League of Arab States
Arab Organization For
Agricultural Development

TECHNICAL ASSISTANCE FOR
THE TECHNICAL AND ECONOMIC FEASIBILITY STUDY FOR THE STATE FORESTS DEVELOPMENT OF ZIMBABWE

Volume 2
ANNEXES

FINAL REPORT
(Restricted for official Use Only)
December 1992

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Annex 1.a

APPENDIX I of (M.U)

TERMS OF REFERENCE FOR

TECHNICAL AND ECONOMIC FEASIBILITY STUDY FOR

THE STATE FORESTS DEVELOPMENT IN ZIMBABWE

A. The Government has the intention to:

1. Develop state forestries natural resources by improving their productivity, quality and quantity.
2. Conserve forest environment.
3. Improve wildlife management system in state forests.
4. Improve and conserve forest pasture resources and adopt well studied-systems of range management and improvement practices.

B. The feasibility study shall cover the technical, financial and economical aspects related to state forests of Zimbabwe. The main features of the study will include:

i. The economy of the country and the role of the agricultural sector as well as the forests sub-sector on national economy.

ii. Study of the prevailing situation of state forestry including soils, plants, wildlife, etc.

iii. Review of existing legislation and policy and recommendation of appropriate change.

iv. Investigation of problems facing state forests development and management.

v. The project's salient features and rationale, its objectives and a detailed description of its major components, cost estimates and financing, phasing and disbursement, organization and management, production and marketing, financial and economic analysis as well as any other relevant issues.

Annex 1.b

BADEA TECHNICAL ASSISTANCE

MANAGEMENT OF INDIGENOUS FORESTS

TERMS OF REFERENCE OF THE CONSULTANTS ON

MANAGEMENT OF INDIGENOUS FORESTS

1. GENERAL

The consultants will be required to analyze and evaluate issues, problems, opportunities for sustainable development, management and utilization of indigenous forest resources. The studies should produce bankable projects and plans for efficient and profitable management of indigenous forest resources. The consultants will be guided by current operations, proposed programmes and the Commission's management to perform their work.

II FOREST RESOURCES DEVELOPMENT PROGRAMME:

1. The items for reference of the consultants are to review the current forest management systems and their likely impact on the regeneration of the forest and identify constraints on current or proposed forest development programmes.
   The current management systems include:
   a. wildlife management.
   b. forest management/silvicultural systems.
   c. forest livestock grazing as currently done under the various lease systems.
   d. the forests' water/soil/conservation role which should come up with quantifiable benefits of the forest's role in this.
2. More specifically the consultants will be required to:
   i. Examine current silvicultural systems and recommend methods of improvement.
   ii. Study in detail the Division's livestock development programme and produce recommendations for a profitable programme.
   iii. Recommend best methods of improving wildlife stock in the forests.

iv. Review management programmes in the proposed Five Year Development Plan of the Division and determine their effectiveness.

v. Establish the conservation value of indigenous forests in Matabeleland North.

vi. Ascertain the value and viability of ostrich and crocodile farming, and fishing in the Division.

vii) Determine manpower requirements for the management programme.

III. FOREST UTILIZATION PROGRAMME:

1. Under the utilization programme, the consultants will be required to review the currant utilization systems and determine their profitability sustainability, and impact on the indigenous forest ecosystem, and recommend appropriate levels of both management profitability and resource use sustainability.

   Current utilization programmes include:

   a) hunting safaris
   b) photographic safaris
   c) periodic harvest/salvage of timber
   d) grazing leases
   e) conservation

2. More specifically, the consultants will be required to:

   i. Review in detail the proposed Five Year Development Plan for the utilization of indigenous resources with a view to determine its viability.

   ii. Develop a land use plan for the implementation of the long term development plan.

   iii. Propose ways of improving utilization of wildlife and their products from detailed studies of the industry.

vi. Determine wildlife and forest utilization levels friendly to the environment and appropriate for sustainable regeneration of forests.

v) Determine manpower requirements for forests products utilization.

IV RESULTS:

The consultants are expected to produce a five year investment programme for the management and utilization of indigenous forests and determine the manpower requirements for the programme.

Annex 1.c

FIELD WORK PROGRAMME AND NAMES AND SPECIALIZATION OF EXPATRIATE AND LOCAL CONSULTANTS

A. PROGRAMME OF THE VISIT TO ZIMBABWE

6 to 24 December 1991

I. TRAVEL ITINERARY

1st Group of 6 Experts				2nd Group of 6 Experts		12 Experts Together	
NO	DATE	DAY	NIGHT	Day	Night	Day	Night
1	6 Fr	A	A				
2	7 St	A	H				
3	8 Su	H	B				
4	9 Mo	B	B				
5	10 Tu	F	F				
6	11 Wd	F	F				
7	12 Th	F	F				
8	13 Fr	F	F	-	H	-	-
9	14 St	F	F	H	H	-	-
10	15 Su	F	B	B	B	B	B
11	16 Mo	B	B	B	B	B	-
12	17 Tu	B	H	F	F	-	-
13	18 We	H	H	F	B	-	-
14	19 Th	H	H	H	H	H	H
15	20 Fr	H	H	H	H	H	H
16	21 St	H	H	A	A	A	A
17	22 Su	A	A	A	A	A	A
18	23 Mo	A	A	K	-	K	-
19	24 Tu	K	-				
TOTAL	H	5	5	3	4	2	2
	B	3	4	2	3	2	1
	F	6	5	2	1	-	-

KEY

H -HARARE
B -BULAWAYO
F -FIELD
A -ADDIS ABABA
K -KHARTOUM

II. PROGRAMME IN BULAWAYO 16th to 19th DECEMBER

MONDAY 16th

All Groups Meet Consultants-Butcher and Culvert
No 1. GROUP TO GO CATTLE PRODUCTION (AGRITEX)
No 2. GROUP TO VISIT NGAMO COMPANY
FULL TEAM BRIEFING BY TEAM LEADER AND MANAGER INDIGENOUS RESOURCES.

TUESDAY 17th

8. 00 AM — Meet Dr.SIMPSON
10. 30 AM — No 1. GROUP VISIT COLD STORAGE COMMISSION
Nn 2. GROUP VISIT SURVEY OFFICE
No 3. GROUP VISIT TIMBER Co.(P.G) DOORS ETC. (MEET Mr.CHIHAMBAKKE)
No 4. GROUP MEET NGAMO STAFF
No 5. GROUP VISIT FOREST PRODUCTS (SAWMILLERS)
GROUP I ORIGINAL FLY TO HARARE.

WEDNESDAY 18th — 2ND GROUP (ORIGINAL) VISIT CHESA, INSIEZE, MBEMBESI, MGUSA and FARQUHAR CAMP FOR NIGHT STOP.

THURSDAY 19th — 2ND GROUP (ORIGINAL) VISIT GWAAI, LAKE ALLICE, MOLO/GWAMPA/WINTERBLOCK RETURN TO BULAWAYO AND FLY TO HARARE.

III.PROGRAMME IN HARARE 18 TO 21 DECEMBER

WEDNESDAY 18: MEETING WITH

9.00 — Gondo
11.30 — FAO Representative
12.00 — Natural Resources Ministry Dept -also N.R.Board.
2.p.m. — GWAZE and PIEARCE (Research).
3.p.m. — MUSHOVE (SILVICULTURE)

TUESDAY 19 Meeting

8.00 a.m. — Personnel Manager
9.00 a.m. — National Park & Wildlife Dept.
10.00 a.m. — FAO Representative
10.00 a.m. — Corporate planner (Tqngwena) Financial controller to joint.
11.00 a.m. — Macro planner (Ministry of Finance)
12.30 p.m. — FAO Deputy Representative
3.00 p.m. — Booth, Price House

FRIDAY 20

8.00 a.m. — Meet Mr.GWAZE (Research)
11.30 a.m — UNDP Representative
12.00 a.m. — Financial Controller
2.00 p.m. — MAKONE.

SATURDAY 21

9.00 a.m. — Mr.Mohne-M. of economics
10.00 a.m. — Debriefing with G.M.F.C.

B. CONSULTANTS

I. EXPATRIATE CONSULTANTS

FIRST GROUP	
1. M.K.SHAWKI	- TEAM LEADER.
2. M.B.NIMIR	- WILDLIFE & TOURISM.
3. ABDOULLA M.IBRAHIM	- POLICY,LAW &ADMIN.
4. ELNOUR ELSIDDIK	- FOREST MANAGEMENT.
5. GAFAR F.ALI	- ECONOMICS CONSULTANT.
6. M.E.MUKHTAR	- WOOD UTILIZATION.
SECOND GROUP	
7. H.O.ABD ELNOUR	- FOREST PROTECTION.
8. T.E.AHMED MOHD.	- ANIMAL PRODUCTION.
9. SALAH A.ABBAS	- FINANCIAL ANALYSIS
10. A.Y.SHAFIQUE	- SILVICULTURE
11. I.GADALLA	- FOREST DEVELOPMENT
12. E. I.WARRAG	- FOREST REGENERATION

II. LOCAL CONSULTANTS

1. T. KATARERE	- (G.M FC)
2. R. MUTSIWEGOTA	- MANAGER (IRD)
3. D. GWAZE	- (M, RESEARCH DESIGN)
4. P. GONDO	- (MAP and INVENTORY)
5. A. TEMBE	- (AREA, M SOUTH)
6. J. MOYO	- (AREA, M NORTH)
7. A. STEWART	- (NGAMO ADMIN. SEC)
8. M. BUTCHER	- (Wildlife ECOLOGIST)
9. L. SIMPSON	- (ANIMAL PRODUCTION)
10. J. CALVERT	- (FOREST ECOLOGIST).

Annex 1.d

LIST OF LOCAL STAFF AND SPECIALISTS

CONSULTED BY THE EXPATRIATE TEAM

YEMI KATERERE (GM)	- GM GENERAL MANAGER-FOR.COMMISSION-HARARE.
CUTHBERT MUTSIWEGOTA	- MANAGER INDIGENOUS RESOURCES - BULAWAYO.
ARMSTRONG TEMBE	- AREA MANAGER SOUTH FOREST HILL.
DOMINIC KWESHA	- FORESTER MAPPING AND INVENTORY-HARARE.
ANGELINE STEWART	- ADMINISTRATIVE SECRETARY NGAMO-HARARE,FC.
DUNCAN CHEWALA	- AREA ASSISTANT- BEMESI FOREST.
CHRISTOPHER CHITSA	- PROFESSIONAL HUNTER -MATABELELAND,FC.
NAISON INDUNA	- AREA ASSISTANT- NGAMO FOREST.
RASSON NYAAMANDI	- PROJECTS OFFICER ,FC.
PETER CONDO	- MAPPING AND INVENTORY OFFICER.
ONIOUS NKOMO	- ASSISTANT FOREST PROTECTION UNIT OFFICER.
RIGAYA	- WILDLIFE OFFICER NATIONAL PARKS-MAIN CAMP.
PETER PHILIP MUSHUNGE	- FOREST PROTECTION OFFICER-INDIGENOUS FORESTS PROTECTION UNIT
DAY CATHAMN	- CHAIRMAN GWAAI ICA
CUEMA	- ASSISTANT FOREST PROTECTION OFFICER FOR NORTHERN INDIGENOUS FORESTS-NGAMO- SIKUSMO.
JAISON JANGE	- ASSISTANT AREA OFFICER SIKUMO
JONAS CHAFOTA	- ECOLOGIST NATIONAL PARK DEPT. MATETSIA WILD LIFE AREA.
JADIAS MOYO	- AREA MANAGER NORTH.
DAVIAD BENNING	- AFRICAN GLOBAL MARKETING PRIVATE BUSINESS- HARARE.
M. BUTECHER	- Wildlife ECOLOGIST OF THE FORESTS COMMISSION.
L.SIMPSON	- FREE LANCE ANIMAL PRODUCTION EXPERT-EX.FC.
M.CHIHAMBAKWE	- MANAGER SAND/PG
.....	- DEPT.SURVEY, OFFICER,AGRITEX.
J.M. CULVERT	- CONSULTANT ECOLOGIST OF THE FC.
D.GWAZE	- ACTING MANAGER, RESEARCH AND DEVELOPMENT DESIGNATE MANAGER FOREST RESEARCH.

