Appendix III

INVENTORY OF QUESTIONS FOR FORMAL INTERVIEWS HELD WITH:

A: AREX, DEPARTMENT OF NATURAL RESOURCES AND FORESTRY COMMISSION OFFICIALS

1. Is deforestation a serious problem in Mufurudzi resettlement scheme?
2. Which villages/ areas are worst affected by deforestation?
3. If deforestation is a serious problem in the area what would do you consider as its main causes? If it is not a serious problem explain why it isn't.
4. Who is responsible for enforcing the legislation that controls deforestation and which laws are applicable?
5. In Mufurudzi, how many people have been prosecuted or evicted for wanton destruction of trees since 1981? If none why?
6. To what extent are farmers in Mufurudzi resettlement scheme consulted when forest and woodland conservation projects are developed or implemented?
7. Which forest related programmes and/ or projects have been implemented in the scheme since 1981and what have been their successes and main constraints?
8. Which methods of community participation have you employed in conservation projects?
9. Who is responsible for co-coordinating conservation projects in the area?
10. What solutions do you suggest for problems related to loss of forest and woodland cover?
11. Which are the main institutions involved in the conservation of natural forest in the area?
12. What mechanisms exist, regarding power sharing, resource governance, responsibility and decision-making in management of natural forest and woodland resources?
13. What trends are observable about:
    a. Livestock populations?
    b. Human population?
14. Does your department have any Community-Based Natural Resource Management Programmes? If it does not have these programmes, what are the reasons for that? If it has CBNRM programmes, what are the main activities and constraints of these programmes?

B: HOUSEHOLDS INTERVIWED DURING LIVELIHOOD ANALYSIS

1. When were you resettled?
2. Where did you use to live before you were resettled?
3. In what way has resettlement changed your life?
4. What assets did you bring with you when you were first resettled?
5. What assets have you managed to acquire as a result of resettlement?
6. How did you manage to acquire these assets?
7. In what way has the current drought affected your household?
8. How are you coping with the drought?
9. How are the current economic hardships affecting your household?
10. How is the household coping with the hardships?
11. In what way does your household rely on forest and woodland resources to cope with the present drought
    and economic hardships?

Appendix IV

Distribution of Keystone Species in Mufurudzi Resettlement Scheme

KEY

I- Mufurudzi II
II- Mupedzanhamo
III- Zvataida
IV- Mudzinge
V- Principe A
VI- Principe B
VII- Chidumbwe II
VIII- Chidumbwe I
POP- Tree Population
NODT- Number of damaged trees

L. discolor

Species	Population	Distance from Homestead	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree	POP	0-100	3	0	0	0	0	0	0	0	3	
	NODT		3	0	0	0	0	0	0	0	3	100
	POP	101-200	1	4	0	0	0	0	0	0	5	
	NODT		1	2	0	0	0	0	0	0	3	60
	POP	201-300	1	1	1	0	1	2	0	0	6	
	NODT		1	1	0	0	1	0	0	0	3	50
	POP	301-400	0	1	0	0	0	0	0	0	1	
	NODT		0	0	0	0	0	0	0	0	0	0
	POP	401-500	3	4	1	0	2	0	0	0	10	
	NODT		2	2	0	0	0	0	0	0	4	40
Total	POP		8	10	2	0	3	2	0	0	25	
Total	NODT		7	5	0	0	1	0	0	0	13	
		% Damage	87.5	50	0	0	33.33 333	0	0	0	52	

B. boehmii

Species Population	Distance from Homestead	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree POP	0-100	0	25	0	13	10	6	0	0	54	
NODT		0	24	0	13	4	1	0	0	42	77.778
POP	101-200	5	17	6	0	10	8	4	2	52	
NODT		5	15	4	0	3	7	4	2	40	76.923
POP	201-300	13	13	3	0	16	10	0	2	57	
NODT		13	10	1	0	9	5	0	1	39	68.421
POP	301-400	24	15	1	0	12	13	2	0	67	
NODT		23	10	1	0	3	7	0	0	44	65.672
POP	401-500	32	14	4	4	6	15	1	1	77	
NODT		32	7	1	4	4	10	0	0	58	75.325
Total POP		74	84	14	17	54	52	7	5	307	
Total NODT		73	66	7	17	23	30	4	3	223	72.638
		98.649	78.571	50	100	42.593	57.692	57.14	60		

J. globiflora

Species Population	Distance	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree POP	0-100		0	1	0	0	9	2	4	0	16	
NODT			0	1	0	0	1	0	4	0	6	37.5
POP	101-200		0	2	1	0	1	0	0	0	4	
NODT			0	2	1	0	0	0	0	0	3	75
POP	201-300		0	3	1	0	7	4	0	0	15	
NODT			0	3	1	0	0	0	0	0	4	26.66667
POP	301-400		2	1	2	0	6	15	0	0	26	
NODT			2	1	1	0	0	3	0	0	7	26.92308
POP	401-500		1	7	0	0	2	2	0	0	12	
NODT			1	2	0	0	0	0	0	0	3	25
Total POP			3	14	4	0	25	23	4	0	73	
Total NODT			3	9	3	0	1	3	4	0	23	
				64.28				13.04			31.50	
	% Damage		100	571	75	0	4	348	100	0	685	

T. sericea

Species Population	Distance from Homesread	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree POP	0-100	7	1	1	0	0	0	0	0	9	
NODT		7	1	0	0	0	0	0	0	8	88.88889
POP	101-200	6	0	0	0	0	0	1	1	8	
NODT		4	0	0	0	0	0	1	1	6	75
POP	201-300	1	0	1	0	0	1	2	8	13	
NODT		1	0	1	0	0	0	2	4	8	61.53846
POP	301-400	0	0	0	0	3	0	0	0	3	
NODT		0	0	0	0	0	0	0	0	0	0
POP	401-500	0	0	0	1	0	0	4	0	5	
NODT		0	0	0	1	0	0	2	0	3	60
Total POP		14	1	2	1	3	1	7	9	38	
Total NODT		12	1	1	1	0	0	5	5	25	
% Damage		85.71	100	50	100	0	0	71.42	55.55	65.78	
		429						857	556	947	

