the assistance of DFID in order to examine the social fencing approach for acquiring cooperation and participation of the residents. The preparation project for the shared forest management terminated at the end of November 1999. After that the program has no progress.

2-3 Forests and Forestry

Most of the woody cover in the Survey Area comprises of deciduous indigenous woodlands of which the canopy density is low (usually up to 50%). The main timber species are *Baikiaea plurijuga* (teak), *Pterocarpus angolensis* (mukwa) and *Guibourtia coleosperma* (muchibi).

In terms of management of forest resources in the Survey Area, trees having DBH of more than 40 cm had been the subject of harvesting from the early 1900s to 1973. Since the beginning of the 1970s, the trees to be harvested have been regulated within the range of the annual mean increment of 28,000 m³, which corresponds to the rotation period of roughly 40 years.

The local hardwoods sell at less than half the price of their imported counterparts. It is widely believed that there is a good scope for substantial increases in royalties as a means of pushing indigenous hardwood prices closer to those of imported hardwoods. The effective use of such increases will contribute to the forest management system, specially emphasizing forest fire control. It is estimated that roughly 95% of rural residents in the Survey Area depend on firewood as the main source of energy for cooking.

3. Topographic Mapping

The aerial photography was conducted for the Survey Area (some 200,000 ha) and the ground survey was conducted for the Intensive Area (some 50,000 ha) through sub-contracting. All 622 sheets of black and white aerial photographs were prepared. The ground survey mainly consisted of the control point survey with 30 new points and ordinary levelling for 170 km.

Using the aerial photographs and results of the land survey, a total 8 sheets of topographic maps (scale 1/20,000) were prepared for the Intensive Area.

4. GIS

The FC initiated Vegetation Resources Information System (VegRIS) project in association with GTZ from 1993 by using GIS software, Landsat data and aerial photos. The latest upgrade of the software was conducted in July of 1999. The project covers the whole of Zimbabwe and provides woody cover maps at scales of 1/250,000 and 1/1,000,000.

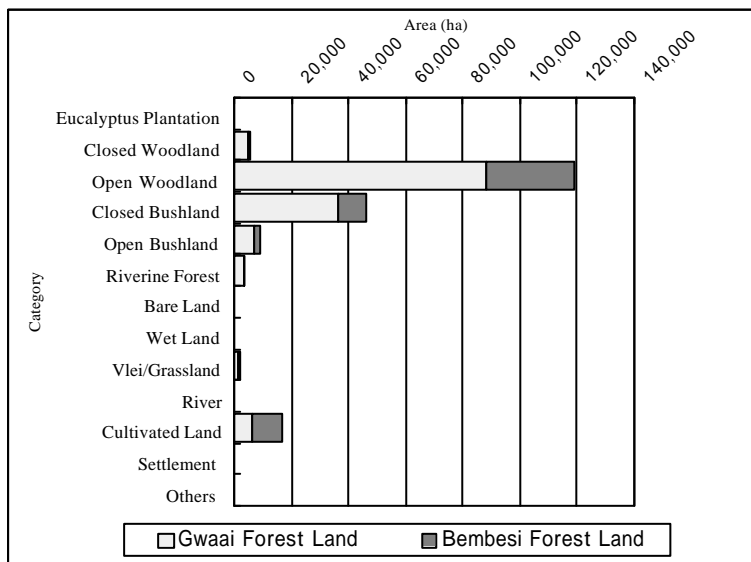
Based on the discussion with the relevant staff of the FC, the format of the GIS digital data to be provided was as follows:

- The final GIS data format was ARC/INFO export files (E00 file).
- The E00 files were also saved in ArcView shape files as a backup.

The various types of information contained in these thematic maps were digitized in order to efficiently utilize them in GIS. The digital data were installed into the system of the FC.

5. Preparation of Land Use and Vegetation Maps

The categories and criteria used for the Land Use and Vegetation Maps for the Survey Area were prepared and agreed with the FC side. The land area of each category is shown in the following figure.