G.PIEARCE	- DDA PROJECT MANAGER.
P.MUSHOVE	- SILVICULTURIST, FC.
Mr.MUNEMO	- DEPUTY DIRECTOR, DEPARTMENT OF NATURAL RESOURCES.
Mr. MAKOMBE	- DEPUTY DIRECTOR NATIONAL PARKS, WILDLIFE MANAGEMENT.
Mrs. F.MUNJANJA	- PERSONNEL AND ADMINISTRATIVE MANAGER,FC.
Mr.E.S.MUTSVAIRO	- FINANCIAL CONTROLLER, FC.
Mr.S.R.TUNSWENA	- PLANNING OFFICER, FC.
Mrs.MATIZA	- M.PF FINANCE MAERESFLOWER.
MC CULLOUGH	- F.A.O REPRESENTATIVE.
MAGDI GHEITH	- DEPUTY F.A.O. REPRESENTATIVE.
V.BOOTH	- PRICE WATER HOUSE.
G.MOHNE	- MACRO ECONOMIC EXPERT.
E.T.MUNDANGE PFUPFU	- SECRETARY MINISTRY OF ENVIRONMENT AND TOURISM.
I.J.MAKONI	- MANAGER, FORESTS EXTENSION SERVICES.
A.DUBE	- AGRITEX/ LIVESTOCK OFFICER.
C.J.MUROMBIDZI	- CSC, MARKETING DEPT.
F.C NOHLOVU	- CSC,LIVESTOCK DEPT.
M.MUGARA	- CSC LIVESTOCK DEPT.
R.V.KHARA	- CSC CATTLE IMPROVEMENT DEPT.
DR. L.NOLOVU	- DEPT.OF ANIMAL SCIENCE, UNIVERSITY OF ZIMBABWE.
PROF. J.C.KATIGELA	- LIASION OFFICE, ILCA SOUTHERN ADMIN. OFFICE DEPT. OF EPIDEMIOLOGY.
DR. M.AGREY	- FACULTY OF VET.SC.UNIVERSITY OF ZIMBABWE DEPT.OF EPIDEMIOLOGY.
MR. CHIRANGANDE	- INDIGENOUS FORESTS DIVISION ACCOUNTANT, CHIEF ACCOUNTANT FC,HARARE.
MR.MASIKAII	- HEAD OFFICE (FC) ACCOUNTANT.
MRS. S.STEADMAN	- NGAMO SAFARI COORDINATOR.

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Annex 1.f

GOVERNMENT OF ZIMBABWE

FORESTRY POLICY STATEMENT

1. THE POLICY OF THE FORESTRY COMMISSION IN ROLE OF FORESTRY AUTHORITY

1.2 to ensure the conservation of forests and trees where this is necessary for the protection and/or production of soil water, wood and other forest produce for the lasting benefit of the people of Zimbabwe.

1.3 to protect forest areas of special scientific or aesthetic value.

1.4 to ensure that sufficient suitable land is set aside as part of the country's permanent forest estate.

1.5 to prepare and maintain an inventory of Zimbabwe's forest resources.

1.6 to ensure that the country's entire forest resources are managed and developed holistically on a sustained yield basis that the needs for all kinds of forest produce by the people and forest industries and assessed and in consultation with Government, the private sector and the people to ensure that these needs are met both now and in the future.

1.7 to provide such forestry advisory and management services as may be necessary for Government forest industry and other bodies.

1.8 to intensify reafforestation and management of indigenous woodland on communal land with due regards to sustained utilization

1.9 to increase the planting of indigenous species together with suitable fast growing exotic species so that the needs of rural farmers are met.

1.10 to undertake and conduct research relevant to the needs of forestry and forest industries and ensure that the the results are known to all potential beneficiaries.

1.11 to promote and/or educational and training facilities to meet the needs of forestry and forest industry.

1.12 to advise Government on proposed new schemes within the forestry industry

Annex 1.f (cont.)

2. THE POLICY OF THE FORESTRY COMMISSION IN THE ROLE OF ENTERPRISE

2.1 to acquire land for forestry and associated industrial and commercial purposes and develop and use the land to best advantage.

2.2 to establish, develop and manage its own forests for the production and adequate supply of wood and other forest produce in the future.

2.3 to introduce, develop, manage and promote additional forms of land use to supplement forestry and optimize the utilization and production of the Forestry Commission's land holdings.

2.4 to develop and foster new market for forest produce.

2.5 to harvest, process and market its own forest produce whenever this is advantageous.

2.6 to stimulate forest based industry and commerce in Zimbabwe by developing new ventures either alone or jointly with other bodies.

3. GENERAL

3.1 in pursuit of all aspects of its policy, to plan, operate and maintain a suitable administrative structure which will ensure efficient and where appropriate, profitable performance to yield an adequate return of all capital employed

Annex 3-a

Land uses in the Indigenous Demarcated Forests

Multiple land use with tenants subsist-ence Agricult-ural farming	Wild-life Areas	Live-stock grazing	Wildlife and livestock together	Wood utiliza-tion	Possible conver-sion to communal lands
Gwaai Bembesi Gwampa Umgusa Inseze Mafungabusi Grant properties	Sikumi Ngamo	Chesa	Inseze Extension	Mfungabusi Fuller Sikumi Gwaai Chesa Inseze Ext Lake Alice Gwampa	Mzola Bembesi Gwaai Gwampa

Annex 3.b: Distribution of Timber Tree Species in the DSIF

SN	Timber Tree Species	The Demarcated Indigen ous Forests																
		BEMBESSI	GWAMPA	FORESTHILL	FULLER	NGAMO	UMZABANI	GWAAI	INCESE	KAZUMA	MUDZUNGWI	LAKE ALICE	MZOLA	SIKUMI	CHESSA	SIJRRARE	KAVIRA	MAFUNGABUSI	
1	Colophospermum mopani(MOPANI)													x		x			on valley floor
2	Guibourtia coleasperma (MCHIBIS)	x						x		x									
3	Terminalia sericae																	x	
4	Entandophrgma caudatu.m (Mahog.)										x							x	
5	Acacia sp.																	x	
6	Petrocarpus angolensis (MUKWA)	x	x	x	x	x	x	x		x								x	on Ridges
7	Backiaea plurijuga (TEAK)	x	x					x		x									
8	Erithrophlum africanum																		
9	Burkea african																		
10	Ricinordendon rautamenii																		on valley floor
11	Afzelia quanzensis (Mahogony)																	x	on high altitude
12	Brachystegia speciformis (MIOMBO)																	x	on Ridges
13	Combretum sp																		on valley floor
14	Julbemardi globiflora (MONDO)																	x	
15	Isodelina sp																		

Annex 4.a

Acts related to forests and their short comings regarding the protection of the DSIF

Acts	Objectives	Short comings and constraints	Associated institution
1. **The Natural Resources Act** Enacted 1941. Amended 1975 and 1981.	i. To control use of Natural resources. ii. To create the Natural Resources Board and Local conservation Committees. iii. Regulate cultivation on river banks.	i. control is exercised through many ways. ii. No provision for efficient utilization in private lands. iii. Of limited use as a management tool. iv. It differs with Forest Act in river banks cultivation limits, setting 30m as limit.	1. The Department of Natural Resources (DNR). 2. The Natural Resources Board. 3. Local conservation Committees.
2. **The Communal Land Act 1982.**	i. To control occupation and use of Communal lands.	i. Largely in-effective because of acute pressure on land and other natural resources. ii. Implementation is fraught with difficulty.	1. District councils. 2. Local population organizations. 3. Conservation committees.
3. **Forest Act**	i. To control the destination of Forestry products. ii. Regulate cultivation on river banks. iii. Creates FC and FB. iv. Deals with Commercial planation on state land.	i. Deals only with commercial plantations in the State Lands. ii. Can not address deforestation problems in CA. iii. Differs with the Natural Resources Act on setting the river banks cultivation limits by 100 m.	1. Forestry Commission (FC) a- The state forestry authority. b- The state Forestry enterprise. 2. Forestry board.

Annex 4.a (continued...)

4. **Communal Land and Forest Produce Act**	i. To control the exploitation of timber resources in CA. ii. To transfer technology and timber management to communal forests. iii. To prevent outsiders from gaining access to timber and removing it from CA.	i- Population pressure on depleting natural resources. ii- Lack of alternatives for woodfuel.	1. District councils. 2. Local population organizations 3. Conservation committees.
5. **Parks and Wildlife Act**	i. Proclamation of National Parks, safari areas, and recreational parks. ii. The development of private game ranching.	i- Legal reponsibilities on limited to State lands except for species afforded legal protection. ii- No legal obligations to work in CA except where threat to human life is presented by some wild animals.	1. Parks and wildlife Board (PWB). 2. Department of National Parks and Wildlife Management (DNPWM).
6. **Trapping of Animals Control Act**	i. To control use of traps.		
7. **Bees Act**	i. To support communal production of honey. ii. To set minimum standards and regulations for honey production.	i- Lack of information on production methods, patterns quantities, marketing etc..	1. Honey producers. 2. Agricultural reserve units.

Annex 4.a (Conti.)

8. Hazardous substance and Article Act	i. Control over applications of toxic chemicals.	i- Lack of information on chemical waste. ii- Lack of monitoring equipment for waste disposal. iii-Inadequate administrative support.	
9. Atmospheric pollution Act	i. Control of atmospheric pollution.	i- Lack of information from producers.	
10. Noxious Weed Act	i. To prevent insect accommodation in agricultural residues as precaution against insect damage.		
11. Plant pests and diseases Act	i. For effective control of pest and insects.		
12. Mines and Minerals Act	i. Exploitation of mines.	i- Overrides all other Acts. ii- Very few restrictions are attached to it. iii-It has negative impacts on the environment i.e:- a. extensive timbe felling. b. No reforestion activities are demanded. c. Causes siltation.	
13. Water Act	i. Control of surface and ground water.	i. Does not sufficiently address the CA degradation problem of water catchment.	1. Water pollution unit.

Annex 4.a (continued)

14. **District Council Act**	i. Creation of conservation committees.	i. Its implementation is facing serious problems in CA because: a. It collides with tradition. b. Boundaries have not been drawn.	
15. **The Zambezi River Act 1986**	i. Energy development. ii. Hydropower utilization.		
17. **NOCZIM Act** 1986	i. Establishment of a National oil company.		
18. **All Acts above**		i. Many Acts inherited from colonial period. ii. They are not amended to cope with present goales and policies. iii. In the colonial periods conservation was perceived as a restrictive activity. iv. Conflicts between some acts e.g Natural Resources Act and different sectoral Acts. v. Laws equally applicable on diff-erent categories of lands. vi. The enforcing institution may depend on other government inst-itutions in the other ministries for implementation ie (DNP) depends on Agritex, FC and water pollution unit. vii. Of limited use in areas where environmental problems are most severe. viii. Contradictions and overlapping between some Acts. ix. Previewing of these Acts recommended by the National conservation strategy (NCS) is not implemented. x. Lack of adequate funds. xi. Lack of qualified personnel. xii. Institutional overlaps and conflicts at central and local levels. xiii. Contradiction between long term policies and short term measures for checking environmental degradation. xiv. Reduction of budget for rese-ttlement schemes and preventive environmental measures.	