T. stenostachya

Species Population	Distance	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree POP	0-100		0	0	2	2	5	0	3	0	12	
NODT			0	0	2	1	1	0	3	0	7	58.33333
POP	101-200		0	1	3	0	5	0	0	2	11	
NODT			0	0	1	0	1	0	0	0	2	18.18182
POP	201-300		2	0	8	0	2	0	2	0	14	
NODT			2	0	2	0	0	0	0	0	4	28.57143
POP	301-400		0	2	4	0	1	0	1	0	8	
NODT			0	2	2	0	1	0	0	0	5	62.5
POP	401-500		0	0	7	7	5	0	2	0	21	
NODT			0	0	2	1	1	0	0	0	4	19.04762
Total POP			2	3	24	9	18	0	8	2	66	
Total NODT			2	2	9	2	4	0	3	0	22	
				66.66		22.22	22.22				33.33	
% Damage			100	667	37.5	222	222	0	37.5	0	333	

D. kirkii

Species Population	Distance from Homestead	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree POP	0-100		2	0	2	0	0	0	0	0	4	
NODT			2	0	2	0	0	0	0	0	4	100
POP	101-200		3	2	3	0	2	1	0	0	11	
NODT			3	1	2	0	2	1	0	0	9	81.81818
POP	201-300		0	3	6	0	1	5	0	4	19	
NODT			0	3	6	0	1	1	0	3	14	73.68421
POP	301-400		0	0	1	2	3	2	0	0	8	
NODT			0	0	1	2	2	1	0	0	6	75
POP	401-500		0	1	1	2	2	0	0	1	7	
NODT			0	1	0	1	1	0	0	1	4	57.14286
Total POP			5	6	13	4	8	8	0	5	49	
Total NODT			5	5	11	3	6	3	0	4	37	
				83.33	84.61						75.51	
	% Damage		100	333	538	75	75	37.5	0	80	02	

D.cenerea

Species Population	Distance	I	II	III	IV	V	VI	VII	VIII	Total	% Damage
Tree POP	0-100		8	0	1	0	1	1	25	0	36	
NODT			8	0	0	0	0	0	3	0	11	30.55556
POP	101-200		1	2	1	0	0	1	24	0	29	
NODT			1	2	0	0	0	0	6	0	9	31.03448
POP	201-300		1	1	2	1	0	0	6	0	11	
NODT			1	0	0	1	0	0	2	0	4	36.36364
POP	301-400		1	0	0	0	1	1	0	0	3	
NODT			1	0	0	0	0	0	0	0	1	33.33333
POP	401-500		0	0	0	0	1	1	1	0	3	
NODT			0	0	0	0	0	0	0	0	0	0
Total POP			11	3	4	1	3	4	56	0	82	
Total NODT			11	2	0	1	0	0	11	0	25	30.4878
				66.66							30.48	
	% Damage		100	667	0	100	0	0	19.64	0	78	

Appendix V

Name of Transect	**Mean Tree Spacing Along Transect (MSFT)**
Chidumbwe I	5.2
Chidumbwe II	6.8
Mudzinge	3.9
Mufurudzi II	4.0
Mupedzanhamo	2.9
Zvataida	3.6
Principe A	2.0
Principe B	2.3

Appendix VI

Glossary of Tree Species

Tree species

Botanical Name	**Common Name**	**Shona (*Kore-Kore*) Name (s)**
Acacia spp.		Muunga, Muzunga, Mubayamhondoro
Adonsonia digitata	Boabab	Muuyu
Afzelia quansensis	Pod Mahogany	Mukamba
Albizia amara		Muora
Aloes		Gavakava
Annona senegalensis	Wild Custard-Apple	Muroro
Bauhinia petersiana		Mung'ando
Bauhinia thonningii (Piliostigma thonningii)	Monkey Bread	Mutukutu
Berchemia discolor		Munyii
Brachystegia boehmii	Mufuti	Mupfuti
Brachystegia glaucescens	Mountain Acacia	Muunze
Brachystegia spiciformis		Musasa
Breonadia salicina (Adina microcephala)		Muonya
Bridelia mollis		Mutsvitsviriondo
Burkea africana		Mukarati
Cassia spp	Sjambok Pod	Murumanyama; Kasokosoko; Nyamatevere
Colophospermum mopane	Mopane	Mupani
Combretum fragrans		Mudembere

Combretum imberbe	Leadwood	Muhweti; Muchenarota
Combretum molle	Velvet Bush Willow	Mugodo
Commiphora spp.	Corkwood	Gwatikwati
Crossopteryx febrifuga	Sand Crown Berry	Mukombigo
Dalbergia melanoxylon	Blackwood; Zebrawood	Murwiti
Dalbergia nyasae	Mane-Pod	Musvovanyoka
Dichrostachys cinerea		Mupangara
Diospyros kirkii		Muchenje
Diplorhynchus condylocarpon	Horn-Pod	Mutowa
Englerophytum magalismontanum		Muhorongwa
Erythrina abyssinica		Mutiti
Euclea divinorum	Magic Guarri	Mushangura
Ficus spp.		Muonde; Mutsamvi
Flucortia indica		Munhunguru
Flueggea virosa (Securinega virosa)		Musosote
Friesodielsia obovata	Savana Dwaba-Berry	Mushingashinga
Garcinia buchananii	Granite Garcinia	Mutunduru
Garcinia livingstonei	African Mangostein	Muhorongwa
Gardenia volkensii		Mutara
Hexalobus monopetalus	Shakoma Plum; Baboon Breakfast	Mukwingwiziri
Gymnosporia buxifolia (previously known as *Maytenus heterophylla*)		Munganganga
Julbernardia globiflora		Munhondo
Kigela africana		Mubvee
Kirkia acuminata		Mutuwa; Mubvumira
Lannea discolor		
Lonchocarpus capassa	Raintree	Mupandapanda
Margaritaria discoidea (Phyllanthus discoedeus)		Muteyahanga
Ormocarpum kirkii		Mupotanzou
Ozoroa insignis		Mugaragunguo
Parinari curatellifolia		Muhacha; Muchakata
Pavetta schumannianna	Poison Bride's Bush	