6. Results of Forest Survey

(1) Forest Resources

The forest resources were estimated by applying the Stratified Random Sampling Method. A total of 136 survey plots were designed at a confidence level of 95% and an estimated error ratio of 10%. The plots consisted of 93 plots for stands dominated by *Baikiaea plurijuga*, 20 plots for stands dominated by *Guibourtia coleosperma*, 8 plots for stands dominated by *Brachystegia* spp. and 15 plots for other forest types.

The stand volume was calculated by total volume and timber volume. The total growing stock was estimated by applying Stratified Random Sampling Method. The mean volume per hectare in the Intensive Area was estimated at $30.086 \pm 2.334 \text{ m}^3$. The estimated error ratio precision aimed at was 10%, but was secured at 8%.

The volume of each stand was estimated by using aerial photograph stand volume equations prepared under this survey. The equations were obtained through regression analysis from factors obtained through photo interpretation and stand volume measured on site. The factors deprived from the photo interpretation were tree height of upper story trees and canopy density, both of which have high correlation with volume. The stand volume equations were used for calculating the volume of each stand which was delineated by photo interpretation and named "parcel". The total growing stock was calculated by adding the volumes of all parcels and the figure obtained was within the confidence interval precision aimed for. The mean volume per hectare in the Intensive Area amounted to 31.6 m^3 .

Each parcel was numbered within a block, and volume by parcel was tabulated in the forest inventory books.

In terms of the abundance of main tree species in the plot survey, *Baikiaea plurijuga* accounted for 42%, the highest percentage of all trees measured, while *Guibourtia coleosperma* accounted for 12%. *Pterocarpus angolensis* held the eighth highest percentage accounting for 3%.

The estimated volume by block and major tree species in the Intensive Area were as mentioned in the table below.

Volume by Block

Block	Total Area (ha)	Ratio (%)	Productive Area (ha)	Ratio (%)	Total Volume (m ³)	Ratio (%)	Total Volume per ha (m ³ /ha)	Timber Volume (m ³)	Ratio (%)	Timber Volume Per ha (m ³ /ha)
Gwaai Forest Land										
C	1,812	3	775	2	22,436	2	29	12,006	2	15
G	5,500	10	4,029	10	152,220	12	38	81,048	12	20
H	12,107	22	9,419	24	277,090	22	29	148,072	22	16
J	14,604	26	11,272	29	370,147	30	33	203,476	30	18
K	13,332	24	5,625	15	142,999	12	25	72,656	11	13
Bembesi Forest Land										
B	8,157	15	7,884	20	268,148	22	34	156,667	23	20
Total	55,512	100	39,004	100	1,233,040	100	32	673,925	100	17

Note: Productive Area comprised of woodland.

Timber Volume by Species (for all of the Intensive Area)

Total Figure (Unit: m ³)				Figure of Volume per ha (m ³ /ha)			
Species	Class1	Class2	Total	Species	Class1	Class2	Total
<i>Baikiaea plurijuga</i>	223,541	125,013	348,554	<i>Baikiaea plurijuga</i>	5.731	3.205	8.936
<i>Pterocarpus angolensis</i>	73,390	12,063	85,453	<i>Pterocarpus angolensis</i>	1.882	0.309	2.191
<i>Guibourtia coleosperma</i>	59,845	34,775	94,620	<i>Guibourtia coleosperma</i>	1.534	0.892	2.426
Others	79,995	65,303	145,298	Others	2.051	1.674	3.725
Total	436,771	237,154	673,925	Total	11.198	6.080	17.278

Note: DBH Class 1 34 cm + Class 2 26 – 33 cm

(2) Natural Regeneration

Baikiaea plurijuga had a high degree of abundance and coverage as well as excellent sprout, in all stands dominated by *Baikiaea plurijuga*, *Guibourtia coleosperma* and *Brachystegia* spp. and no major problems existed with regard to natural regeneration of the species.

Pterocarpus angolensis was found moderately regenerating with a low degree of abundance and coverage wherever mother trees were found among upper story trees. The area where regeneration was taking place is estimated at a third of the Intensive Area. Many mother trees had been selectively cut. In the future the remaining mother trees should be protected.

Guibourtia coleosperma had a high degree of abundance and coverage in the stands dominated by this species, and no problems existed with regard to its regeneration. However, the area of regeneration of this species was estimated at half of the Intensive Area. The mother trees of *Pterocarpus angolensis* also should be protected.