Annex 4.b

Volume distribution above 20.00 cm dbhob for three species Teak (Ba), Mchibis (Gu) and Mukuwa (Pt) for the seven inventoried DSIF

1. Sikumi Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume above 20cm dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
A	16839	0.48	0.17	0.71	0.03	1.39	23406	31903	1.9	5	73
B	5407	1.73	1.10	1.21	0.03	4.10	22169	26955	5.0	4	82
C	3449	4.50	3.10	2.50	0.32	10.4	35938	38325	11.0	1	94
D	3468	3.26	2.88	1.50	0.14	7.78	26981	29244	8.4	2	92
E	13103	3.10	2.50	1.60	0.14	7.40	96962	103940	7.9	3	93

* Order of blocks productivity from 1-5, with 1 being the most productive while 5 is the least.

Annex 4.b (Conti.)

2. Gwaai Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume above 20cm dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
A	83815	1.40	0.82	0.57		2.79	233384	31549	3.76	10	74
B	58297	2.22	0.96	1.46		4.46	26000	35658	6.10	2	73
C	62258	2.00	0.70	0.47		3.17	19735	24896	4.00	8	79
E	56545	1.50	1.80	0.660		4.00	22738	31107	5.50	3	73
G	63694	1.80	0.90	.44		3.14	20000	29537	4.60	9	68
H	10237	2.76	0.53	0.56		3.85	39314	60027	6.00	5	66
J	10097	3.15	0.50	1.23		4.88	49273	73610	7.29	1	67
K	9415	1.10	1.40	0.70		3.20	30128	43989	4.70	7	69
L	11183	1.62	1.10	0.72		3.44	38469	66212	6.00	6	58
M	8698	1.80	0.45	1.80		4.00	34792	38685	4.50	4	90
N	9200	1.65	0.14	0.42		2.21	20332	34742	3.80	11	59
O	14646	1.50	0.42	0.42		2.16	31635	54095	3.70	12	59

* Order of blocks productivity from 1-12, with 1 being the most productive while 12 is the least.

Annex 4.b (conti.)

3. Ngamo Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume above 20cm dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
A	6960	2.62	4.10	1.00	0.05	7.77	54079	61964	8.90	1	87
B	7962	1.50	3.00	0.60	0.03	5.13	40854	49091	6.20	6	83
C	13534	1.22	2.80	1.13	0.24	5.40	73083	83943	6.20	4	87
D	7010	1.36	1.62	0.81	0.05	3.84	26918	33757	4.80	9	80
E	5974	2.20	1.13	1.54	0.03	4.90	29272	35601	6.00	7	82
F	6266	1.64	1.00	1.44	-	4.10	25691	33460	5.40	8	77
G	6445	0.10	0.45	0.27	-	0.82	5285	6154	1.00	11	86
H	4682	1.77	2.62	1.00	0.08	5.50	25751	28630	6.12	3	90
J	4629	2.81	1.69	1.75	0.07	6.32	29255	33610	7.30	2	87
K	4689	2.70	1.78	0.73	0.02	5.23	24524	26712	5.70	5	92
L	6760	1.00	1.94	0.08	-	3.02	20415	23308	3.50	10	88

* Order of blocks productivity from 1-11, with 1 being the most productive while 11 is the least.

Annex 4.b (conti.)

4. Insieze Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume 20cm above dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
A	790	0.54	0.00	0.00		0.54	427	1818	2.30	6	24
B	4978	0.83	0.55	0.13		1.51	7517	13752	2.76	4	55
C	3057	0.72	0.15	0.40		1.27	3882	8060	2.64	5	48
D	1894	0.89	0.16	0.25		1.30	2462	5638	3.00	3	44
E	7927	3.51	0.11	1.20		4.82	38211	55551	7.00	1	69
F	5120	2.00	0.15	1.10		3.25	16641	22881	4.50	2	73

* Order of blocks productivity from 1-6, with 1 being the most productive while 6 is the least.

Annex 4.b (Conti.)

5. Insieze Extension Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume 20cm above dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
1	5889	3.00	0.67	0.41		4.10	24144	34614	5.90	1	70

Annex 4.b (Conti.)

6. Bembesi Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume 20cm above dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
A	7841	0.72	1.10	0.60		2.42	18975	25143	3.20	3	76
B	22210	2.63	1.36	0.33		4.32	95945	145724	6.60	2	66
C	4707	3.60	0.64	0.34		4.58	30770	30770	6.50	1	70

* Order of blocks productivity from 1-3, with 1 being the most productive while 3 is the least.

Annex 4.b (Conti.)

7. Umgusa Forest

Block	Productive area (ha)	Volume above 34.0 cm dbhob (m^3)						Volume 20cm above dbhob (m^3)		Order of block productivity *	Volume above 34.0 cm as % of total above 20.0 cm
		Ba	Gu	Pt	Pt dead	Per ha	Per block	Per block	Per ha		
I	4639	0.73	0.64	0.53		1.90	8814	15569	3.40	4	66
II	4689	1.32	0.11	0.47		1.90	8909	20471	4.40	3	44
III	8252	1.12	1.00	0.31		2.43	20052	35897	4.40	2	56
IV	6457	1.78	1.34	0.07		3.20	20662	31071	4.80	1	67

* Order of blocks productivity from 1-4, with 1 being the most productive while 4 is the least.

Names of Trees		Trees and Wood Characteristics							
Botanical Names	Local Names	Tree Plent-tifull	Domi-anat trees	large Size Trees	Wood With Good Appear-ance	Dur-able	Low Shrinkage Stable Wood	Small Size & short Poles	Hard
1.Baikiae plurijuga	Teak	X	X	X	X				
2.Guibourtia coleosperma	Mchibi	X	X	X	X				
3.Pterocarpus angolensis	Mukwa	X	X	X	X		X		
4.Entandrophragma caudatu	Mahogany				X				
5.Afzelia guanzensis					X				
6.Terminalia sericae	Umsusu							X	
7.Colophospermum mopani	Mopani				X				
8.Brachystegia speciformi	Miombo		X						
9.Julbemardia globiflora	Mondo								X
10.Acacia goetzii	Muvunsa			X					
11.Erithrophlum africanum			X	X	X				
12.Ricinodendron rautamen	Mugung				X				
13.Sclerocarya caffra	Marula								
14.Albizia amara	Muwora	X		X					
15.Bolusanthus speciosus	Mopaka	X				X			
16.Monotes glaber	Munyuny	X							
17.Azanza grackeana				X					
18.Peltophorum africanum	Muzeze								
19.Commiphora sp									
20.Pilostigma sp									
21.Lochocarpus sp									
22.Acacia albida			X	X					
23.Combretum imberbe	Mutsvri								
24.Kirkia acuminata		X			X				X
25.Faurea saligna	Musesetu	X			X			X	
26.Dalbergia melanocylon	Mursviri								
27.Burkea sp									
28.Grewia sp									
29.Ochna sp									

Annex 4.c (conti.)

Names of Trees		End Uses of Indigenous Wood												
Botanical Names	Local Names	S.T for J&O	Rail way slee-pers	MT	Hvy Str. Wrks	Rou-gh farm Wrks	Furn. & Cab. Wrks	Crv. & Curio	Sm. Art. Utns. Mrts	Tools Hand-les	Bld. Pol., ence Post, Catt. Pens	Wood fuel (F&C)	fr-uits edi-able	Leaves brow-sed by Cattle
1.Baikiae plurijuga	Teak	X	X	X	X		X	X	X					
2.Guibourtia coleosperma	Mchibi	X	X	X	X		X	X	X					
3.Pterocarpus angolensis	Mukwa	X	X	X	X		X	X	X					X
4.Entandrophragma caudatu	Mahogany	X												
5.Afzelia guanzensis		X												
6.Terminalia sericae	Umsusu										X	X		X
7.Colophospermum mopani	Mopani				X						X			
8.Brachystegia speciformi	Miombo									X		X		X
9.Julbemardia globiflora	Mondo					X						X		X
10.Acacia goetzii	Muvunsa		X	X	X									
11.Erithrophlum africanum		X												
12.Ricinodendron rautamen	Mugung	X												
13.Sclerocarya caffra	Marula							X	X				X	
14.Albizia amara	Muwora	X					X							
15.Bolusanthus speciosus	Mopaka										X			
16.Monotes glaber	Munyuny						X		X					
17.Azanza grackeana							X			X			X	
18.Peltophorum africanum	Muzeze						X		X					
19.Commiphora sp												X		X
20.Pilostigma sp														X
21.Lochocarpus sp														X
22.Acacia albida														X
23.Combretum imberbe	Mutsvri										X	X		
24.Kirkia acuminata			X				X							
25.Faurea saligna	Musesetu		X											
26.Dalbergia melanocylon	Mursviri							X				X		
27.Burkea sp														
28.Grewia sp														
29.Ochna sp														

Sawn Timber for joinery and other work (S.T for J&O), Mining timber (MT), Heavy Structural Works (Hvy Str. Wrks), Furniture and Cabinet Works (Furn.& Cab. Wrks), Carving and Curio (Crv & Curio), Small Article, Utinsils Mortars (Sm. Art. Utns. Mrts), Building Poles, Fence Posts and Cattle Pens (Bld. Pols. Fence Posts catt. Pens), Woodfuel Firewood and charcoal (Fuelwood F&C)

Annex 4.C (conti.)

Names of the Trees		Distribution according to forest types		
Botanical Names	Local Names	Teak Forests	Miombo Forests	Mopani Forests
1.Baikiae plurijuga	Teak	x		
2.Guibourtia coleosperma	Mchibis	x		
3.Pterocarpus angolensis	Mukwa	x		
4.Entandrophragma caudatum	Mahogany	x		x
5.Afzelia guanzensis		x		
6.Terminalia sericae	Umsusu	x	x	
7.Colophospermum mopani	Mopani			x
8.Brachystegia speciformis	Miombo		x	
9.Julbemardia globiflora	Mondo		x	
10.Acacia goetzii	Muvunsa			x
11.Erithrophlum africanum.		x		
12.Ricinodendron rautamenii	Mugung	x		
13.Sclerocarya caffra	Marula	x		x
14.Albizia amara	Muwora		x	
15.Bolusanthus speciosus	Mopaka		x	
16.Monotes glaber	Munyunya		x	
17.Azanza grackeana				
18.Peltophorum africanum	Muzeze		x	
19.Commiphora sp				
20.Pilostigma sp				x
21.Lochocarpus sp			x	x
22.Acacia albida				x
23.Combretum imberbe	Mutsvri		x	x
24.Kirkia acuminata		x		x
25.Faurea saligna	Musesetu			x
26.Dalbergia melanocylon	Mursviri			x
27.Burkea sp		x		
28.Grewia sp			x	
29.Ochna sp			x	

Annex 4.d:

Summary of Volumes for the 3 main timber species as calculated from the on-going inventory of 7 Demarcted Indigenious Forests in Matabeleland North. Volumes represent all 3 diameter classes at dbhob.