Pericopsis angolensis	Afromosia	Muvanga
Pseudolachnostylis maprouneifolia		Mutoto
Psorospermum febrifugum		Muparadzamusha
Pterocapus angolensis	Mukwa, Bloodwood	Mubvamaropa
Rauvolfia caffra	Quinine tree	Muonya
Terminalia sericea		Mujoki
Terminalia mollis		Mususu
Sclerocarya birrea		Mupfura; Musomo
Steganotaenia araliacea		Mupomboshori
Sterculia quinqueloba		Mungoza
Strychnos cocculoides	Monkey Orange	Muzhumwi
Strychnos pungens	Spine Orange	Mukwakwa
Strychnos spinosa	Green Monkey Orange	Mutamba
Swartzia madagascariensis	Snake bean	Mucherekesa
Syzygium cordatum	Water Berry	Mukute
Syzygium guineense	Water Pear	Mukute
Uapaca kirkiana		Muzhanje
Vangueria infausta		Munzviru
Vangueria lanciflora		Mutufu
Vitex payos		Mutsubvu
Xeromphis obovata (Catunaregam spinosa)		Chibayamakono
X. americana		Mutsvanzva
Ximenia caffra		Mutsvanzva
Ziziphus mauritiana		Musawu
Ziziphus mucronata	False Buffalo Thorn	Muchecheni

Appendix VII

Table 5.10: Seasonal Calendar for Different Activities Carried Out in Mufurudzi Resettlement Scheme

A: Land clearing, cultivation, fencing

Activities/ Processes	**Nature of Activity/ Process**	**Forest and woodland resources used or destroyed and methods used**	**Time of year/ season the activity or process is carried out and reason for doing so**
Clearing land for cultivation		Wholesome and non-selective destruction of vegetation using hand held tools such as axes, picks and mattocks as well as fire for slash and burning	Winter (June-August), before the rain reason to ensure minimal disruption of farming. Fire is much easier to use during this time of the year while cut trees dry more quickly in the prevailing dry weather
Fencing	Households	Termite resistant species such as *Pericopsis angolensis, Terminalia molle, T. imbebe, Colophospermum mopane* are mostly used while *Lannea discolor* and Commiphora spp. are the preferred species for live fencing	Winter, when household chores are fewer
	Gardens and fields	Thorny trees such as *Acacia spp., Xeromphis obovata (Catunaregam spinosa)* and *Dichrostachys cinerea*	All year round but mostly in winter when it is necessary to prevent damage of leaf vegetables by livestock that will be facing serious shortage of graze and browse

B: Firewood collection

Activities/ Processes	**Nature of Activity/ Process**	**Forest and woodland resources used or destroyed and methods used**	**Time of year/ season the activity or process is carried out and reason for doing so**
Fuel wood collection	Household firewood	A wide range of species is exploited using hand held tools. Dry twigs and branches of already felled trees are gathered and bundled and transported on head, usually by women, while bulky collection from distant places may require ox-carts	Where abundant firewood is opportunistically collected since it takes little time to gather. In areas of scarcity firewood is collected, usually in the dry season (June-October), and stockpiled to ensure that the collection does not interfere with farming activities
	Firewood for tobacco curing	Bulky wood from *Brachystegia boehmii, Acacia spp.* and *Combretum fragrans,* which is usually freshly cut, though dry wood is required for kindling (The collection is as noted above)	Summer (January-April), since tobacco needs to be cured soon after harvesting to ensure that its quality is not compromised
	Brick burning	*B. Boehmii, J. globiflora* and *Acacia spp.* are usually preferred The collection is as noted above, though logs may be tugged individually or in bunches using cattle or donkeys	Winter, when atmospheric humidity is low and chances of damage by rain are minimal.

C: Weaving

Activities/ Processes	**Nature of Activity/ Process**	**Forest and woodland resources used or destroyed and methods used**	**Time of year/ season the activity or process is carried out and reason for doing so**
Weaving			
	Basketry	Reeds, illala palm, and wild sisal are used. Raw materials are collected through different methods but mostly by hand held tools such as pen knives and axes	All year round, but mostly done in winter when more important household chores such as farming are minimal. However, weaving may also be done in summer during the night or on traditional rest days (*Chisi*).
	Bark cloth weaving (hats and bags)	*Brachystegia boehmii,* whose fibre is stripped with the aid of hand held tools and softened before it is spun into twine and woven into cloth	The same as above
	Mats	Reeds for sleeping mats and wild sisal for door and floor mats, usually collected with the aid of hand held tools. In the case of sleeping mats, where reeds are required in large quantities raw materials may be transported by ox-drawn carts	Sleeping mats may be produced and sold all year round. In some villages livelihoods of specialized weavers now depend more on weaving than on farming.

D: Other activities

Activities/ Processes	**Forest and woodland resources used or destroyed and methods used**	**Time of year/ season the activity or process is carried out and reason for doing so**
Hut construction	Wide range of species are used for construction as already mentioned above. Hand held tools, especially axes, are used for cutting poles	Though pole and rope fibre can be collected and stockpiled all year round the actual construction is mostly undertaken during the dry season (June-October) when labour is more readily available due to fewer household chores
Fruit collection	Many species are source of fruit as already mentioned above. In some cases, though rarely, trees may be cut during collection.	Fruits are collected opportunistically (as dietary supplement) all year round, depending on type.
Caterpillar collection	Depending on species these NTFPs are normally gathered from *C. mopane, B. boehmii, J. globiflora, Diospyros kirkii* and *Diplorhynchus condylocarpon.* The branches of the above trees are usually pollarded during collection	Opportunistic collection in summer.