(3) Growth

All tree species in the Survey Area are slow growing. The mean annual increment of the main timber species, in terms of the existing data, is estimated from 1 to 2 mm.

7. Results of Soil Survey

A soil profile survey was conducted in order to prepare the soil maps. A total of 35 soil profiles generally with 100 cm depth were described. The survey items were site conditions and soil conditions such as limit of horizon, soil colour, texture, structure, etc. Based on the results of the soil survey, soil maps were prepared at a scale of 1/20,000 for the Intensive Area. Major soil groups, soil units and their distribution are summarized in the table below.

Distribution of Soils in the Intensive Area

Major Soil Group	Soil Unit	Main Location of Distribution	(Relative Productivity) Suitable Land Use
Leptosols (LP)	Eutric Leptosols (Lpe)	On the footslope of hills and in lands with low relief in lower area along the Bembesi River.	(Low) Suitable for forests or grasslands
Arenosols (AR)	Albic Arenosols (Ara)	On depressions on the hillside slopes or in small valleys.	(Low) Suitable for forests
	Luvic Arenosols (ARl)	Mainly on almost flat surfaces on hills and plateaus, and occupied a large area.	(Low) Suitable for forests
	Ferralsi-luvic Arenosols (Arlo)	On the top area of hills with gentle relief and gentle slopes, occupied a large area.	(Low) Suitable for forests
	Cambi-luvic Arenosols (Arlb)	On the gently sloping areas below the hill slopes or in broad concave sites among hills.	(Moderate) Suitable for forests or farmlands
Vertisols (VR)	Eutric Vertisols (Vre)	On flat land along downstream of Bembesi River.	(High) Suitable for forests, orchards or farmlands
Cambisols (CM)	Eutric Cambisols (CMe)	On lower land along Bembesi River and broad and in flat depressions among hills.	(High) Suitable for forests or farmlands
	Vertic Cambisols (CMv)	Same as above	(High) Suitable for forests or farmlands
	Gleyic Cambisols (CMg)	This unit shows traces of influence of ground water and the area containing this unit was either grasslands or bare land.	(Low) Suitable for forests

8. Recommendations for Forest Conservation Plan Formulation

The recommendations are aimed to support the forest conservation plan to be formulated by the Zimbabwe Government and put the emphasis on technical aspect.

Considering the current condition of forest management, the following three issues are of paramount importance for forest management in the Intensive Area.

- i) Decision of cutting volume based on the allowable cut volume
- ii) Promotion of forest tending measures
- iii) Development of fire protection measures

The basic concept and contents of the recommended forest conservation plan are described below.

(1) Concept of Forest Conservation

(a) Management by Category of Forest Functions

Under the forest management plan, operations to enhance various functions of forests (timber production, soil and water conservation, etc.) should be conducted. The current forest management plan adopts zoning by specific objectives such as timber production, safari, grazing (combined with timber production) and relocation. The current zoning is generally appropriate for the improvement of the target forest functions. The following objectives or functions would be beneficial if added to the existing objectives: firewood production, restoration, protection of genetic resources of useful species and soil and water conservation.

For a high and sustainable performance regarding forest functions, it is very important to establish target stand types and to conduct forest operations accordingly.

The target stand type for timber production requires a high composition ratio of useful tree species of good form having reached the utilizable DBH size. In addition, trees of various DBH-sizes must form the stand so that it can restore or supplement the distribution gap caused by cutting large trees periodically.

Regarding the firewood production area, the desirable tree diameter will be a DBH of approximately 10 cm. It is favourable that the safari area and the soil and water conservation area be protected as indigenous forests, unless necessity calls for otherwise. The protection area of genetic resources of useful species, the number of which is decreasing, should consist of useful tree species of a utilizable quality.

(b) Division of Forests

To facilitate the forest management plan, it will be appropriate to subdivide the existing blocks into compartments which will be the minimum units for forest operations. Roads or rivers will form the boundaries of each compartment. It should be emphasized that demarcation by roads should be carried out in such a way so that each compartment is divided into approximately equal size and the roads function as fire guards (firebreaks).

(c) Planning Period

It would be appropriate to formulate the forest management plan for a period of ten-years accompanied by intermediate reviews at every fifth-year, while taking the next 50 or 100 years into account.