FORESTS	Areas of Forests in ha			Volume of Wood according to species at dbhob									Grand Tatal		
	Total area in ha	Produc-tive area in ha	% of Productive areas %	BAIKAEA PLURIJUGA (Teak)		GUIBOURTIA COLEOSPERMA (Mchibis)		TEROCARPUS ANGOLENSIS (Mukwa)					Volume in M^3	% of Grand Total	Annual allow-ble cut in M^3
								Live Mukwa		Dead Mukwa					
				Volume in M^3	% to Total wood	Volume in M^3	% to Total wood	Volume of live Mukwa in M^3	% of live Mukwa to live wood	V of Dead Muk-wa in M^3	% of Dead wood to all wood	% of Dead wood to live wood			
1.GWAAII	144300	105969	73.7	317655	19.71	117400	7.29	89056	5.52	-	-	-	524111	38.52	6551
2.NGAMO	76856	74915	97.0	152900	9.49	177039	10.98	79406	4.93	6077	-	7.65	415422	25.78	5193
3.SIKUMI	54400	42266	77.7	103978	6.45	67677	4.20	54833	3.40	3861	-	7.04	230349	14.29	2879
4.BEMBESSI	55100	34758	63.1	111742	6.93	72184	4.48	17710	1.10	-	-	-	201636	12.51	2520
5.INSIEZE	35200	23767	67.2	75302	4.67	9130	0.57	23268	1.44	-	-	-	107700	6.68	1346
6.UMGUSA	32200	24037	74.6	50177	3.13	42865	2.66	10075	0.63	-	-	-	103117	6.40	1289
7.INSEZE Ex	8400	5889	71.1	24705	1.53	559	0.03	3861	0.24	-	-	-	29125	1.82	369
TOTALS	406456	311601	76.66	836459	51.91	486854	30.21	278209	17.26	9938	0.62	3.57	1611460	100.00	20142

Conclusions derived from above figures are:

1- % of area inventorized to total area of the demarcted indigenious forests = 406456/885000 =45.92% .
2- Teak is the most dominant spp. constituting 51.91% of the avialable wood, followed by Mchibis with 30.21% and Mukwa with 17.88%.
3- Dead wood appears only in Mukwa trees with a percentage of 3.57% to live Mukwa and 0.62% to all wood.
4- Total volume of the 3 species avi\ailable at 20cm-34cm dbhob and above is equal to 1,611,460 M^3.
5- Annual allowable cut on an 80 years felling cycle will be 1,611,460/80=20142 m^3.
6- If the balance of the area of demarcated indigenious (885,000-406456) of 478544 ha which is not inventorized yet will have similar stocking as the above seven forests, then an addtional volume of wood equal to 54.08/45.92x1,611,460 = 1,897,917 M^3 could be obtained, bringing the total utilizable stock to 3,509,277 M^3 and the annual allowable cut to 43866 M^3.
7- These figurres indicates good potential for establishing sawmills and or veneer plants of moderate sizes.

Annex 4.e National fuelwood supply and demand projected up to year 2002.

S. No	Fuelwood Situation	Wood fuel consumption projected to year 2002 in Ml Tons				
		Y	E	A	R	S
		1982	1987	1992	1997	2002
1.	Remaining stock	645.33	644.13	641.47	636.47	629.25
2.	Yields	7.13	6.81	5.63	4.92	4.67
3.	Total Stock	652.46	650.94	647.10	641.39	633.92
4.	Demand	8.33	9.47	10.63	12.14	13.69
5.	Net stock carried forward	644.13	641.47	636.47	629.25	620.23
6.	Depletion of stock (row 4 - 2)	1.20	2.66	5.00	7.22	9.02
7.	% of depletion	0.186	0.413	0.780	1.134	1.434
8.	Cumulative depletion %	0.186	0.599	1.379	2.513	3.947
9.	Projected population	7.5	8.9	10.0	11.4	13.1
10	Consumption/ capita/ annum in Tons	1.11	1.06	1.06	1.06	1.04

Depletion of IF growing stock by fuelwood consumptions is expected to reach nearly 4% by the year 2002.

* *Sources*: information collected during the field trip and from available literature.

Annex 4.f

1991 Prices of indigenous wood obtained from settlement area and processed in sawmill ($)

Timber speices	Saw logs m^3	Sawn Timber		Woodfuel as sawmill WASTE		
		Sleeper size m^3	Smaller sizes m^3	Ton	m^3 solid	m^3 stacked
Mukwa	120	1300	600	15	21	7.5
Teak and others	90	850	600	15	21	7.5

Notes :* Sawlogs prices are for standing timber.
* Sawn timber and wood fuel prices are at sawmill site.

Annex 4.g:

Wood Supply from various sources 1989/90 as recorded in available literature

Sources of Wood	Stocks in million M^3			Wood Supplies in Million M^3								
	Growing Stock Ml m^3	% to Indig-enous Stock	% to all Stock	Wood Suppli-es Ml m^3	% of indige nous supply to indige nous stock	% of exotic supply to exotic stock	% of Indig enous exotic Suppli es to all stock	% of Total wood suppli-es to all stock	Industr-ial Wood		Fuelwood and Charcoal	
									Supp ly M.Mc	% to all stock	Supp ly M.Mc	% of All stock
1.Demarcated Indigenous forests	3.51	0.55	0.53	-	-	-	-	-	-	-	-	-
2.Other Indigen.forests	632.96	99.45	95.11	8.23	-	-	1.24	-	0.05	0.65	8.30	92.63
3.Total Indigen.forests	636.47	100.00	95.64	8.23	1.29	-	-	91.85	0.05	0.65	8.30	92.63
4.Exotic forests	29.03	-	4.36	0.73	-	2.51	0.11	5.15	0.61	6.81	-	-
5.Total of all forests	665.50	-	100.00	8.96	-	-	1.35	100.00	0.66	7.37	8.30	92.63

1- Total wood exploited from all forests in 1989/90 totalled 8.96 million m^3, of this volume 8.23 m^3 m3 were of indigenous wood, representing 91.85% of all wood exploited and 0.73 million m^3 of exotic wood representing 8.15% of all wood exploited.
2- The demarcated indigenous forests supplied none and all indigenous wood came from other forests.
3- Only 0.66 Ml m^3 of all wood exploited were used as industrial wood, representing 7.37% of all wood used and the balance of wood was used as woodfuel totaling 8.30 Ml m^3 and representing 92.63% of all wood used.
4- Indigenous wood contributed 0.05 Ml m^3 to industrial wood while exotic wood contributed 0.61 mm^3 or almost 92.42% of all industrial wood.
5- Purchased fuel wood (0.61 Ml m^3) represent only 7.23% of total woodfuel.

Annex 4.h

Round Wood Purchased and or transferred by species and type of planting in m^3 1989/90.

Species Used	Saw logs	veneer logs	Mining timber	Treated poles	Fuel wood	Pulp wood	Match wood	Totals	% of Total
Conifers	387771	24877	-	-	-	21381	-	434029	65.05
Eucalyptus	23652	134	4627	39061	4209	58163	-	129846	19.46
Black Wattle	-	-	-	1337	52490	1500	-	55237	8.29
Imported poplar	-	-	-	-	-	-	859	859	0.13
Total Exotic	411423	25011	4627	40398	56699	81044	859	619971	92.93
Indigenous Hard wood	20374	11865	12352	-	2460	-	-	47051	7.07
Grand Total	431797	36876	16979	40398	59159	81044	859	667112	100.00
% of Total	%	%	%	%	%	%	%	%	
Conifers	85.8	67.8	-	-	-	26.4	-	65.05	
Eucalyptus	5.5	0.6	27.3	96.7	7.1	71.8	-	19.96	
Black wattle	-	-	-	3.3	88.7	1.8	-	8.29	
Imported poplar	-	-	-	-	-	100.00	-	0.13	
Indigenous wood	4.7	31.9	72.7	-	4.2	-	-	7.07	
TOTAL %	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	
% According to use	64.72	5.53	2.55	6.06	8.87	12.14	0.13	100	100

Annex 4.i

Details of Indigenous Wood Utilized Commercially all over Zimbabwe covering the main species used.

Major Uses	Round Indigenous Wood Used in 1989/90 in 4 Major uses (m³)											Share of spp. in major uses %			
	Mukwa			Other Species			Teak and Michibis			All species					
	Vol. used (m³)	% OF Total Mukwa	% of Total of all spp.	Vol. used (m³)	% of Total Other spp.	% of Total of all spp.	Vol. used (m³)	% OF Total Teak and Mchibis	% of Total of all spp.	Volume used (m³)	% of all spp.	Mukwa %	Other Spp. %	Teak and Mchibis %	All Spp. %
1. Swan logs	13000	55.11	28.18	1160	6.79	2.52	5304	97.23	11.49	19464	42.19	66.79	5.96	27.25	100.0
2. Mining Timber	-	-	-	12352	72.28	26.78	-	-	-	12352	26.78	-	100.0	-	100.0
3. Veneer longs	10588	44.89	22.95	1126	6.59	2.44	151	2.77	0.34	11865	25.72	89.24	9.49	1.27	100.0
4. Fuel Wood	-	-	-	2450	14.34	5.30	-	-	-	2450	5.31	-	100.00	-	100.0
Total	23588	100.0	51.13	17088	100.0	37.04	5455	100.00	11.93	46131	100.00				

i. Sawlogs constitute 42.19% of the total round wood obtained from indigenous forests and 66.79% of the total sawlog are Mukwa, 5.96% are of (other Species) and 27.25% of Teak & Mchibis (Mukwa, Teak& Mchibis constituted together 94.04% of saw logs (other species of Albizzia, Monotes, Peterocarpus, Kirkea, Ricinodendron, Afzelia, Entandrophrgma).

2. Mining Timber constitute 26.78% of the total round wood obtained from indigenous forests and all mining wood is obtained from other species (Acacia goetzii, Brachystegia, Coleosperma) Terminlalia.

3. Veneer logs constitute 25.72% of the total round wood obtained from indigenous forests and 89.24% of total veneer logs are obtained from Mukwa, 9.44% from other species (Entandophorgma sp, Afzelia, Terminalia Brachystegia, Erithrophlum, Kirkea, Albizzia, Gulbernardia, Colophsperma, Riciniodendron).

4. Fuelwood constitute 5.31% of the total round wood obtained from indigenous forests (all fuelwood obtained from other species Brachystegia, Combretum imberbe, Acacia, Mopani etc.).

Annex 4. j

Estimated numbers of wild animal species found in the indigenous forests in Zimbabwe *

Species	Number of animals	Density
Elephant	0800	0.020
Black Rhino	0056	
White Rhino	0040	
Zebra	0800	0.100
Hippo	0100	
Bushpig	0400	0.050
Warthog	1600	0.200
Giraffe	0400	0.050
Buffalo	1600	
Nyala	0	
Bush buck	0800	0.050
Kudu	2400	0.200
Eland	1600	0.100
Duiker	4000	0.500
Reed buck	0160	0.020
Water buck	1200	0.050
Sable	0800	0.100
Roan	0080	
Ory	0016	
Wildebeest	0400	0.100
L.Harte beest	0	
R.Harte beest	0016	
Tsessibe	0240	0.020
Impala	2400	1.00
Klipspinger	0400	0.020
Steen bok	2400	0.40
Grysbok	800	0.200
Lion	160	
Leopard	400	0.050
Wild cat	240	0.030
Carcal	040	0.005
Serval	080	0.010
Cheetah	080	0.020
Genet	400	0.050
Civet	160	0.020
Hyena	160	0.020
Jackal	400	0.050
Wild dog	016	
Bat-eared Fox	080	
Porcupine	400	0.050
Baboon	4000	0.500
Crocodile	200	
Ostrich	24	0.020

* Adopted from DNPWM estimates of wildlife populations in Zimbabwe. Unpublished document DNPWM Harare.