Appendix IX

Uses of Trees in Mufurudzi

A: Dyes Produced From Indigenous Trees

Species from which dye is derived	**Source of dye**	**Colour of dye**
Hexolabus monopetalus	Bark	Blue-black
Annona senegalensis	Bark	Yellowish brown
Parinari curatellifolia	Bark	Brown and pink
Pterocarpus angolensis	Bark	Brown
Berchemia discolor	Bark and roots	Bluish
Bauhinia thonningii	Bark, fruit and roots	Red, blue, black (depending on source)
Lannea discolor	Bark	Red
Sclerocarya birrea	Bark	Brown

B: Medicinal Value of Trees in Mufurudzi

Species	**Type of Medicinal/ Magical Use**	**Method of Preparation/ Application**
Lannea discolor	Treatment of bone fractures in both people and animals	Bark is tied around the fracture and secured by wooden supporters to keep it in place
	Treatment of stomach ailments and sexually transmitted infections (STIs)	Bark is soaked in water and the decoction taken orally
Lonchocarpus capassa	Tooth aches	Decoction from boiled bark gurgled while still warm
	Treatment of *Chihumbe* (dilation of anal muscles)	Bark is pounded and soaked in water and directly applied to the anus.
Gymnosporia buxifolia (previously known as *Maytenus heterophylla*)	Aphrodisiac	Dried roots are pounded with roasted maize and then added to sweet beer or tea. Additives from other trees like *B. thonningii* enhance sexual performance
	Treatment of diarrhoea (in children)	Roots are mixed with bark or roots of *Lannea discolar* and administered orally, by adding the medicine to food

Annona senegalensis	Aphrodisiac	Leaves or roots are boiled with trotters and eaten for fertility enhancement
	Treatment of coughs and colds	Roots are mixed with those of *Diplorhynchus condylocarpon* and dried and then ground to powder which is added to porridge
Bauhnia thonningii	Aphrodisiac	Roots from opposite sides of the plant are dug out and boiled to produce *mungangaringa*, a potency enhancement portion that heightens libido in men
	Treatment of STIs	Decoction from roots is taken orally
Cassia spp. (*Nyamatevere* or *Kasokosoko* in Shona)	Treatment of STIs (infections contracted by men who have had sexual intercourse with a mensurating women)	Roots are mixed with those from *B. thonningii* and boiled to produce a decoction that is administered orally.
	Aphrodisiac	Decoction from boiled pounded roots can be taken by both sexes for fertility enhancement
	Elimination of endoparasites (in children)	Decoction from boiled pounded roots is administered orally. For better results the roots may be combined with those from *Xeromphis obovata*
Zanha Africana	Treatment of head aches, arthritis (*nyamakasi*), cancer (*muka*)	Dried roots are pounded and mixed with water and then applied to cuts (*nyora*) on painful areas. This multi-purpose plant is believed to have analgesic and anti-cacinogenic properties
Syzygium spp.	Treatment of tooth aches	Bark is boiled to produce a decoction that is gurgled while still warm. The bark should be collected from the eastern and western sides of the tree only
	Treatment of stomach pains	Decoction from boiled bark is administered orally
Ximenia caffra (*Mutsvanzva* in Shona)	Treatment of nose bleeding	Roots are pounded and mixed with a little water and then applied to the nose
	Treatment of anemia	Roots are mixed with those of *Pseudolachnostylis maprouneifolia* and water added to produce a decoction that is administered orally
Ficus spp. (Mutsamvi)	Reduction of constipation	The fruit acts as a laxative if eaten in sufficient quantities

Xeromphis obovata	Emetic	Fruit is mixed with water to produce an emetic used to induce vomiting when a person has been poisoned. It also helps to clear the throat when a person bitten by a snake is experiencing breathing difficulties
Sterculia quinqueloba	Luck charms used when one wishes to be acquitted for committed crimes	Informant refused to disclose mode of application
Steganotaenia araliacea	Luck charms for absolution from blame where one has completed a crime or a serious offence	Tufts of leaves from the branch ends are simply placed in the offender's pocket
Aloes	Treatment of STIs in humans, coccidiosis in chickens and elimination of worms in livestock	Leaves or roots are pounded and mixed with water and applied orally

C: The Sacred Trees of Mufurudzi

Species	**Use and Mode of Application**	**Expected Results and Cultural Beliefs**
Kirkia acuminata (Mutuwa/ Mubvumira)	Spiritual divination, involving the incarnation and "bringing home" the spirit of a member of the family who has died and has been buried in far away lands. The tree is planted around the home during a special ceremony meant to bring the spirit of the dead home	If the spirit of the deceased is appeased it will come home to rest and then it will be well with the family. If ceremony is not conducted the belief is that the family will always face misfortunes
Crossopteryx febrifuga (Mukombigo)	Witch hunting. Roots or bark are ground and mixed with roots from *B. thonningii* and then administered on subjects orally	Witches will fail to vomit and their stomachs swell, while quick death is inevitable
Gardenia volkensii	Girls who have reached puberty stage chant around the tree during a ritual ceremony for requesting enlargement of breasts	Request is normally granted magically by the tree

Parinari curatellifolia and *Adonsonia digitata*	Rainmaking and ancestral appeasement ceremonies are conducted under these trees	Rains are expected to fall and people will be spared from environmental hazards such as drought, outbreak of locusts and armyworms as well as related calamities
Julbernardia globiflora	Burial ceremonies. Branches of the plant are used to make biers	Appeasement of the dead
Pseudolachnostylis maprouneifolia	Burial ceremonies. The plant is used to sweep the grave soon after a burial ceremony has been conducted	Appeasement of the dead

D:Common Artifacts Produced From Forest and Woodland Products

Artifacts	**Species most preferred and used**
Baskets	Bamboo, reeds, illala palm, wild sisal, *Combretum spp*
Yokes and harnesses	*Terminalia sericea, T. mollis, B. boehmii, Julbernardia globiflora, Diospyros kirkii*
Curios, walking sticks, knobkerries, bows and arrows	*Breonadia salicina, Pterocarpus angolensis, Swartzia madagascariensis, Dalbergia melanoxylon, Erythrina abyssinica, Afzelia quanzensis, Diplorhynchus condylocarpon*
Grain mortars, bowls and plates	*Sclerocarya birrea, Kigela africana*
Cooking sticks and wooden spoons	*Crossoptery febrifuga, Diospyros kirkii*
Mats	Reeds, *Adonsonia digitata, B. boehmii*
Tool handles	*Diospyros kirkii, T. sericea, T. mollis, Garcinia buchananii*