(d) Allowable Cutting Volume

In the timber production area, the allowable cutting volume should be established in order to secure sustained forest resources, by setting the target production diameter at 40 to 50 cm (or 300 years of cutting age).

The allowable cutting volume is commonly decided by the upper limit of stand increment of the timber production forests within the term of the forest management plan. In the case of stands under the selective cutting system, selective cutting ratio and cutting cycle need to be set. When the selective cutting ratio is high, the cutting cycle becomes longer, and vice versa.

(e) Measures Regarding Forest Tending

The key measures in the areas containing dwarf teak will be the restoration of *Baikiaea plurijuga*. It would be essential to prune the existing sprouts by cutting all but a few sprouts of the strongest of good quality. After conducting the above operation, the follow-up survey at the pruned stand will be important in order to establish a tending method.

(f) Fire Protection Measures

In terms of fire protection, grazing areas should benefit the residents and in exchange their participation in fire protection should be mandatory. Increasing the grazing areas should be examined as a possible measure.

Most causes of fires are due to the human activities. From this viewpoint, the understanding and cooperation of the residents which were supposed to be obtained through the SFM project are very essential.

The newly established roads for demarcating compartments should help facilitate fire protection, including fire guarding and providing access for fire prevention and fire action. To enhance the fire guarding role of the roads, the enlargement of the road width should be considered as an option.

(2) Necessary Conditions for Implementation of Forest Conservation Plan

Forests should be managed through mutual agreements based on the discussions involving the forest residents and the surrounding communities, as well as officials from the FC. The legal system needs to be strengthened to assist the development of mutual agreements.

Regarding the improvement of the residents' living conditions the improvement of social infrastructure is needed. The maintenance and management of the infrastructure should be handled by the FC, forest residents, and the relevant organizations of the Zimbabwe Government. The sustainable wood production is needed as a financial source for the maintenance and management of the Survey Area's infrastructure. The residents should recognize the importance of such issues and be trained in relevant forestry technologies. Sufficient extension services should be provided in such fields as forestry, agriculture and livestock raising.

The means to provide livelihood should be strengthened, improving the living conditions by supplying jobs through forest management. It is important that the residents agree to the above outlined forest conservation plan, which will provide them with income from jobs such as seedling cultivation, planting and cutting. Promotion of participation by the residents is necessary for the implementation of the forest management plans. On the other hand, the prices of timber produced from state forests should be raised to improve income in general.

Chapter 1

1. Outline of the Survey

1.1 Background of the Survey

Zimbabwe is a landlocked country with a total land area of approximately 39,000,000 ha and the highland area at an elevation of 1,200 m extends from the southwest to the northeast. As of 1998, forests (including woodlands) accounted for 54% of the total land area and mainly consist of commercial forests of exotic pine and eucalyptus in the east and conservation forests of indigenous hardwood species in the west. In recent years, forests have been facing increasing pressure due to rapid population growth (3.1% per year) and land shortage at communal land, losing approximately 60,000 ha each year.

The Gwaai Forest Land (144,000 ha) and the Bembesi Forest Land (55,100 ha), both of which are located in the west, are designated as conservation forests and preserve the large natural forests in the country. As the construction of the Shangani Dam is planned to supply irrigation water to Matabeleland North in the lower reaches, these Forest Lands are important from the viewpoint of watershed conservation. The forests are partly inhabited by settlers who moved in prior to forest demarcation (Gwaai in 1930 and Bembesi 1940) and those who have moved in due to civil unrest from 1970 onwards. These people mainly live in settlements along Bembesi River and Gwaai River in the Forest Lands and are involved in stock raising and agriculture. However, degradation and development of the forests become more serious due to forest fire and cutting accompanied by farmland development. The preparation and implementation of management plan of indigenous forests are issues to be tackled because of the concern that soil and water conservation function of the relevant lands will deteriorate if such tendency remains. While the Forestry Commission (FC) of the Zimbabwe Ministry of Mines, Environment and Tourism planned to establish a relocation area (30,000 ha) to the north of the paved road in the northeastern part of the Gwaai and Bembesi Forest Lands with a view to relocating all of the inhabitants of the Forest Lands, the plan was not making smooth progress because of opposition on the part of the inhabitants. The pressure on forests has already increased at the Gwaai and Bembesi Forest Lands, particularly in areas surrounding settlements, making the formulation and implementation of a forest management plan imperative. In the face of such pressure, the Government of Zimbabwe made a request to the Government of Japan in January, 1996 for a development study (master plan study: M/P) for the formulation of a management plan of indigenous forests.