Annex 4.k Wild animals quota for the different forest areas in the DSIF in Zimbabwe

Area P.T.O	Irsete Ext. Forest	Gwaai Sembesi Forest	Tjolotjo CA	Umkom-bo Farm	Gwaai river hotel	Chimwa-ra	Wezla	Fuller				Panda Masule	Kavira		Sijarira		Total actual
Baboon	–	–	U/L	25	10	–	–	8	–	–	U/L	10	1	1	U/L	U/L	U/L
Buffalo T	–	U/L	12	10(?)	–	–	–	3	4	7	4	4	1	1	4	7	33
Buffalo NT	–	U/L	–	15(?)	–	–	–	–	–	–	–	4	–	–	–	–	
Bushbuck	–	–	–	–	4	1	–	–	–	1	–	–	3	3	2	4	15
Bushpig	4	6	12	3	4	–	–	3	4	–	2	8	2	2	1	2	38
Crocodile	–	–	–	–	1	–	–	–	–	–	–	–	1	1	1	2	5
Duiker T	8	10	24	5	10	–	–	6	3	10	8	6	3	3	2	4	84
Duiker NT	2	10	30	–	–	–	–	3	–	–	–	6	6	6	3	5	58
Eland	4	15	12	1	–	–	–	–	–	1	–	2	–	–	–	–	30
Elephant	–	–	10	10	–	–	–	–	–	3	2?	4T/2F	–	–	6	–	24T2F
Giraffe	–	–	2	1	–	–	–	–	–	–	–	–	–	–	–	–	3
Grybok	–	–	–	–	–	–	–	2	2	2	2	–	3	3	4	8	13
Hippo	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	1	2
Hyaena	–	U/L	U/L	1	–	–	–	–	–	–	U/L	8	1	1	U/L	U/L	U/L
Impala T	–	4	2	5	8	3	–	–	1	–	–	–	–	–	3	7	34
Impala NT	–	–	–	3	4	–	–	–	–	–	–	–	–	–	5	10	17
Jackal	2	5	10	2	5	–	–	–	–	–	–	5	–	–	–	–	27
Klipspringer	–	–	–	–	–	–	–	2	–	–	1	–	4	3	1	5	9
Kudu	4	6	6	2	5	1	–	3	4	6	2	5	1	1	3	5	46
Leopard	1	3	7	2	1	–	–	1	2	2	1	4	1	1	2	3	22
Lion	–	–	3	1	–	–	–	–	3	2	1	4	–	–	1	2	11
Peecbuck	4	3	7	–	–	–	–	–	–	1	–	–	–	–	–	–	10
Sable T	3	10	18	–	–	–	3	4	4	2	2	4	–	–	–	–	34
Sable NT	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Steenbuck	4	5	10	3	–	–	–	–	–	–	–	–	–	–	–	–	18
Tsesebbe	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
Warthog T	4	6	12	3	5	3	–	2	5	6	2	6	–	–	–	–	45
Warthog NT	–	3	4	–	–	–	–	3	2	–	3	4	–	–	–	–	13
Waterbuck	–	1	2	–	3	1		3	4	6	4	5	–	–	–	–	18
Wildebeest	–	3	7	2	–	–	–	–	–	–	–	–	–	–	–	–	12

Annex 4.1

Staffing levels available facilities and fire incidence during 1990/91 in some of the DSIF under study.

Forest	Area ha	Tenant	squatters	Tech. Staff	Hous -ing	Permen- ant labour- ers	Hous -ing	Casual labour -ers	Vehi- cles	Tract- ors	Fire incid -ents
Umgusa	32200	73	-	1 (*)	1	12	12	8	1	1	None
Insieze & Ext.	4360	78	-								None
Umzibani	2471	-	-	-							-
Gwaai	144320	-	-	1 (*)	1	16	16	7	1	1	23
Bembesi	55100	-	-	1 (*)	1	10	-	7	1	1	14
Gwampa	47000	111	45	1 (*)	1	10	10	7	1	1	one
Lake Alice	39000	-	-	-	-	-	-	-	-	-	-
Chesa	14250	2	50	1(**)	1	6	6	0	1	1	

(*) holder of Certificate in forestry.
(**) holder of Diploma in forestry.

Annex 4.m Distribution ofIRD Manpower by Employees Function, Educational Qualifications or Occupational Cadre

CADRE / Employees Functions	Professional Post Graduate	Technical Diploma/ Certificate	Vocational Technical Certificate	Vocational Clerk, Accountant &Personnel	Forest Protection Unit	Safari works	Specialized Labourer	Total
Manager IRD	1	-	-	1	-	-	3	5
Wildlife Ecologist	■	-	-	-	-	-	-	-
Area Manager S	-	9	-	-	-	-	119	128
Area Manager N	-	4	-	-	-	-	41	45
Coordinator Safaris	-	1	6	2	-	43	-	52
Divisional Accountant	1	■	-	4	-	-	-	5
Personnel & Adminstrative Officer	1	-	-	2	-	-	3	6
Protection Officer	-	1	-	-	41	-	-	42
Projects Officer	-	1	-	-	-	-	-	1
Maintenanc Supervisor	-	1	-	-	-	-	-	1
Workshop Foreman	-	1	2	-	-	-	6	9
Total	3	18	8	9	41	43	172	294

Source:Personnel & Adminstrative officer - Bulawayo Dec.1991.

Annex 4.n

The Existing Ratio of DSIF area per one forest worker by forest.

Forest	Area of Forest in ha	No of Forest Workers	Forest area per Forest worker in ha
1.Gwaai	144300	23	6274
2.Bembesi	55100	17	3241
3.Chesa	14248	6	2375
4.Gwampa	47200	17	2764
5.Umgusa	23200	20	1610
6.Sikumi	55100	18	3022
7.Ngamo	102900	18	5217
8.Sijarira	25600	16	1600
9.Mzola	67000	5	13440
10.Fuller	24700	14	1521
11.Kazuma	59500	6	9917
12.Other Forests	268330	55	4879
Forest Protection Unit	885000	41	21600
Average area per worker	885000	256	3457

Annex 4.o

Forestry Commission
Government Activities
Actual balance sheet (1989-1991)
($ 1000)

Assets	1989	1990	1991
Current Assets			
Cash	289	432	1361
Debtors	444	616	744
Stocks and Stores	360	658	900
Amounts owing by other divisions	25	939	-
Short-term investment	3600	3800	9677
Sub total	4718	6355	12682
Fixed Assets			
Capital WIP	665	1150	1880
Office F.and Eq	148	418	409
Vehicles and Equipment	270	218	418
Plant and Machinery	129	110	97
Roads and Communication	216	226	228
Housing	1385	1339	1355
Land and Buildings	1207	1188	1466
Sub-total	4020	4659	5853
Total Assets	8738	11014	18535
Liabilities and Capital			
Current Liabilities			
Creditors	1177	1296	1849
Amounts owing to other divisions	3382	357	1860
Sub total	4559	1653	3709
Capital			
Grants (GOZ)	3810	8925	13966
Others	369	436	860
Sub-total	4179	9361	14826
Total Liabilities and capital	8738	11014	18535

Annex 4.p

Forestry Commission
Government Activities
Actual Income and Expenditure Account
(1989-1991)
($1000)

		1989	1990	1991
Indigenous Forestry:	Income	458	522	1347
	Expenditure	(1248)	(1216)	(2615)
	Net	(790)	(694)	(1268)
Research:	Income	517	505	588
	Exp.	(1783)	(1854)	(2351)
	Net	(1266)	(1349)	(1763)
Training:	Income	133	195	417
	Exp.	(1259)	(915)	(1045)
	Net	(1126)	(721)	(628)
Communal lands:	Income	5	154	201
	Exp.	(49)	(94)	127
	Net	(44)	60	74
Wildlife safaris	Income	654	356	-
	Exp.	(527)	(632)	-
	Net	127	(276)	
Nurseries	Income	769	821	1290
	Exp.	(688)	(783)	1112
	Net	81	37	178
Head office O.H.	Income	331	1138	719
	Exp.	(1028)	(1222)	(1748)
	Net	(697)	(84)	(1029)
Total Net Expenditure		3,713	3,027	4,436

Source: FC. Annual Reports 1989/90/91

Annex 4.q

Forestry Commission
Government Activities
Indigenous Resources Division
Actual Balance Sheets for the period
1988-1991
(in $)

	1991	1990	1989	1988
Amount owed by Head Office and other Divisions.				
less: excess of expenditure over revenue	2043938 (1213450)	1718627 (1078945)	1595043 (872865)	883282 (769754)
	830488	639682	722178	113528
Represented by:				
Fixed Assets	2858255	2027385	1914672	1602102
Less accumulated Depreciation	(1386120)	996250	905095	675088
	1472105	1031135	1009577	927014
Current assets				
cash on hand	8131	8717	3033	6456
cash at bank	124048	64611	25283	46330
general stores	63180	191473	42963	-
workshop stores	59820	-	-	-
stock of timber and plant	288281	30209	6445	-
stocks fuel, oil and lubricant	106986 32729	47876 30113	51199 29068	29144 26490
current assets bank				
sundry deposit	(170)	-	-	-
staff debtors	1750	-	123	20064
	(961)	-	-	-
Less creditors and other provision	683794 (1266301)	372999 (797774)	158114 (423458)	128484 (44170)
Stock adjustment	(582507) (59110)	(394775) 3322	(265344) 22055	813480 -
	(641617)	391453	287399	813486
Total	830488	639682	722178	113528