E: Common Fruit Trees in Mufurudzi

Diospyros kirkii, Lannea discolor, Bridelia mollis, Parinari curatelifolia, Berchemia discolor, Strychnos spinosa, Stryschnos cocculoides, Strychnos pungens, Uapaca kirkiana, Screlocarya birrea, Ficus spp, Flucortia indica, Vitex payos, Ziziphus mauritiana, Hexalobus monopetalus, Flueggea virosa (Securinega virosa), Friesodielsia obovota, Vangueria infausta, V. lanciflora, Garcinia buchananii, G. livingstonei,

Bauhinia petersiana, B. thonningii (Piliostigma thonningii), Ximenia caffra, X. americana and *Syzigium spp.*

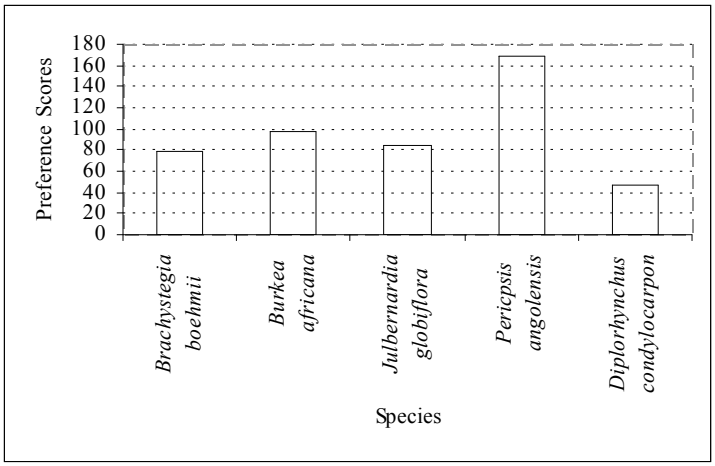
F: Other Mundane Uses of Trees

Species	**Use**
Bauhinia petersiana and *Dichrostachys cinerea*	Dried branches are used for ground water divining. Water divining is normally done when identifying ideal locations for sinking deep wells
Bauhinia thonningii	Leaves are used for baking. Dough is wrapped in the heat resistant leaves and placed in a pot that is laid on embers to produce the famous "matukutu buns", (named after "mutukutu", the Shona name for the species).
Diplorhynchus condylocarpon and Dalbergiella nyasae	Freshly cut branches and leaves are put on the fire and the smoke produced is blown over a bee colony in order to drug it during honey collection.
Commiphora spp.	Gum and fruit are crushed and mixed with water to produce a pesticide. Some species of *Commiphora* may be used to produce fire by friction, a practice which is now in rare use