Meanwhile, the Department for International Development (DFID) of the UK conducted

the preparatory phase of a project designed to secure the agreement of local inhabitants through the shared forest management (SFM) approach in the period from June to August, 1998 and it plans to implement the projects after the completion of the preparatory phase.

Against this background, a preparatory study team (for discussions on the S/W) was dispatched to Zimbabwe by JICA in February, 1999 which held discussions with the Forestry Commission (FC) on the status of the project implemented by the DFID and that of the development study for the formulation of a management plan for conservation of indigenous forests requested of Japan. As a result, as the DFID project had already commenced, it was agreed that the JICA and DFID would conduct a forest survey and a socioeconomic survey respectively and that the Forestry Commission would formulate a forest management plan based on the findings of these two surveys. Based on this agreement, the S/W detailing the contents of the forest survey to be conducted by the JICA was concluded on 18th February, 1999.

1.2 Objectives of the Survey

A forest survey and other surveys were conducted to identify the volume of forest resources and other information such as soil condition and existing woody coverage necessary for the formulation of a forest management plan. In addition, the transfer of and guidance on technologies/techniques was provided to the counterparts regarding individual survey items, planning procedure/principles and others.

1.3 Survey Area and Intensive Area

(1) Survey Area

The Survey Area covered approximately 200,000 ha consisting of the Gwaai Forest Land (144,000 ha) and the Bembesi Forest Land (55,100 ha), both of which are located some 150 - 200 km northwest of Bulawayo City (some two hours by paved road towards the Victoria Falls). The location of the Survey Area is shown in Fig. 1 – 1.

(2) Intensive Area

An Intensive Area (some 50,000 ha) has already been established along the Falls Road by the preparatory study team. However, the final decision on the Intensive Area has been made by examining the forest blocks established by the Forestry Commission, taking the management requirements primarily for the fire protection into consideration.

1.4 Outline of the Survey

The Survey was conducted in two phases and the scope of each phase is described below.

[Phase I]

(1) Preparatory Work in Japan

- 1) Sorting and analysis of existing information/data
- 2) Preparation of specifications (draft) required for the subcontracting of aerial photography and ground survey
- 3) Preparation of base maps for land use and vegetation maps
- 4) Preparation of Inception Report
- 5) Explanation of and discussions on Inception Report at inter-ministerial meeting
- 6) Preparation of technology transfer plan (draft)

(2) First Field Survey

- 7) Explanation of and discussions on Inception Report
- 8) Gathering of general information on socioeconomic and natural conditions
- 9) Gathering of reference materials and information for forest survey and field reconnaissance
- 10) Aerial photography and ground survey

Subcontracted work:

aerial photography = Survey Area (some 200,000 ha)

ground survey = Intensive Area (some 50,000 ha)

- 11) Preparation of land use and vegetation maps and implementation of preliminary forest survey
- 12) Final decision on Intensive Area
- 13) Preparation of Progress Report and explanation of and discussions on Progress Report with government organizations in Zimbabwe

[Phase II]

(3) First Work in Japan

- 14) Explanation of and discussions on Progress Report
- 15) Preparation of topographical maps of Intensive Area
- 16) Interpretation of aerial photographs and survey design
- 17) Preparation of Interim Report

(4) Second Field Survey

- 18) Explanation of and discussions on Interim Report
- 19) Full-scale forest survey on Intensive Area

(5) Second Work in Japan

- 20) Compilation of forest survey findings for Intensive Area; preparation of forest

type maps and soil maps, etc.