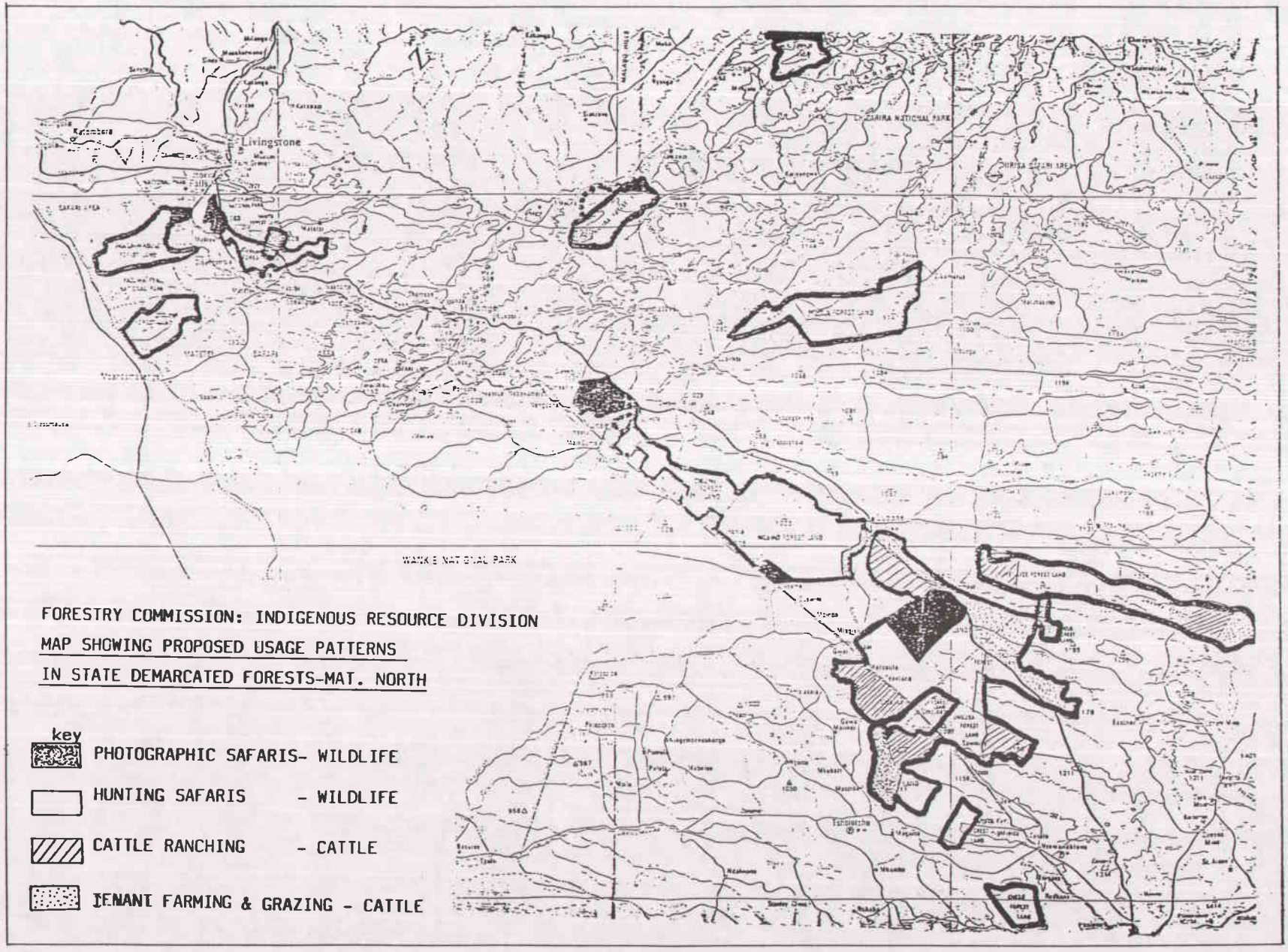
Annex 5.a

ZIMBABWE FORESTRY COMMISSION: INDIGENOUS RESOURCES DIVISION PROPOSAL FOR SUSTAINABLE UTILIZATION OF INDIGENOUS FORESTS

DRC	Forest	Area (ha)	HS	PhS	Ca Ra Gr	LGS	EC	FF	OF	CF	Bk &H	S&T	Cm	TF	T&Fu	WC	P	FW	LG	O
BINGA	KAVIRA	28200	/	/	/			/		/			/	/					/	
"	SIJAR.	25600	/	/				/		/										
TSHOL. BUBI	BEMB-ESI	55100	/		/							/		/	/					/
HWANGE	FULLER	23300	/	/	/											/				
"	KAZUMA PANDA MASUI	59500	/			/	/									/				
BINGA	MZOLA	67200	/	/		/	/							/	/				/	/
HWANGE	SIKUMI	54400	/	/			/				/	/					/			
LUPANE	NGAMO	102900	/	/	/	/	/							/						
"	GWAYI	144300	/	/	/	/			/		/			/	/		/		/	
TSHOL.	UMGUSA	32200	/		/							/		/	/				/	/
TSHOL.	INSEZE	43600	/		/	/						/		/	/				/	/
TSHOL.	CHESA	14250	/						/		/	/				/	/			/
LUPANE	L Alic	39000	/		/							/		/	/		/		/	
MAKAYI	GWAMPA MOLO NYAMA NOLOVA	47000	/		/							/		/	/		/		/	
GAKWE	MAFUN-GABUSI	82100												/					/	

(Hunting Safari (HS), Photographic Safari (PHS), Cattle Ranching and Grazing (Ca Ra & Gr) Live game selling (LGS), Elephant Culling (EC) Fish Farming (FF), Ostrich farming (OF), Crocodile (CF), Bee keep and honey (BK&H), Skin Factory and tannery (S&T), Camping (Cm), Tenant farming (TF), Timber and furniture (TF), Wood curving (WC), Poles (P), Firewood (FW), Lease Grazing (LG), Others (O)

Annex 5.a (conti.)



Annex 5.b

Areas designated for hunting, photographic safari, ranching and lease grazing in DSIF.

Forest	Total (ha)	Hunting (ha)	Photographic (ha)	Ranching (ha)	Grazing Leases (ha)
1- Sijarira	25600	14000	11600	-	-
2- Kavira	28203	22600	-	-	5600
3- Fuller	24700	17000	4000	-	2300
4- Panda Masuie	57500	57500	-	-	-
5- Mzola	69900	50000	-	-	17200
6- Sikumi	55100	25000	23000 & 6500	-	-
7- Ngamo	102900	94000	5000	-	3900
8- Lake Alice and Gwampa	86000	49000	-	32000	5000
9- Gwaai	144300	43000	20000	30000	50000
10- Mbembesi	55100	18000	-	-	37000
11- Umgusa	32200	13200	-	13000	6000
12- Insieze	35200	14000	-	13000	8000
13- Chesa and Insieze-Extension	22648	22000	-	-	-
Total	735550	439300	63600	88000	135000

Annex 5.c

Consumptive safari profitability analysis

i) Revenue generation is expected to grow as estimated by the corporate plan up to year (5) and from there on assumed to remain constant. 1992 prices for hunting days and trophy fees were used to calculate revenue. Revenue generation is assumed to be the same for both scenarios (A and B).

ii) Expenditure and recurrent costs are different for different scenarios. The same line items presented in the project documents are assumed valid, based on the data supplied by the wildlife ecologists of the IRD. These figures were then subjected to changes as follows:

Scenario (A):

- The 1990/91 ecologist data given in local currency were assumed to split into 50/50 local/foreign currency components using 1990/91 exchange rate of 0.4.
- An exchange rate of 0.2 is now used for the analysis.
- An annual 10% increase in recurrent cost is assumed for local currency expenditures only over the investment plan after year (5).

Scenario (B):

- All recurrent cost data of 90/91 assumed to be in foreign currency using the 0.4 exchange rate of 1990/91.
- Recurrent costs assumed to remain constant after year (5).

iii) Investment costs as appeared in the project paper are used in US $ using a 0.4 exchange rate during 1990/91.

iv) All the figures in the analysis are in US $.

v) Net present value calculations were based on 10.75%, the current government lending rates.

Annex 5.c (Conti.)

Consumptive Safari Scenario (B)
All In (000) US$

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue	722	843	1058	1282	1330	1330	1330	1330	1330	1330
Expenditure	549	594	686	828	911	957	1005	1055	1108	1153
Net profit	173	249	352	454	419	379	325	275	222	187
Investment	754	344	369	101	335	0	0	0	0	0
Net cash flow	-581	-95	-17	353	84	373	325	275	222	187
Depreciation	27	27	27	27	27	27	27	27	27	27
Net cash Inflow	-535	-48	29	399	130	419	371	321	268	213
Net cash flow Discounted at 0.1075	575.6387									
NPW (0.0)	0.558000									
IRR	0.197									

Annex 5.c (Conti)

Consumptive Safari Scenario (A)
All In (000) US$

Item /Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue US$	722	843	1038	1282	1330	1330	1330	1330	1330	1330
Expenditure	354	445	514	621	683	751	827	909	1000	1100
N.profit	328	397	524	661	647	579	503	421	330	230
Investments	754	344	369	101	335	0	0	0	0	0
Net cash flow	-226	53	155	560	312	579	503	421	330	230
Depreciation	27	27	27	27	27	27	27	27	27	27
Net cash Inflows	-399	80	182	587	339	606	530	448	357	257
Net cash Flow Discounted at 0.1075	1453.251									
IRR	0.64									
NPV	0.26434									

Annex 5.d

Non-Consumptive safari profitability analysis

i) Revenue generation was calculated using the assumptions made by the IRD as follows:

- International clients will pay US $ 150 per night while local clients will pay $ 200 per night.
- 20% of clients are local and 79% international and 1% free agents.
- Occupancy rate will be Yr 1 30%, Yr 2 40%, Yr 3 60% for each camp.
- Revenue will remain constant after year 5.
- A 0.2 exchange rate is used.

ii) Recurrent Costs: are based on the FC estimates in the project paper and allowed an annual 15% increase after year (5).

iii) A 0.2 exchange rate is used.

iv) Discount rate of 10.75% is used for Net Present Value (NPV) calculation.

Annex 5.d (Conti.)

Non-consumptive Safari
all in (000) US$

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue	41	450	886	1229	1377	1377	1377	1377	1377	1377
Expenditure	89	262	425	481	501	576	663	762	877	1008
Net profit	- 48	188	481	748	976	801	714	615	500	369
Investment	447	576	42	0	0	0	0	0	0	0
Net cash flow	-485	-388	419	748	876	801	714	615	500	369
Depreciation	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3	33.3
Net cash Inflow	461.7	-354.7	452.3	781.3	909.3	834.3	747.3	548.3	589.3	402.3
Net cash flow Discoun-ted at 0.1075	2153.866									
IRR	0.582									
NPV(0.0)	0.441767									

Annex 5.e

Ostrich farming profitability analysis

i) Revenue calculations were based on the data presented on the project document and current prices for ostrich skins, meat, feathers and live birds as the major products. The revenues are expected to be generated from year (2) and gradually increase to reach its maximum in year (5) when design capacity for the farm is reached. From year (5) revenues were assumed to remain constant.

ii) Recurrent costs as estimated by the FC project paper were used as basis for analysis. From year (5) an annual 10% increase in recurrent costs is built into the calculations.

iii) Investment costs as in the project paper is estimated as adding a capital cost for the first 40 live birds needed for initiating the farm at the current price of 3000 per pair .

Annex 5.e (Conti.)

Ostrich Farming
all in (000) Z$

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue	0	180	162	228	353	353	353	353	353	535
Expenditure	118	153	161	167	180	198	218	240	264	290
Net Profit	-118	27	1	61	173	155	153	113	89	63
Investment	155	20	0	0	0	0	0	0	0	0
Net cash flow	-271	7	1	61	173	155	153	113	89	63
Depreciation	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
Net cash Inflows	-252.5	25.5	19.5	79.5	191.5	173.5	153.5	131.5	107.5	81.5
Net cash inflow Discounted at 0.1075	274,4098									
IRR	0.303									
NPV(0.0)	-0.32970									

Annex 5.f

Crocodile farming profitability analysis

i) Revenue calculation was based on the following assumptions:

- Production of 225 skins of 40 cm belly width annually from 10 captive adults as appeared in the FC project paper.
- Production classes for skin produced distributed as follows:

Classes	Percentage	No. of Skins
Class I	60%	135
Class II	20%	45
Class III	10%	22.5
Class IV	10%	22.5

- 1991 international prices for skin/cm are used US $ 5 class I, US $ 4 for class II, US $ 3.5 for class III and US $ 2.5 for class IV.
- An exchange rate of 0.2 is used (US $ = 285).
- Revenue assumed to remain constant over the 10 year duration of the project.

ii) Data for recurrent costs in the project paper were used with the following modifications:

- Corrected for 1991/92 by a 10% increase to form year (1) of project.
- An annual increase of 10% over the project life.

iii) Investment costs as appeared in the project paper were used in addition to a capital cost element for the 10 captured adults which forms the basis for the breeding programme. The value of the captive adults is estimated using Ngamo 1992 trophy fees for crocodile (US $ 3500).

Annex 5.f (Conti.)