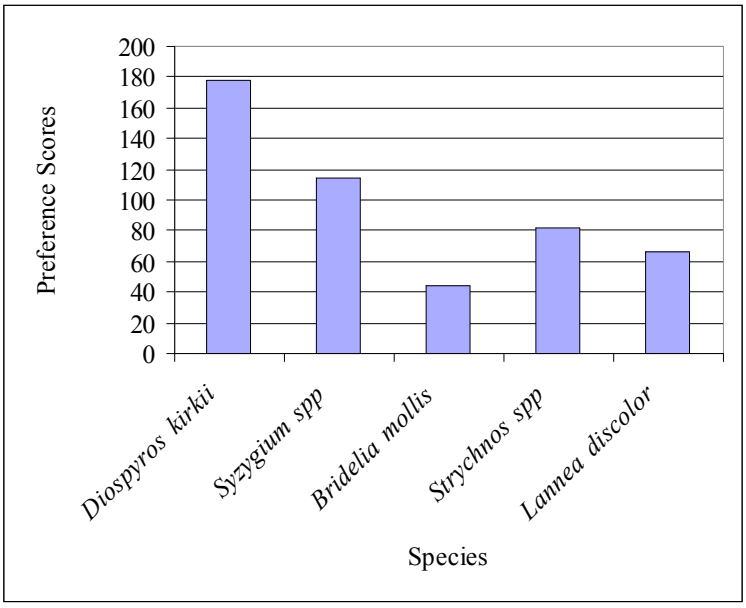
Appendix X

Preferred Trees

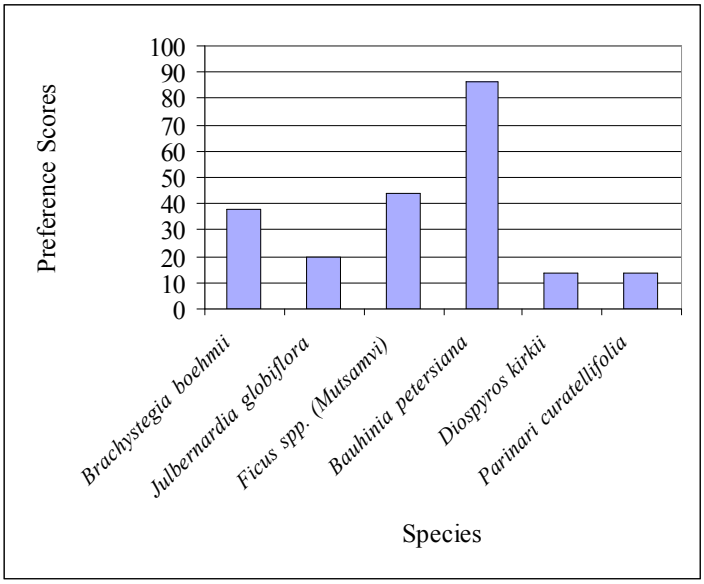
A: Species Preferred for Construction



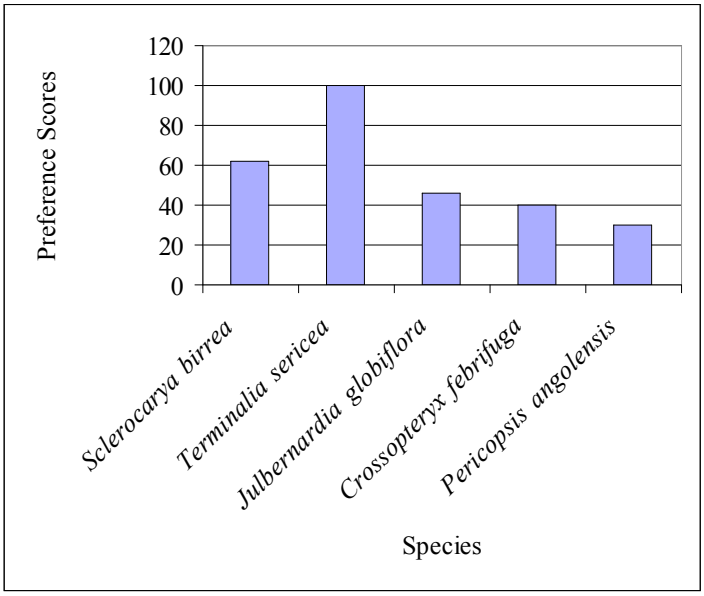
B: Most Preferred Indigenous Fruit Trees



C: Species Preferred for Shade



D: Species Considered as Most Economically Rewarding for Carving, Artifacts and Curios



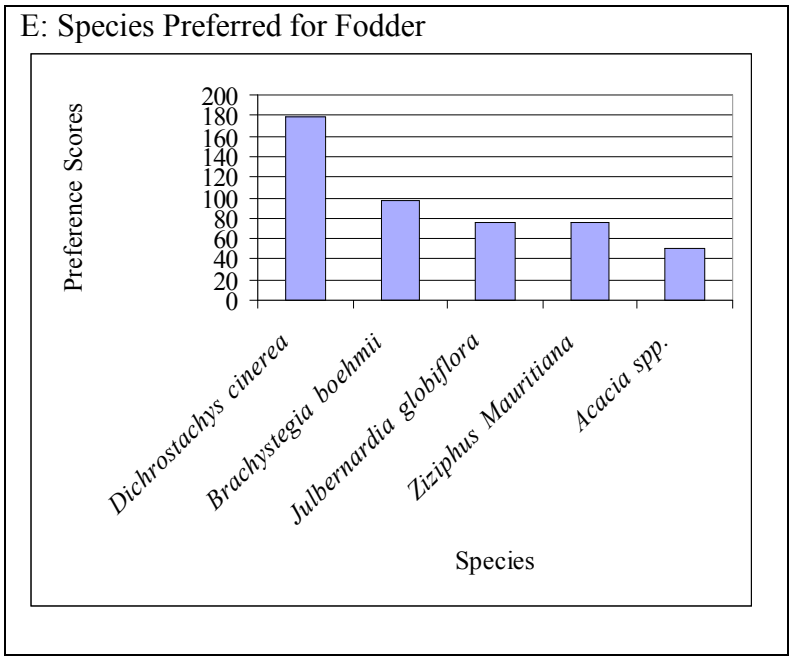


Table A: Conditions/ Reasons for Which Species are Preferred

Conditions	**Five most favoured species exhibiting the conditions**
Species that are easy to grow	*Lannea discolor, Ficus, Ziziphus mauritiana, Pterocarpus angolensis, Brachystegia spiciformis,*
Species that are widely available	*B. spiciformis, L. discolor, Julbernardia globiflora Bauhinia petersiana, Ficus*
Rapid growing species	*Lannea discolor, Commiphora spp, Ziziphus mauritiana, Pterocarpus angolensis, Brachystegia spiciformis*
Highly nutritious to humans	*Diospyros kirkii, Strychnos spp., Uapaca kirkiana, Flocurtia indica, Syzigium spp., Parinari curatelifolia*
Multi-purpose species	*Brachystegia spiciformis, Diospyros kirkii, Pericorpsis angolensis, Ficusspp., Julbernardia globiflora*
Species with coppicing capabilities	*Lannea discolor, Ficus, Ziziphus mauritiana, Pterocarpus angolensis, Brachystegia spiciformis, Bauhinia petersiana*
Species that are compatible with crops (minimal shading of crops)	*Lannea discolor, Dispyros kirkii, Brachystegia spiciformis, Pericopsis angolensis, Acacia spp.*

Table B: Tree Species That are Preferred for Specified Reasons

Reason for preference	Species	**Number of groups that gave the species the highest ranking**	**Number of groups that would prefer to grow the species for the reason given**	**Reason(s) for preference**
Easy to grow	*Lannea discolor* (Mumbumbu)	17	6	Species can be grown under adverse conditions and has multiple uses. It can be vegetatively grown in winter even when the soil if facing critical levels of moisture stress. The species is relatively abundant locally.
Species is widely available	*Brachystegia spiciformis* (Mupfuti)	15	13	An abundantly available multi-purpose species which can even be found on rock outcrops. The tree is in great demand for its quality firewood and fibre. The tree is also source of edible caterpillars.
Species grows rapidly	*Lannea discolor* (Mumbumbu)	15	1	As noted above can grow rapidly from truncheons to produce live fences around homesteads
Highly nutritious	*Diospyros kirkii* (Muchenje)	21	17	A multi-purpose tree that is perceived to be widely abundant. Species produces large quantities of fruit which ripens during times of food scarcity.
Multi-purpose use	*Brachstegia spiciformis* (Mupfuti)	14	4	Main source of building materials, firewood and rope fibre
Coppicing capabilities	*Brachstegia spiciformis* (Mupfuti)	15	3	Species can coppice soon after damage while samplings grow and mature quickly
Compatibility with crops	*Lannea discolor* (Mumbumbu)	17	6	Species can be grown under adverse conditions and has multiple uses. Narrow crown and low leaf surface area minimize crop shading.

Appendix XI

Historical Changes in Mufurudzi Resettlement Scheme

In italics is the verbatim account of the events that took place in Mudzinge village between 1981 and 2002, as told by the villagers themselves, while the English translation is in parenthesis. The case of Mudzinge is a microcosm of the historical and environmental processes that have affected Mufurudzi resettlement scheme as a whole. The accounts that emanated from the other seven villages that were surveyed within this scheme were similar to that recorded in Mudzinge. The events that took place were recorded in Shona, a vernacular language in Zimbabwe.