21) Conversion of land use and vegetation maps, forest type maps and soil maps to digital data

22) Preparation of Draft Final Report (based on forest survey findings)

23) Explanation of and discussions on Draft Final Report at inter-ministerial meeting

(6) Third Field Survey

24) Explanation of and discussions on Draft Final Report with government organizations in Zimbabwe

25) Installation of digital data to GIS equipment possessed by Forestry Commission

(7) Third Work in Japan

26) Reporting of third field survey findings

27) Preparation of replies to comments on Draft Final Report

28) Preparation of Final Report

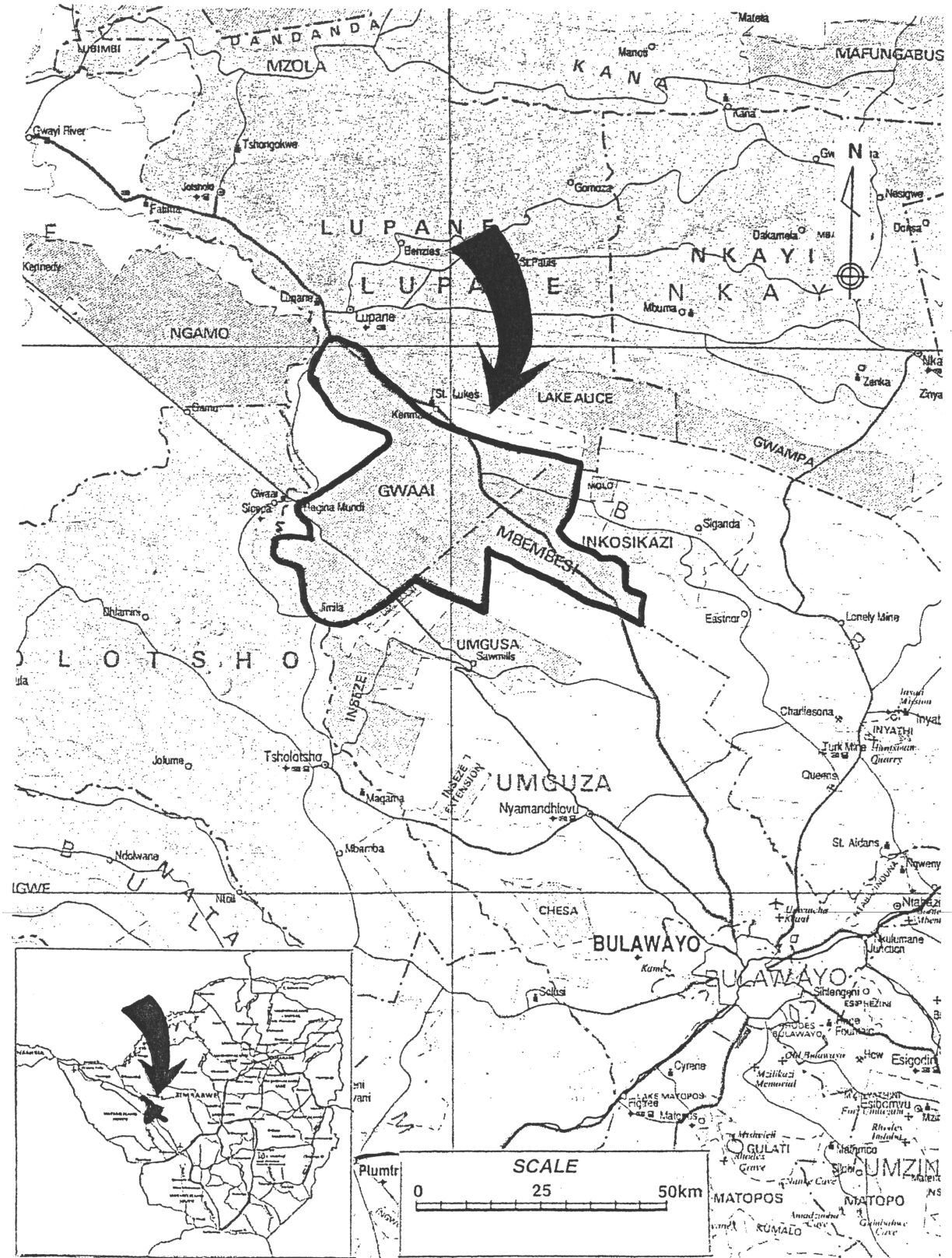


Fig. 1 - 1 Location of Survey Area