Crocodile Farming
All in (000) US$

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue	198	198	198	198	198	198	198	198	198	198
Expendi-ture	69	75	83	92	101	111	122	134	148	163
Net profit	129	122	115	105	97	87	76	64	50	35
Invest-ment	372	0	0	0	0	0	0	0	0	0
Net cash flow	-243	122	115	106	97	87	76	64	50	35
Deprecia-tion	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Net cash inflows	-231.5	133.5	126.5	117.5	108.5	98.5	87.5	75.5	61.5	46.5
Discount-ed cash flow at 0.1075	306.9945									
IRR	0.5									
NPV(0.0)	-0.89991									

Annex 5.g
Sawmilling profitability analysis

i) Revenue calculations were based on the following assumptions:
- Sawmilling capacity as proposed to be limited to 2700 m3.
- All production is sold at rather low prices existing now for sawn-timber from communal areas at $ 750 per cubic meter. High quality timber can fetch twice this price.
- No revenue generation is built into the calculation for other side products namely off-cuts. Present estimates for existing capacity estimates an annual production of 600 m3 of off-cuts providing a revenue of $ 6000 at current prices.
- Revenue generation will increase as saw milling capacity is gradually reached in year (3). Then an annual 10% increase in prices is assumed.

ii) Recurrent costs used are based on the same estimates that appeared in the FC project paper with the following modifications:
- Wood raw material cost is now built into the calculation based on existing concessions from communal areas. Prices quoted are $ 120 for Mukwa and $ 90 for other species per cubic meter. On the basis of inventoried forests the production of combination of 20180% of Mukwa versus other species is assumed.
- An annual 15% increase for recurrent cost is assumed.

iii) Investment cost is assumed to be the same as appeared in the project paper.

iv) All calculations were made in $.

v) A 10.7% discount rate is used for the calculation of Net Present Value (NPV).

iv) Net Present Value for three scenarios for selling timber standing at different prices to compare with saw milling decision is made. Prices used are as follows:
- For scenario (A) current prices for Mukwa ($ 120) and other species ($ 90) are used.
- For scenario (B) an annual increase in prices of 20% is assumed.
- For scenario (C) higher prices by 40% were initially used.

Annex 5.g (Conti.)

Sawn Timber Production
All in (000) ₹ $

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue	1013	1500	2025	2228	2450	2695	2965	3251	3587	3945
Expenditure	557	670	828	951	1034	1258	1445	1653	1913	2200
Net profit	456	850	1197	1277	1356	1437	1519	1598	1674	1746
Investment	2255	1230	480	355	0	0	0	0	0	0
Net cash flow	-1799	-400	707	922	1306	1437	1519	1588	1674	1745
Depreciation	175	175	175	175	175	175	175	175	175	175
Net cash inflows	-1624	-225	882	1097	1481	1612	1694	1773	1849	1921
Discounted cashflow at 0.1075	4532.580									
IRR	0.365052									
NPV(0.0)										

Annex 5.g (Conti.)

Selling timber standing option
All in (000) Z$

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Net cash flow Scenario (A)	512	522	522	522	522	522	522	522	522	522
Discounted at 0.1075	3106.673 ≈ NPV									
Net cash flow Scenario (B)	626	751	901	1082	1298	1558	1870	2244	2592	3231
Discounted at 0.1075	8327.634									
Net cash flow Scenario (C)	730	730	730	730	730	730	730	730	730	730
Discounted at 0.1075	4344.581									

Annex 5.h

Cattle Ranching Project Proposal

1. Background

Human and livestock population densities in most DSIF areas are low, and their vast grazing resources are under utilized. Agro ecological conditions and forest management requirements indicate that some of these forests are best suited for intensive cattle production, and have a great scope and potential for sustainable, profitable and efficient beef cattle production from their veld.

Current demand for beef in Zimbabwe is high, and exceeds supply and is growing. Good rail and road communications in the proposed project area are advantageous for its development.

2. Rationale and Justification

The project objectives and the rationale justifying its development, include:-

(a) Sustainable utilization of the under utilized forest grazing resources, together with reduction of forest fire hazards.

(b) Augmenting national beef production to reduce the current beef demand/supply gap.

(c) Generating a badly needed revenue for the FC to undertake its forest protection and environment conservation duties. It is estimated that the project will provide a net profit of $ 1.8 mil. annually from the 4th year of its inception.

3. General description:

The proposed project which is to be owned, implemented and managed by the FC involves:

(a) The planning and development of 4 cattle ranches on a total area of 88000 Ha to accommodate 3200 breeding cattle and their followers all year around.

(b) fencing 88 paddocks, drilling and equipping 18 bore holes and building 4 dip tanks.

(c) Sourcing a breeding stock of 3076 cows and 124 bulls by the second year of the project.

4. **Area(s):**

Location and size of the proposed 4 cattle ranches are as follows :

Gwaai	30000 ha
Gwampa	32000 ha
Umgusa	13000 ha
Inseze	13000 ha
Total	88000 ha

The above named forests are chosen on the following basis:

(a) Availability of land and ground water.

(b) Agro-ecological suitability for cattle ranching and husbandry

(c) Proximity to basic infrastructure such as markets rail and road communication.

5. **Detailed features:**

(a) **Paddocking** : Each ranch area will be divided radially by fences into 1000 ha paddocks.

The number of paddocks within the ranches would be as follows:

Gwaai	30 paddocks
Gwampa	32 "
Umgusa	13 "
Insize	13 "

(b) **Water points:** Assuming a maximum walking distance of cattle to a water point of 3.9 Km., one water borehole would be needed for every 4780 ha, giving a total requirement of 18 water holes, these are to distributed as follows:

Gwaai	6 water points
Gwamp	6 "
umgusa	3 "
Insieze	3 "

(c) **Dip Tanks:** One dip tank can service up to 2000 heads of cattle.

However, considering locations sizes of the proposed ranches, 4 dips will be constructed instead of 3.

(d) **Breeding Stock:** 3076 healthy incalf heifers and 124 breeding bulls of the Brahmen or Africander breed could be purchased from local cattle breeders in CA and CF through CSC cattle finance scheme. Brahmen and Africander breeds are preferred because they yield a better carcass grade than others.

The distribution of the purchased cattle on the proposed ranches would be as follows :

Gwaai	1049 cows and	42 bulls
Gwampa	1119 cows and	46 "
Umgusa	454 cows and	18 "
Insieze	454 cows and	18 "
Total	3076	124

Under Metabeleland conditions cattle are physically mature at the age of 2 to 3.5 years. With proper management, each cow can produce a calf every year for 5 years.

(e) **Grazing System and LCC:** Short duration grazing system (SDGS) would be applied and is the main reason behind the elaborate and extensive paddocking. A blanket LCC value of 24 ha per 1 LU (14 ha/head of cattle) would also be applied on the proposed ranches.

This would allow the accommodation of 3667 LU (6110 heads of cattle) on the proposed ranches, for all year round grazing.

(f) **Veld Utilization and Management :** because grass is particularly sensitive to grazing during the growing season it is imperative that strict weekly rotation is maintained on the ranches between late October and end of april. Once grass growth has ceased the purpose of rotation falls away.

Cattle can be allowed to graze a paddock continuously during winter as long as it is not over utilized and the stocking density is not too high. Stocking density is a major factor in veld utilization.

Excessive stocking density tends to result in loss of grazing through trampling, a change in grazing quality through selective removal of desirable species and enhanced of erosion by damage to the grass cover.

Recommended maximum stocking rate on the proposed ranches should not exceed 4 ha/LU for any length of time.

(g) **Disease Control:** Regular vaccination against diseases endemic in the area is a must. Segregation and isolation (quarantine) of suspected sick animals is essential.

Cattle dipping is to be undertaken on weekly and biweekly basis during wet and dry seasons, respectively.

(h) **Production Level :** the project aims at an annual weaning percentage of 70% and hence from year 4 releases about 2000 weaner calves for sale per annum.

6. Physical Inputs :

Items to be provided are :

(a) Cattle : 3200 heads (3076 incalf heifers and 124 bulls)
(b) Fence (Km) : 800
(c) Waterpoints : 18
(d) Dip Tank : 4
(e) Land cruiser : 1
(f) Worker house : 15
(g) Tractor and Trailer : 2
(h) Motor Cycle : 4
(i) Spraying hose : 1
(k) Chemicals and Salts

Capital Investment

The Project's Annual Capital Investment Programme over its 5 years Duration

Item	Expenditure in $ in each of the projects 5 development years					
	1	2	3	4	5	Total
Cattle purchase (heads)	1600	1600	-			3200
Paddock fence (Km)	200	200	-	200	200	
Waterpoints (bore hole)	5	5	3	3	2	
Dip tanic (unit)	1	1	1	-	1	
Land Cruiser	1	-	-	-	-	
Worker house (unit)	5	5	-	5	-	
Tractor & Trailer (unit)	1	-	1		-	
Motor Cycle (unit)	1	1	1	1	-	
Slaughter	-	-	-	1	-	

8. **Yield and Benefits :**

i. Production of 60,000 weaner calves for slaughter during the estimated 29 years period of the project.

ii. sustainable utilization of under- utilized forest grazing and reducing the risk of forest fires.

iii. Revenue generation enabling FC to undertake its forest protection and environment conservation duties. This is estimated at a net annual profit of $ 1.8 mil. as of year 4 of the project.

9. **Marketing and Prices:**

The beef market is far from saturation. However, it is consolidated, heavily monitored and subjected to strict price control by the government.

Major buyers of live cattle include CSC, private abattoirs and private feed lot operators. Distribution of beef meat include CSC, butcheries and supermarkets.

Hides and skin are bought and distributed by tanneries and leather and shoe manufacturers.

10. **Organization and Management :**

IRD/FC staff to be responsible for the different project components are as follows :-

(i) Production/Planning : Under cattle specialists and section officers.

(ii) Training and Staffing : Under the IRD personnel department

(iii) Marketing : IRD marketing unit

(iv) Sourcing : IRD purchase unit

(v) Financing : IRD finance unit through internal and external search

(vi) Research and Development: Agritex, CSC and Veterinary Service Department.

The new structure for IRD may accommodate a livestock section with area managers and section officers.

Research:

Research required includes:

(i) Identification of a sustainable forest grazing system for the utilization of the forest grazing resources.

(ii) Assessment of cattle grazing impact on the forest and its regeneration and soil erosion.

Annex 5.i

Cattle Ranching Investment Profitability Analysis

i) Revenue generation was based on estimated productivity as in the FC project paper starting at Year 4 and remaining constant over the rest of the project life.

ii) Recurrent costs quoted by the FC estimates were also used and an annual 10% increase was built into the calculation. An additional 5% contingency is assumed.

iii) Investment costs as estimated by the FC project paper was used with the following additions.
   a) Cattle herding facilities
   b) PVC pumping at water points.

iv) A 10.75% discount rate was used for Net Present Value calculations.