Women's account of historical events

Source: Chisvo, R. and Madzudzo, L. (2001) *Nhoroondo Yekusvika Kwedu muMudzinge*: The History of When we Arrived Here in Mudzinge (Unpublished)

Nguva (Date):*Zvatakaita* (What we did/ Historical events)

1981: *Sango* (Bush was prevalent). *Takagobora miti* (We cleared the trees by destumping). *Takavaka dzimba dzemiti* (We built pole and dagga huts)

1982: *Takaita group remadzimai eclub, rakaita group rekuchengeta huku, rimwe rekuita zvekubika mabuns, rimwe rekuita zvekuchengeta mari, rimwe rikaita gadheni taita nzara*. (We formed a number of women clubs, one for poultry farming, another for baking, and yet another for gardening so as to cope with food shortages).
Mubatanidzwa wekubatsirana parufu (We also started a bereavement fund)

1982-1983: *Takavaka zvikoro primary* (We built a primary school)

1984: *Vanhu vakawana zvakawanda* (We had good harvests)
Takavaka danga (We built cattle pens)
Takachera tsime (We dug a well)
Takarima munda webeans (We planted a communal bean field)
*Takapiwa masimende ematoilet ne*DAPP (We received a donation of cement bags from DAPP for the construction of communal toilets)
Vecensus vakatanga kushanda nesu vachitipa mbeu dzemugarden (We received donations of vegetable seeds)

1984-1985: *Vanhu vakapiwa ngoro nemombe* (We received donations of cattle and ox-drawn carts)

1983-1986: *Takavaka secondary* (We built a secondary school)
Vanhu vakarima beans (We grew beans in a communal field)

Taikaita chokoro chevakuru (We embarked upon adult literacy project)

1986: *Takapiwa chikwereti chedzimba* (We were given housing loans)
Kwakauya hwiza (There was an outbreak of locusts)

1987: *Vanhu vakapiwa mukaka ne*beans (We received food donations, including beans and milk)

1987-1995: *Takabatsirwa ne*phone (A telophone link was introduced)

1992-1993: *Kwakaita nzara* (There was severe drought)
Mombe dzakarova nekuda kwemvura (Many cattle died because of shortage of water)

1995: *Kwakauya makonye* (The was an outbreak of armyworm)

1993-1996: *Takayamurwa nembeu, nzungu,* fertlizer (We received donations of seed and fertilers)

1996: *Takatanga kusimuka vanhu vose, kusimuka kwevanhu vachiva nema*solar (Our livelihoods started to improve, and some people could even afford to buy solar panels)

1995-2001: *Kwakava nechirongwa chekuvaka chipatara* (A clinic was built)

2000: *Kwakava nezvemasabhuku* (Village heads were introduced)

Men's account of historical events

Source: Chipoyera, J. and Kambeu, F. (2001) *Nhoroondo Yekusvika Kwedu muMudzinge:* The History of When we Arrived Here in Mudzinge (Unpublished)

Nguva (Date) Zvatakaita (What we did/ Events)

1981: Musasa (We built temporary shelters)
Kutema miti kuvaka (Land was cleared and huts were constructed)
Koghobora minda (Fields were cleared. Trees were destumped in the process)
Kwakarimwa nekupihwa fetereza (Donations of fertilizers were received and people started farming)
Chibhorani (A borehole/ well was sunk)

1981-1984: *Takaita zvikwata pakurima* (co-ops) (Farming co-operatives were formed)

1982: *Kubikwa kwedoro remvura* (A rainmaking ceremony was conducted)

Kufomwa kwemishandirapamwe (Co-operatives were formed)

1983: *Kaseke, chigayo netuckshop* (A grind mill and a tuckshop were introduced)

1984: *Kuvakwa kwezvikoro* (Schools were built)
Tsetse kumombe (There was an outbreak of tsetse fly)
Mvura mombe kumine (There was a drought and Madziwa mine help us by giving water to our cattle)
AFC *kupa zvikwereti* (Agricultural loans were received from the Agricultural Finance Co-operation)

1984-1985: *Kurima kuwana* (Harvests were good)

1984-1987: *Kuvakwa kwemapadhoki* (Paddocks/ grazing schemes were introduced)

1985: *Kuchererwa mvura nemine* (There was drought and the Madziwa mine helped us with water)

1985-1986: *Takapiwa newelfare kudya* (We received food aid from the Department of Social Welfare)

1986: *Mhondoro kudya zvipfuyo zvakagadziriswa kumidzimu yegame vachizo dzivirira* (Our livestock were attacked by lions. Ancestral spirits were consulted while the Department of National Parks and Wildlife Management came with assistance)

1986-1988: *Kupegwa kwedemu, harinakuvakwa* (An earth dam was pegged, though its construction is still pending)

1985-1994: *Zvikwereti zvedzimba kuvaka* (Housing loans were received)

1987: *Kuvakwa kweMadziwa* Mine Secondary School (Madziwa Mine Secondary School was built)
1992: *Kuomerwa pakurima, kusabhadhara zvikwereti* (A severe drought occurred. Many failed to pay back government loans)

1994: *TV nemasola* (Some people bought TV sets and solar panels)

1994-1995: *Pfumvu nemakonye kumbeu* (Outbreak of the armyworm)

1997: *Hwiza mudunhu* (Outbreak of locusts)

1997-2000: *Kuvakwa kweTakawira* clinic (Takawira clinic was built)

1998: *Kurima fodya* (Tobacco farming started)

2000: *Kugadzwa kwemasabhuku* (Village heads were appointed)

Appendix XII

Notes on Survey Techniques Used

The Point Centre-Quarter Method

The Point Centre-Quarter Method (PCQM), a plotless ground survey method (Goldsmith and Harrison, 1976), was employed in the actual collection of data on tree resource distribution. Plotless methods for determining vegetation changes and relative abundance of species have been highly recommended by the Indian Joint Forest Management Guide (Poffenberger *et al*, 1992). The PCQM, which is commonly used for assessing rangelands (Olang, 1984), involves the use of a sampling frame that has two arms that are outstretched at right angle to one another, thus forming a cross.

From the homestead boundary a 50 metre measuring tape was stretched along the surveyed routes or tracks. In all cases transects were approximately five metres away from the actual paths along which people move. Two advantages were reaped from this. First, it helped to maintain the course of the track during the survey, as the track could easily be viewed from this distance. Second, it minimized the chances of recording errors than would otherwise have resulted had transects been established along the actual paths themselves. This is because the some of the tree resource damage that would have been recorded would otherwise have simply resulted from the widening of the track to allow better movement rather than from the actual use of forest and woodland products. In order to avoid bias, pairs of single digit random numbers were assigned to each of the surveyed transects to determine which side of the path the transect would follow. Where

the first digit was the smaller number the line of survey (transect) would be on the left side of the track and vice versa.

The point centre-quarter sampling frame was placed equidistantly at sampling points that were set up at every tenth metre point. To ensure consistency in data collection one of the axis of the sampling frame was always aligned to the line of transect. Ranging poles were used to mark the sampling points. Data about the distance between each point and the closest tree, as well as the size (basal diameter or girth) and state of the tree (state of damage) were collected within each quarter of the frame.

A *Garming Global Positioning System (GPS III Plus)* was used to determine the co-ordinates of points of inflection along each transect, where the orientation of transect changed, while a *Voyager 9020 Silva 1-2-3 System* compass was used to determine the bearing of the succeeding transect segments that immediately followed the points of inflection, that is any points where direction changes down the transect. It was necessary to geo-reference the actual locations of the surveyed transects for purposes of mapping, validation, and future monitoring. Data base files from the GPS readings were converted to Arc View shape files which were used to map the transects. All mapping was done on the Class 1950 projection which is used for topographic mapping in Zimbabwe. Overlays of the transect files and geo-referenced scanned aerial photographs and satellite images provided means for augmenting forest and woodland resource analyses.

The distance of the nearest tree from the designated sampling points was measured within each quarter of the sampling frame using another 50 metre measuring tape. This was achieved by stretching a measuring tape from the ranging poles that were "pitched" at the sampling points to the nearest tree within each quarter of the sampling frame. According to the PCQM, the area occupied by the nearest tree is calculated by squaring the distance between the sampling point and the tree.

Tree girth or diameter was measured at the base of the trees using a diameter tape. Where multi-stemmed woody species such as shrubs were encountered it was the distance and diameter of the largest stem that were considered if branching started below or close to the ground surface. Three textbooks were used as field guides for tree species identification. These include (1) Field Guide to Trees of Southern Africa by Van WYK and van WYK (1997), (2) Common Trees of the Central Watershed Woodlands of Zimbabwe by Drummond (1981), and (3) Trees of Southern Africa by Palgrave and Palgrave (2002). Both the vernacular and scientific names of species were recorded (see Appendix VI). The vernacular names were recorded in *Kore-kore* dialect, the main Shona dialect spoken in the area. The details of the surveyed transects are summarized in table 3.5 below. The sampling points where the average of the distances between the sampling point and the nearest trees exceeded thirty metres were considered as bare.

Willing village elders and community leaders provided information on species type and use, as well as major land uses that occur along the surveyed transects, thus ensuring a

participatory approach to data collection. In villages such as Principe A, Mudzinge and Zvataida village heads agreed to be incorporated into the survey team.

The actual spatial variations of vegetation characteristics were analyzed through a number of methods. First, there was need to determine whether the spacing of trees varied with distance from homesteads. To achieve this, line graphs, bar graphs and scatter graphs (scatter plots, according to Kitchin and Tate, 2000), were plotted, using a Microsoft Excel package, while other data were presented in form of tables. Scatter graphs simply related the spacing of trees to the distance from households. Line graphs were used to reveal patterns of tree densities and how these densities varied with distance from homesteads.

However, the bar graphs showed the manner in which the mean spacing for all trees along any given transect (MSFT) differed from the mean tree spacing at individual sampling points (MSSP) along that transect. In this respect the MSFT was taken to be the average of the distances of all the measured trees from their respective sampling points, along the entire transect, while the MSSP was simply the average of tree spacing at specific sampling points along the transect, that is the average for four trees only. For any one transect, the MSFT value was subtracted from MSSP values for each sampling point and the differences were plotted on a graph. This approach provided the means by which transitions of different zones of vegetation cover were detected in geographical space. Transitions were taken to be those areas where positive values gave way to negative values and vice versa. In most cases transitions corresponded with the margins of zones

of differentiation within vegetation cover, where more closed vegetation cover grades into relatively more open woodland and vice versa. The general assumption held in this case was that if the intensity of forest exploitation decreases with distance from homesteads then the density of tree cover should increase with distance from homesteads and vice versa. A derivation of this assumption is that if trees are evenly distributed within the woodland then there would be no difference between the MSFT and MSSP values at any point along the transect.

Conversely, differences between MSFT and MSSP values reflected variability of tree density within the woodland. In this analysis, positive values on the graphs denoted that the MSSP is greater than the MSFT, signifying tree dispersion while the converse is true for negative values. Thus, positive values depicted areas of relative sparse vegetation cover, where tree densities were less than the average density for the transect as a whole, and vice versa.

In order to determine the extent to which tree girth varied with distance from homesteads, the average base diameter values for specific tree species were computed for every hundred metre change of distance along the transect and the values so obtained were compared, using Microsoft Excel plotted graphs and tables. The general expectation was that there would be no noticeable spatial variation in average tree diameters for those species that are of little value to the communities as such trees are rarely used or damaged. Similarly, the spatial variation for the average diameters of trees that receive special protection from the resource users, that is the local community, is unlikely to be

insignificant. This would apply for both fruit and sacred trees or trees that occur in sacred gloves, which local communities rarely cut. On the other hand, the diameters of tree species that are subjected to intensive use by the local community are likely to vary considerably with distance from homesteads. The number of damaged trees was recorded for each species type and tree size and the percentage of damaged trees for different species computed for different ranges of distance along each transect.