Annex 5.i (Conti)

Cattle Ranching Investment
All in (000) $

Subject	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Revenue	0	0	0	1935	1935	1935	1935	1935	1935	1935
Expenditure	51	101	92	128	147	169	195	224	257	295
Net profit	-51	-101	-92	1807	1788	1788	1740	1711	1678	1639
Investment	1290	1055	260	270	275	0	0	0	0	0
Net cash flow	-1341	-1156	-352	1537	1513	1766	1740	1711	1678	1539
Depreciation	0	0	0	0	0	0	0	0	0	0
Net cash inflow	-1341	-1156	-352	1537	1513	1766	1740	1711	1678	1639
Net cash inflows Discounted at	0.1075			3341.506						
IRR	0.3295									
NPV(0,0)	0.109422									

Annex 6.a

Proposed IRD Organization

Chart A : Organization of IRD - overall setup

Chart B : Organisation for Forest Management Inventory and Utilization

Chart C : Organization for Tourism

Chart D : Organisation for Wildlife and Range management

Key

_____ Existing posts (all filled except the Wildlife Ecologist and the Assistant Accountant)

---- New proposed posts. (Gradual filling after verification)

Chart A : Organization of IRD - overall setup

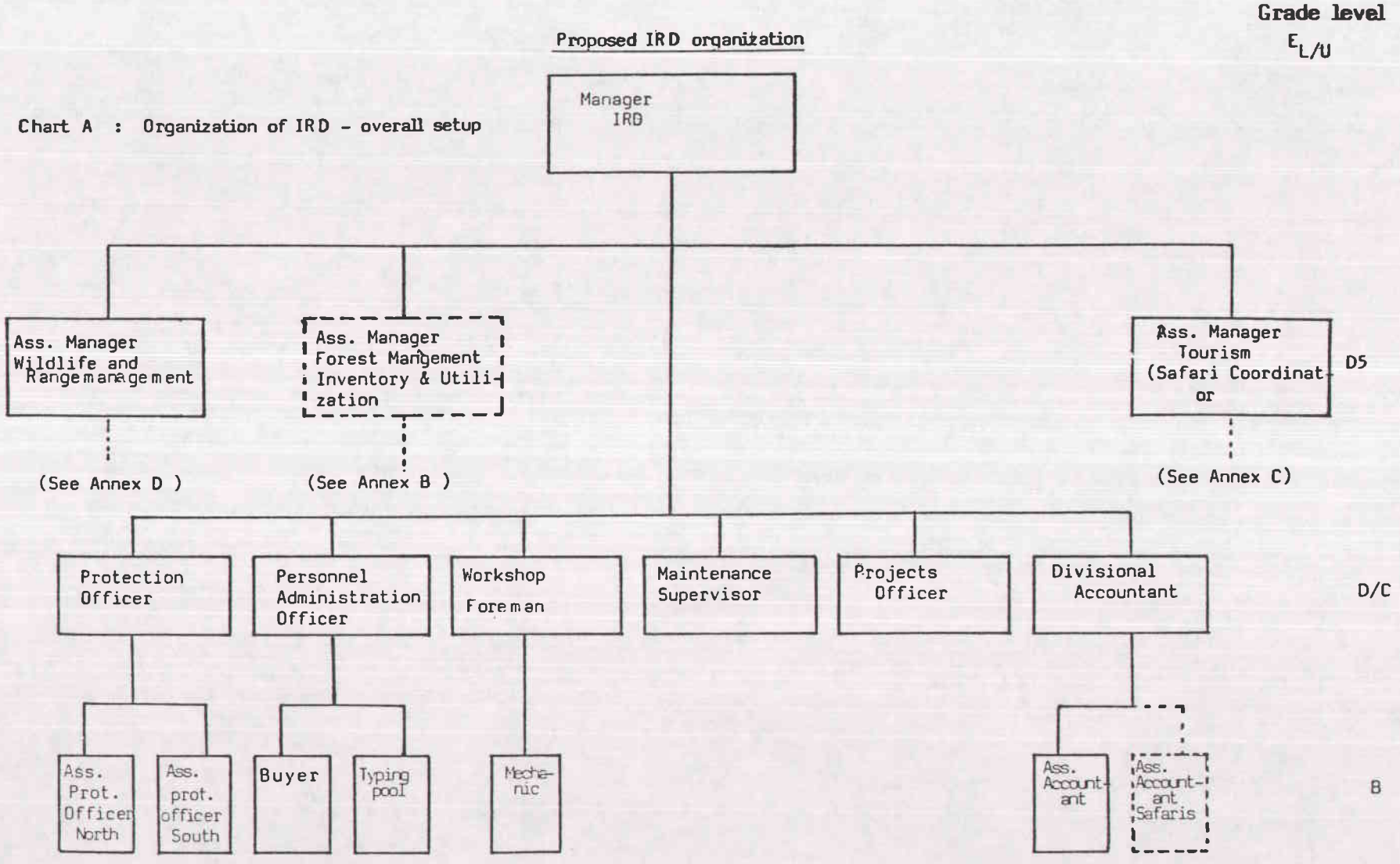


Chart B : Organisation for Forest Management Inventory and Utilization

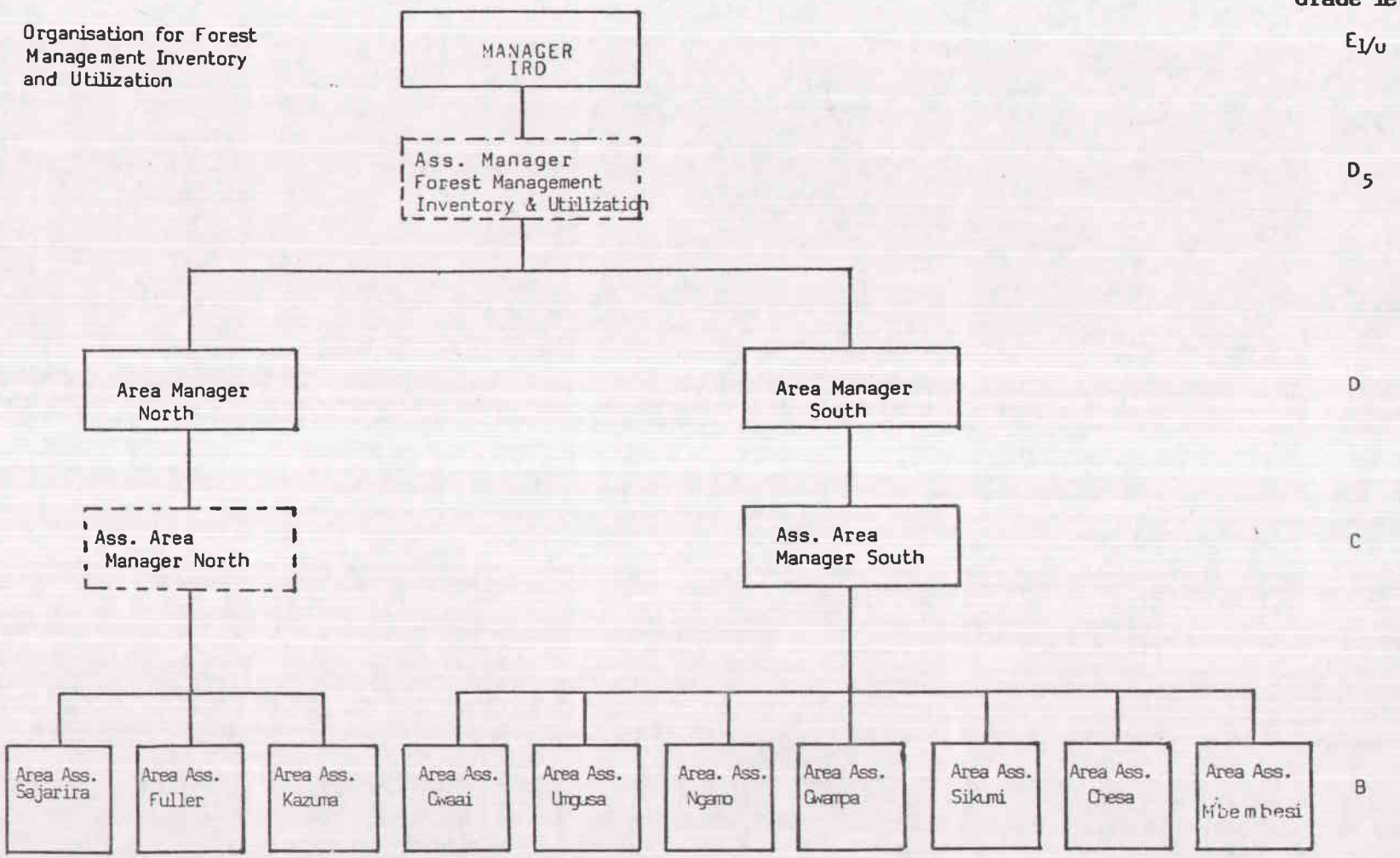


Chart C : Organization for Tourism

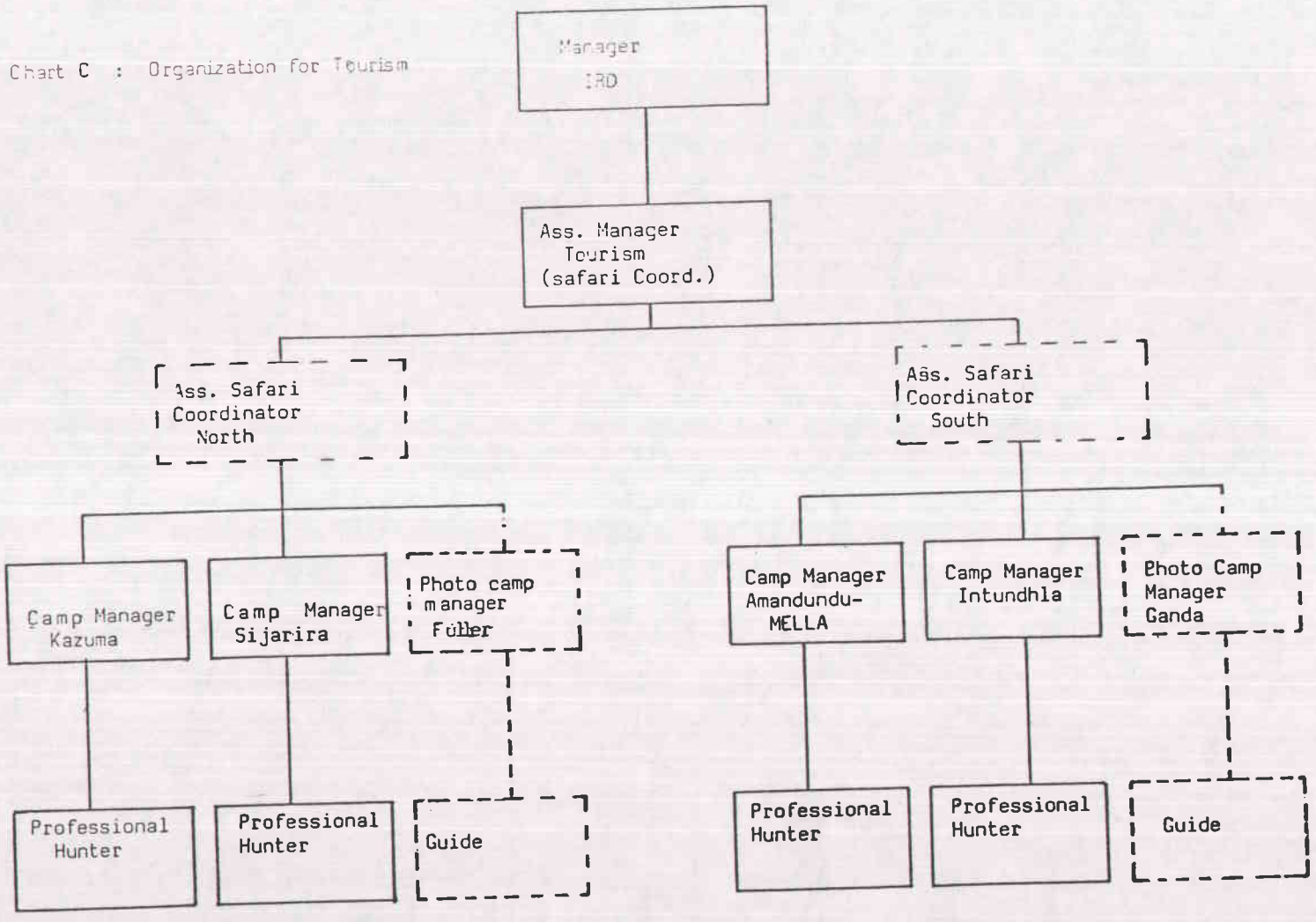


Chart D : Organization for Wildlife and Range Management